```
L        ASSEMBLY AND OPERATION INFORMATION                                   USER'S PAGE NO.   1

R000001

R000002 ***********************************************************************
R000003 *                                                                     *
R000004 *            THIS AGC PROGRAM SHALL ALSO BE REFERRED TO AS:           *
R000005 *                                                                     *
R000006 *                                                                     *
R000007 *                           COLOSSUS 3
R000008 *                                                                     *
R000009 *                                                                     *
R000010 *         THIS PROGRAM IS INTENDED FOR USE IN THE CM AS SPECIFIED    *
R000011 *         IN REPORT R-577. THIS PROGRAM WAS PREPARED UNDER DSR        *
R000012 *         PROJECT 55-23890, SPONSORED BY THE MANNED SPACECRAFT
R000013 *         CENTER OF THE NATIONAL AERONAUTICS AND SPACE                *
R000014 *         ADMINISTRATION THROUGH CONTRACT NAS 9-4065 WITH THE         *
R000015 *         CHARLES STARK DRAPER LABORATORY, MASSACHUSETTS INSTITUTE OF *
R000016 *         TECHNOLOGY, CAMBRIDGE, MASS.                                *
R000017 *                                                                     *
R000018 ***********************************************************************


R000019           SUBMITTED:
R000020               A.G.ENGEL JR, COLOSSUS PROGRAMMING LEADER
R000021               APOLLO GUIDANCE AND NAVIGATION

R000022           APPROVED:
R000023               M.H.HAMILTON, DIRECTOR, MISSION PROGRAM DEVELOPMENT
R000024               APOLLO GUIDANCE AND NAVIGATION PROGRAM

R000025           APPROVED:
R000026               S.L.COPPS, COLOSSUS PROJECT MANAGER
R000027               APOLLO GUIDANCE AND NAVIGATION PROGRAM

R000031           APPROVED:
R000032               R.H. BATTIN, DIRECTOR, MISSION DEVELOPMENT
R000033               APOLLO GUIDANCE AND NAVIGATION PROGRAM

R000034           APPROVED:
R000036               D.G. HOAG, DIRECTOR
R000037               APOLLO GUIDANCE AND NAVIGATION PROGRAM

R000038           APPROVED:
R000039               R.R. RAGAN, DEPUTY DIRECTOR
R000040               INSTRUMENTATION LABORATORY
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L         ASSEMBLY AND OPERATION INFORMATION                                  USER'S PAGE NO.   2      E.

R0001     ASSEMBLY AND OPERATIONS INFORMATION
R0002     TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS
R00025    ABSOLUTE LOCATIONS FOR UPDATES
R00031    SUBROUTINE CALLS


R00041              ERASTOTL
R00051                        ERASABLE ASSIGNMENTS
R00052                        CHECK EQUALS LIST
R00061              DIOGENES
R00065                        INTERRUPT LEAD INS
R00071                        T4RUPT PROGRAM
R00081                        DOWNLINK LISTS
R0009                         FRESH START AND RESTART
R0010                         RESTART TABLES
R0011                         SXTMARK
R0012                         EXTENDED VERBS
R0013                         PINBALL NOUN TABLES
R0014                         CSM GEOMETRY
R0015                         IMU COMPENSATION PACKAGE
R0016                         PINBALL GAME  BUTTONS AND LIGHTS
R0017                         R60,R62
R0018                         ANGLFIND
R0019                         GIMBAL LOCK AVOIDANCE
R0020                         KALCMANU STEERING
R0021                         SYSTEM TEST STANDARD LEAD INS
R0022                         IMU CALIBRATION AND ALIGNMENT
R0023               MEDUSA
R0024                         GROUND TRACKING DETERMINATION PROGRAM - P21
R0025                         P34-P35, P74-P75
R0026                         R31
R0027                         P76
R00281                        R30
R00301              MENELAUS
R0031                         P15
R0032                         P11
R0033                         P20-P25
R0034                         P30,P31
R0035                         P32-P33, P72-P73
R0036                         P40-P47
R0037                         P51-P53
R0038                         LUNAR AND SOLAR EPHEMERIDES SUBROUTINES
R0039                         P61-P67
R0040                         SERVICER207
R0041                         ENTRY LEXICON
R0042                         REENTRY CONTROL
R0043                         CM BODY ATTITUDE
R0044                         P37,P70
R0045                         S-BAND ANTENNA FOR CM
R0046               ULYSSES
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L       ASSEMBLY AND OPERATION INFORMATION                                    USER'S PAGE NO.   3

R0047                    TVCINITIALIZE
R0048                    TVCEXECUTIVE
R0049                    TVCMASSPROP
R0050                    TVCRESTARTS
R0051                    TVCDAPS
R0053                    TVCROLLDAP
R0055                    MYSUBS
R0056                    RCS-CSM DIGITAL AUTOPILOT
R0057                    AUTOMATIC MANEUVERS
R0058                    RCS-CSM DAP EXECUTIVE PROGRAMS
R0059                    JET SELECTION LOGIC
R0060                    CM ENTRY DIGITAL AUTOPILOT
R00605            ZEUS
R0061                    DOWN-TELEMETRY PROGRAM
R0062                    INTER-BANK COMMUNICATION
R0063                    INTERPRETER
R0064                    FIXED-FIXED CONSTANT POOL
R0065                    INTERPRETIVE CONSTANTS
R0066                    SINGLE PRECISION SUBROUTINES
R0067                    EXECUTIVE
R0068                    WAITLIST
R0069                    LATITUDE LONGITUDE SUBROUTINES
R0070                    PLANETARY INERTIAL ORIENTATION
R0071                    MEASUREMENT INCORPORATION
R0072                    CONIC SUBROUTINES
R0073                    INTEGRATION INITIALIZATION
R0074                    ORBITAL INTEGRATION
R0075                    INFLIGHT ALIGNMENT ROUTINES
R0076                    POWERED FLIGHT SUBROUTINES
R0077                    TIME OF FREE FALL
R0078                    STAR TABLES
R0079                    AGC BLOCK TWO SELF-CHECK
R0080                    PHASE TABLE MAINTENANCE
R0081                    RESTARTS ROUTINE
R0082                    IMU MODE SWITCHING ROUTINES
R0083                    KEYRUPT, UPRUPT
R0084                    DISPLAY INTERFACE ROUTINES
R0085                    SERVICE ROUTINES
R0086                    ALARM AND ABORT
R0087                    UPDATE PROGRAM
R0088                    RTB OP CODES


R0089             SYMBOL TABLE LISTING
R0090             UNREFERENCED SYMBOL LISTING
R0091             ERASABLE & EQUALS CROSS-REFERENCE TABLE
R0092             SUMMARY OF SYMBOL TABLE LISTINGS
R0093             MEMORY TYPE & AVAILABLITY DISPLAY
R0094             COUNT TABLE
R0095             PARAGRAPHS GENERATED FOR THIS ASSEMBLY
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L       ASSEMBLY AND OPERATION INFORMATION                              USER'S PAGE NO.   4      1

R0096            OCTAL LISTING
R0097            OCCUPIED LOCATIONS TABLE
R0098            SUBROS CALLED & PROGRAM STATUS
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L       ASSEMBLY AND OPERATION INFORMATION                                  USER'S PAGE NO.  5     E

P0099   VERB LIST FOR CSM

R0100   REGULAR VERBS

R0101   00 NOT IN USE
R0102   01 DISPLAY OCTAL COMP 1 IN R1
R0103   02 DISPLAY OCTAL COMP 2 IN R1
R0104   03 DISPLAY OCTAL COMP 3 IN R1
R0105   04 DISPLAY OCTAL COMP 1,2 IN R1,R2
R0106   05 DISPLAY OCTAL COMP 1,2,3 IN R1,R2,R3
R0107   06 DISPLAY DECIMAL IN R1 OR R1,R2 OR R1,R2,R3
R0108   07 DISPLAY DP DECIMAL IN R1,R2 (TEST ONLY)
R0109   08
R0110   09
R0111   10
R0112   11 MONITOR OCTAL COMP 1 IN R1
R0113   12 MONITOR OCTAL COMP 2 IN R1
R0114   13 MONITOR OCTAL COMP 3 IN R1
R0115   14 MONITOR OCTAL COMP 1,2 IN R1,R2
R0116   15 MONITOR OCTAL COMP 1,2,3 IN R1,R2,R3
R0117   16 MONITOR DECIMAL IN R1 OR R1,R2 OR R1,R2,R3
R0118   17 MONITOR DP DECIMAL IN R1,R2 (TEST ONLY)
R0119   18
R0120   19
R0121   20
R0122   21 LOAD COMPONENT 1 INTO R1
R0123   22 LOAD COMPONENT 2 INTO R2
R0124   23 LOAD COMPONENT 3 INTO R3
R0125   24 LOAD COMPONENT 1,2 INTO R1,R2
R0126   25 LOAD COMPONENT 1,2,3 INTO R1,R2,R3
R0127   26
R0128   27 DISPLAY FIXED MEMORY
R0129   28
R0130   29
R0131   30 REQUEST EXECUTIVE
R0132   31 REQUEST WAITLIST
R0133   32 RECYCLE PROGRAM
R0134   33 PROCEED WITHOUT DSKY INPUTS
R0135   34 TERMINATE FUNCTION
R0136   35 TEST LIGHTS
R0137   36 REQUEST FRESH START
R0138   37 CHANGE PROGRAM (MAJOR MODE)
R0139   38
R0140   39
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L       ASSEMBLY AND OPERATION INFORMATION                                    USER'S PAGE NO.  6    E

P0141   EXTENDED VERBS

R0142   40 ZERO CDU-S
R0143   41 COARSE ALIGN CDU-S
R0144   42 FINE ALIGN IMU-S
R0145   43 LOAD IMU ATT ERROR METERS
R0146   44 SET   SURFACE FLAG
R0147   45 RESET SURFACE FLAG
R0148   46 ESTABLISH G+C CONTROL
R0149   47 MOVE LM STATE VECTOR INTO CM STATE VECTOR.
R0150   48 REQUEST DAP DATA LOAD ROUTINE (R03)
R0151   49 REQUEST CREW DEFINED MANEUVER ROUTINE (R62)
R0152   50 PLEASE PERFORM
R0153   51 PLEASE MARK
R0154   52 MARK ON OFFSET LANDING SITE
R0155   53 PLEASE PERFORM ALTERNATE LOS MARK
R0156   54 REQUEST RENDEZVOUS BACKUP SIGHTING MARK ROUTINE (R23)
R0157   55 INCREMENT AGC TIME (DECIMAL)
R0158   56 TERMINATE RENDEZVOUS TRACKING (P20)
R0159   57 DISPLAY UPDAT STATE OF FULTKFLG
R0160   58 ENABLE AUTO MANEUVER IN P20
R0161   59 PLEASE CALIBRATE
R0162   60 SET ASTRONAUT TOTAL ATTITUDE (N17) TO PRESENT ATTITUDE
R0163   61 DISPLAY DAP ATTITUDE ERROR
R0164   62 DISPLAY TOTAL ATTITUDE ERROR (WRT N22 (THETAD))
R0165   63 DISPLAY TOTAL ASTRONAUT ATTITUDE ERROR (WRT N17 (CPHIX))
R0166   64 REQUEST S-BAND ANTENNA ROUTINE
R0167   65 OPTICAL VERIFICATION OF PRELAUNCH ALIGNMENT
R0168   66 VEHICLES ARE ATTACHED.  MOVE THIS VEHICLE STATE TO OTHER VEHICLE.
R0169   67 DISPLAY W MATRIX
R0170   68 SPARE
R0171   69 CAUSE RESTART
R0172   70 UPDATE LIFTOFF TIME
R0173   71 UNIVERSAL UPDATE-BLOCK  ADR
R0174   72 UNIVERSAL UPDATE-SINGLE ADR
R0175   73 UPDATE AGC TIME (OCTAL)
R0176   74 INITIALIZE ERASABLE DUMP VIA DOWNLINK
R0177   75 BACKUP LIFTOFF
R0178   76 SPARE
R0179   77 SPARE
R0180   78 UPDATE PRELAUNCH AZIMUTH
R0181   79 SPARE
R0182   80 UPDATE LEM STATE VECTOR
R0183   81 UPDATE CSM STATE VECTOR
R0184   82 REQUEST ORBIT PARAM DISPLAY (R30)
R0185   83 REQUEST REND  PARAM DISPLAY (R31)
R0186   84 SPARE
R0187   85 REQUEST RENDEZVOUS PARAMETER DISPLAY NO. 2 (R34)
R0188   86 REJECT RENDEZVOUS BACKUP SIGHTING MARK
R0189   87 SET VHF RANGE FLAG
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R0190     88 RESET VHF RANGE FLAG
R0191     89 REQUEST RENDEZVOUS FINAL ATTITUDE ROUTINE (R63)
R0192     90 REQUEST RENDEZVOUS OUT OF PLANE DISPLAY ROUTINE (R36)
R0193     91 DISPLAY BANK SUM
R0194     92 OPERATE IMU PERFORMANCE TEST (P07)
R0195     93 ENABLE W MATRIX INITIALIZATION
R0196     94 PERFORM CYSLUNAR ATTITUDE MANEUVER (P23)
R0197     95 SPARE
R0198     96 TERMINATE INTEGRATION AND GO TO P00
R0199     97 PERFORM ENGINE FAIL PROCEDURE
R0200     98 SPARE
R0201     99 PLEASE ENABLE ENGINE
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L       ASSEMBLY AND OPERATION INFORMATION                                             USER'S PAGE NO.   2        E

R0202   IN THE FOLLOWING NOUN LIST THE :NO LOAD: RESTRICTION MEANS THE NOUN
R0203   CONTAINS AT LEAST ONE COMPONENT WHICH CANNOT BE LOADED, I.E. OF
R0204   SCALE TYPE L (MIN/SEC) OR PP (2 INTEGERS).
R0205   IN THIS CASE VERBS 24 AND 25 ARE NOT ALLOWED, BUT VERBS 21, 22 OR 23
R0206   MAY BE USED TO LOAD ANY OF THE NOUN:S COMPONENTS WHICH ARE NOT OF THE
R0207   ABOVE SCALE TYPES.
R0208   THE :DEC ONLY: RESTRICTION MEANS ONLY DECIMAL OPERATION IS ALLOWED ON
R0209   EVERY COMPONENT IN THE NOUN. (NOTE THAT :NO LOAD: IMPLIES :DEC ONLY: )

R0210   NORMAL NOUNS                               COMPONENTS  SCALE AND DECIMAL POINT              RESTRICTIONS

R0212   00  NOT IN USE
R0213   01  SPECIFY MACHINE ADDRESS (FRACTIONAL)    3COMP    .XXXXX FOR EACH
R0214   02  SPECIFY MACHINE ADDRESS (WHOLE)         3COMP    XXXXX. FOR EACH
R0215   03  SPECIFY MACHINE ADDRESS (DEGREES)       3COMP    XXX.XX DEG FOR EACH
R0216   04  SPARE
R0217   05  ANGULAR ERROR/DIFFERENCE                1COMP    XXX.XX DEG
R0218   06  OPTION CODE                             2COMP    OCTAL ONLY FOR EACH
R0219   LOADING NOUN 07 WILL SET OR RESET SELECTED BITS IN ANY ERASABLE REGISTER
R0220   07  ECADR OF WORD TO BE MODIFIED            3COMP    OCTAL ONLY FOR EACH
R0221       ONES FOR BITS TO BE MODIFIED
R0222       1 TO SET OR 0 TO RESET SELECTED BITS
R0223   08  ALARM DATA                              3COMP    OCTAL ONLY FOR EACH
R0224   09  ALARM CODES                             3COMP    OCTAL ONLY FOR EACH
R0225   10  CHANNEL TO BE SPECIFIED                 1COMP    OCTAL ONLY
R0226   11  TIG OF CSI                              3COMP    00XXX. HRS                         DEC ONLY
R0228                                                        000XX. MIN                         MUST LOAD 3 COMPS
R0230                                                        0XX.XX SEC
R0231   12  OPTION CODE                             2COMP    OCTAL ONLY FOR EACH
R0232        (USED BY EXTENDED VERBS ONLY)
R0233   13  TIG OF CDH                              3COMP    00XXX. HRS                         DEC ONLY
R0235                                                        000XX. MIN                         MUST LOAD 3 COMPS
R0237                                                        0XX.XX SEC
R0238   14  INERTIAL VEL MAG AT TLI CUTOFF          1COMP    XXXXX. FT/SEC
R0239   15  INCREMENT MACHINE ADDRESS               1COMP    OCTAL ONLY
R0240   16  TIME OF EVENT                           3COMP    00XXX. HRS                         DEC ONLY
R0242        (USED BY EXTENDED VERBS ONLY)                   000XX. MIN                         MUST LOAD 3 COMPS
R0244                                                        0XX.XX SEC
R0245   17  ASTRONAUT TOTAL ATTITUDE                3COMP    XXX.XX DEG FOR EACH
R0246   18  AUTO MANEUVER BALL ANGLES               3COMP    XXX.XX DEG FOR EACH
R0247   19  SPARE
R0248   20  ICDU ANGLES                             3COMP    XXX.XX DEG FOR EACH
R0249   21  PIPAS                                   3COMP    XXXXX. PULSES FOR EACH
R0251   22  NEW ICDU ANGLES                         3COMP    XXX.XX DEG FOR EACH
R0252   23  SPARE
R0253   24  DELTA TIME FOR AGC CLOCK                3COMP    00XXX. HRS                         DEC ONLY
R0255                                                        000XX. MIN                         MUST LOAD 3 COMPS
R0257                                                        0XX.XX SEC
R0258   25  CHECKLIST                               3COMP    XXXXX. FOR EACH
R0259        (USED WITH PLEASE PERFORM ONLY)
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L       ASSEMBLY AND OPERATION INFORMATION                                     USER'S PAGE NO.   9      E

R0260   26  PRIORITY/DELAY, ADRES, BBCON              3COMP   OCTAL ONLY FOR EACH
R0261   27  SELF TEST ON/OFF SWITCH                   1COMP   XXXXX.
R0262   28  SPARE
R0263   29  XSM LAUNCH AZIMUTH                        1COMP   XXX.XX DEG                    DEC ONLY
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L        ASSEMBLY AND OPERATION INFORMATION                                  USER'S PAGE NO. 1      E0

R0265   30  TARGET CODES                         3COMP    XXXXX  FOR EACH
R0266   31  TIME OF W INIT                       3COMP    00XXX. HRS                  DEC ONLY
R02675                                                    000XX. MIN                  MUST LOAD 3 COMPS
R02677                                                    0XX.XX SEC
R0268   32  TIME FROM PERIGEE                    3COMP    00XXX. HRS                  DEC ONLY
R0270                                                     000XX. MIN                  MUST LOAD 3 COMPS
R0272                                                     0XX.XX SEC
R0273   33  TIME OF IGNITION                     3COMP    00XXX. HRS                  DEC ONLY
R0275                                                     000XX. MIN                  MUST LOAD 3 COMPS
R0277                                                     0XX.XX SEC
R0278   34  TIME OF EVENT                        3COMP    00XXX. HRS                  DEC ONLY
R0280                                                     000XX. MIN                  MUST LOAD 3 COMPS
R0282                                                     0XX.XX SEC
R0283   35  TIME FROM EVENT                      3COMP    00XXX. HRS                  DEC ONLY
R0285                                                     000XX. MIN                  MUST LOAD 3 COMPS
R0287                                                     0XX.XX SEC
R0288   36  TIME OF AGC CLOCK                    3COMP    00XXX. HRS                  DEC ONLY
R0290                                                     000XX. MIN                  MUST LOAD 3 COMPS
R0292                                                     0XX.XX SEC
R0293   37  TIG OF TPI                           3COMP    00XXX. HRS                  DEC ONLY
R0295                                                     000XX. MIN                  MUST LOAD 3 COMPS
R0297                                                     0XX.XX SEC
R0298   38  TIME OF STATE VECTOR                 3COMP    00XXX. HRS                  DEC ONLY
R0300                                                     000XX. MIN                  MUST LOAD 3 COMPS
R0302                                                     0XX.XX SEC
R0303   39  DELTA TIME FOR TRANSFER              3COMP    00XXX. HRS                  DEC ONLY
R0305                                                     000XX. MIN                  MUST LOAD 3 COMPS
R0307                                                     0XX.XX SEC
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L        ASSEMBLY AND OPERATION INFORMATION                                                   USER'S PAGE NO.  11      E0

P0308    MIXED NOUNS                              COMPONENTS  SCALE AND DECIMAL POINT                RESTRICTIONS

R0310    40  TIME FROM IGNITION/CUTOFF               3COMP    XXBXX  MIN/SEC                         NO LOAD, DEC ONLY
R0312        VG,                                              XXXX.X FT/SEC
R0313        DELTA V (ACCUMULATED)                            XXXX.X FT/SEC
R0314    41  TARGET  AZIMUTH,                        2COMP    XXX.XX DEG
R0315                ELEVATION                                XX.XXX DEG
R0316    42  APOGEE,                                 3COMP    XXXX.X NAUT MI                         DEC ONLY
R0318        PERIGEE,                                         XXXX.X NAUT MI
R0319        DELTA V (REQUIRED)                               XXXX.X FT/SEC
R0320    43  LATITUDE,                               3COMP    XXX.XX DEG                             DEC ONLY
R0322        LONGITUDE,                                       XXX.XX DEG
R0323        ALTITUDE                                         XXXX.X NAUT MI
R0324    44  APOGEE,                                 3COMP    XXXX.X NAUT MI                         NO LOAD, DEC ONLY
R0326        PERIGEE,                                         XXXX.X NAUT MI
R0327        TFF                                              XXBXX  MIN/SEC
R0328    45  MARKS (VHF - OPTICS)                    3 COMP   +XXBXX                                 NO LOAD, DEC ONLY
R0330        TFI OF NEXT BURN                                 XXBXX  MIN/SEC
R0331        MGA                                              XXX.XX DEG
R0332    46  AUTOPILOT CONFIGURATION                 2COMP    OCTAL ONLY FOR EACH
R0333    47  THIS VEHICLE WEIGHT                     2COMP    XXXXX. LBS                             DEC ONLY
R0335        OTHER VEHICLE WEIGHT                             XXXXX. LBS
R0336    48  PITCH TRIM                              2COMP    XXX.XX DEG                             DEC ONLY
R0338        YAW TRIM,                                        XXX.XX   DEG
R0339    49  DELTA R                                 3COMP    XXXX.X NAUT MI                         DEC ONLY
R0341        DELTA V                                          XXXX.X FT/SEC
R0342        VHF OR OPTICS CODE                               XXXXX.
R0343    50  SPLASH ERROR,                           3COMP    XXXX.X NAUT MI                         NO LOAD, DEC ONLY
R0345        PERIGEE,                                         XXXX.X NAUT MI
R0346        TFF                                              XXBXX  MIN/SEC
R0347    51  S-BAND ANTENNA ANGLES PITCH             2COMP    XXX.XX DEG                             DEC ONLY
R0349                                  YAW                    XXX.XX DEG
R0350    52  CENTRAL ANGLE OF ACTIVE VEHICLE         1COMP    XXX.XX DEG
R0351    53  RANGE,                                  3COMP    XXX.XX NAUT MI                         DEC ONLY
R0353        RANGE RATE,                                      XXXX.X FT/SEC
R0354        PHI                                              XXX.XX DEG
R0355    54  RANGE,                                  3COMP    XXX.XX NAUT MI                         DEC ONLY
R0357        RANGE RATE,                                      XXXX.X FT/SEC
R0358        THETA                                            XXX.XX DEG
R0359    55  PERIGEE CODE                            3COMP    XXXXX.                                 DEC ONLY
R0361        ELEVATION ANGLE                                  XXX.XX DEG
R0362        CENTRAL ANGLE OF PASSIVE VEHICLE                 XXX.XX DEG
R0363    56  REENTRY ANGLE,                          2COMP    XXX.XX DEG                             DEC ONLY
R0365        DELTA V                                          XXXXX. FT/SEC
R0366    57  SPARE
R0367    58  PERIGEE ALT (POST TPI)                  3COMP    XXXX.X NAUT MI                         DEC ONLY
R0369        DELTA V TPI                                      XXXX.X FT/SEC
R0370        DELTA V TPF                                      XXXX.X FT/SEC
R0371    59  DELTA VELOCITY LOS                      3COMP    XXXX.X FT/SEC FOR EA.                  DEC ONLY
R0373    60  GMAX,                                   3COMP    XXX.XX G                               DEC ONLY
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R0375       VPRED,                                         XXXXX. FT/SEC
R0376       GAMMA EI                                       XXX.XX DEG
R0377   61  IMPACT LATITUDE,                       3COMP   XXX.XX DEG                          DEC ONLY
R0379       IMPACT LONGITUDE,                              XXX.XX DEG
R0380       HEADS UP/DOWN                                  +/- 00001
R0381   62  INERTIAL VEL MAG (VI),                 3COMP   XXXXX. FT/SEC                       DEC ONLY
R0383       ALT RATE CHANGE (HDOT),                        XXXXX. FT/SEC
R0384       ALT ABOVE PAD RADIUS (H)                       XXXX.X NAUT MI
R0385   63  RANGE  297,431 TO SPLASH (RTGO),       3COMP   XXXX.X NAUT MI                      NO LOAD, DEC ONLY
R0387       PREDICTED INERT VEL (VIO),                     XXXXX. FT/SEC
R0388       TIME FROM 297,431 (TFE)                        XXBXX  MIN/SEC
R0389   64  DRAG ACCELERATION,                     3COMP   XXX.XX G                            DEC ONLY
R0391       INERTIAL VELOCITY (VI),                        XXXXX. FT/SEC
R0392       RANGE TO SPLASH                                XXXX.X NAUT MI
R0393   65  SAMPLED AGC TIME                       3COMP   00XXX. HRS                          DEC ONLY
R0395        (FETCHED IN INTERRUPT)                        000XX. MIN                          MUST LOAD 3 COMPS
R0397                                                      0XX.XX SEC
R0398   66  COMMAND BANK ANGLE (BETA),             3COMP   XXX.XX DEG                          DEC ONLY
R0400       CROSS RANGE ERROR,                             XXXX.X NAUT MI
R0401       DOWN RANGE ERROR                               XXXX.X NAUT MI
R0402   67  RANGE TO TARGET,                       3COMP   XXXX.X NAUT MI                      DEC ONLY
R0404       PRESENT LATITUDE,                              XXX.XX DEG
R0405       PRESENT LONGITUDE                              XXX.XX DEG
R0406   68  COMMAND BANK ANGLE (BETA),             3COMP   XXX.XX DEG                          DEC ONLY
R0408        INERTIAL VELOCITY (VI),                       XXXXX. FT/SEC
R0409      ALT RATE CHANGE (RDOT)                          XXXXX. FT/SEC
R0410   69 BETA                                    3COMP   XXX.XX DEG                          DEC ONLY
R0412      DL                                              XXX.XX G
R0413      VL                                              XXXXX. FT/SEC
R0414   70  STAR CODE,                             3COMP   OCTAL ONLY
R0415       LANDMARK DATA,                                 OCTAL ONLY
R0416       HORIZON DATA                                   OCTAL ONLY
R0417   71  STAR CODE                              3COMP   OCTAL ONLY
R0418       LANDMARK DATA                                  OCTAL ONLY
R0419       HORIZON DATA                                   OCTAL ONLY
R0420   72  SPARE
R0421   73  ALTITUDE                               3COMP    XXXXXB. NAUT MI
R0422       VELOCITY                                        XXXXX.  FT/SEC
R0423       FLIGHT PATH ANGLE                               XXX.XX  DEG
R0424   74  COMMAND BANK ANGLE (BETA)              3COMP   XXX.XX DEG
R0425       INERTIAL VELOCITY (VI)                         XXXXX. FT/SEC
R0426       DRAG ACCELERATION                              XXX.XX G
R0427   75  DELTA ALTITUDE CDH                     3COMP   XXXX.X NAUT MI                      NO LOAD, DEC ONLY
R0429       DELTA TIME (CDH-CSI OR TPI-CDH)                XXBXX  MIN/SEC
R0430       DELTA TIME (TPI-CDH OR TPI-NOMTPI)             XXBXX  MIN/SEC
R0431   76  SPARE
R0432   77  SPARE
R0433   78  YAW ANGLE FOR P20                      3COMP    XXX.XX DEG
R0434       PITCH ANGLE FOR P20                             XXX.XX DEG
R0435       AZIMUTH CONSTRAINT FOR P20                      XXX.XX DEG
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R0436   79  P20 ROTATION RATE                     2COMP   X.XXXX DEG/SEC
R0437       P20 ROTATION DEADBAND                         XXX.XX DEG
R04375  80  TIME FROM IGNITION/CUTOFF             3COMP   XXBXX  MIN/SEC                    NO LOAD, DEC ONLY
R0438       VG                                            XXXXX. FT/SEC
R0439       DELTA V (ACCUMULATED)                         XXXXX. FT/SEC
R0440   81  DELTA V (LV)                          3COMP   XXXX.X FT/SEC FOR EACH            DEC ONLY
R0442   82  DELTA V (LV)                          3COMP   XXXX.X FT/SEC FOR EACH            DEC ONLY
R0445   83  DELTA V (BODY)                        3COMP   XXXX.X FT/SEC FOR EACH            DEC ONLY
R0447   84  DELTA V (OTHER VEHICLE)               3COMP   XXXX.X FT/SEC FOR EACH            DEC ONLY
R0449   85  VG (BODY)                             3COMP   XXXX.X FT/SEC FOR EACH            DEC ONLY
R0451   86  DELTA V(LV)                           3COMP   XXXXX. FT/SEC FOR EACH            DEC ONLY
R0453   87  MARK DATA  SHAFT,                     2COMP   XXX.XX DEG
R0454                  TRUNION                            XX.XXX DEG
R0455   88  HALF UNIT SUN OR PLANET VECTOR        3COMP   .XXXXX FOR EACH                   DEC ONLY
R0457   89  LANDMARK  LATITUDE,                   3COMP   XX.XXX DEG                        DEC ONLY
R0459                 LONGITUDE/2,                        XX.XXX DEG
R0460                 ALTITUDE                            XXX.XX NAUT MI
R0461   90  Y ACTIVE VEH               3COMP   XXX.XX NM                                    DEC ONLY
R0463       Y DOT ACTIVE VEH                   XXXX.X FPS
R0464       Y DOT PASSIVE VEH                  XXXX.X FPS
R0465   91  OCDU ANGLES  SHAFT,                   2COMP   XXX.XX DEG
R0466                    TRUNION                          XX.XXX DEG
R0467   92  NEW OPTICS ANGLES  SHAFT,             2COMP   XXX.XX DEG
R0468                          TRUNION                    XX.XXX DEG
R0469   93  DELTA GYRO ANGLES                     3COMP   XX.XXX DEG FOR EACH
R0470   94  NEW OPTICS ANGLES  SHAFT              2COMP   XXX.XX DEG
R0471                          TRUNNION                   XX.XXX DEG
R0472   95  TIME FROM IGNITION/CUTOFF             3COMP   XXBXX  MIN/SEC
R04721      VG                                            XXXXX. FT/SEC
R04722      INERTIAL VEL MAG                              XXXXX. FT/SEC
R0473   96  Y CM                                  3COMP   XXX.XX NM                         DEC ONLY
R04732      Y DOT CM                              XXXX.X FPS
R04733      Y DOT LM                              XXXX.X FPS
R0474   97  SYSTEM TEST INPUTS                    3COMP   XXXXX. FOR EACH
R0475   98  SYSTEM TEST RESULTS AND INPUTS        3COMP   XXXXX.
R0476                                                     .XXXXX
R0477                                                     XXXXX.
R0478   99  RMS IN POSITION                       3COMP   XXXXX.FT                          DEC ONLY
R0480       RMS IN VELOCITY                               XXXX.X FT/SEC
R0481       RMS OPTION                                    XXXXX.
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GAP: ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011       11:40 FEB. 26,1971     (MAIN)     PAGE  14

L      ASSEMBLY AND OPERATION INFORMATION                                     USER'S PAGE NO.  14     E0

P0482  REGISTERS AND SCALING  FOR NORMAL NOUNS

R0483  NOUN           REGISTER      SCALE TYPE

R0484  00         NOT IN USE
R0485  01         SPECIFY ADDRESS     B
R0486  02         SPECIFY ADDRESS     C
R0487  03         SPECIFY ADDRESS     D
R0488  04         SPARE
R0489  05               DSPTEM1       H
R0490  06               OPTION1       A
R0491  07               XREG          A
R0492  08               ALMCADR       A
R0493  09               FAILREG       A
R0494  10         SPECIFY CHANNEL     A
R0495  11               TCSI          K
R0496  12               OPTIONX       A
R0497  13               TCDH          K
R0498  14               VC/0          P
R0499  15         INCREMENT ADDRESS   A
R0500  16               DSPTEMX       K
R0501  17               CPHIX         D
R0502  18               THETAD        D
R0503  19         SPARE
R0504  20               CDUX          D
R0505  21               PIPAX         C
R0506  22               THETAD        D
R0507  23         SPARE
R0508  24               DSPTEM2 +1    K
R0509  25               DSPTEM1       C
R0510  26               N26/PRI       A
R0511  27               SMODE         C
R0512  28         SPARE
R0513  29               DSPTEM1       D
R0514  30               DSPTEM1       C
R0515  31               AGEOFW        K
R0516  32               -TPER         K
R0517  33               TIG           K
R0518  34               DSPTEM1       K
R0519  35               TTOGO         K
R0520  36               TIME2         K
R0521  37               TTPI          K
R0522  38               TET           K
R0523  39               T3TOT4        K
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L        ASSEMBLY AND OPERATION INFORMATION                                  USER'S PAGE NO.  15     E0

P0524    REGISTERS AND SCALING FOR MIXED NOUNS

R0525    NOUN     COMP   REGISTER        SCALE TYPE

R0526    40       1      TTOGO           L
R0527             2      VGDISP          S
R0528             3      DVTOTAL         S
R0529    41       1      DSPTEM1         D
R0530             2      DSPTEM1 +1      E
R0531    42       1      HAPO            Q
R0532             2      HPER            Q
R0533             3      VGDISP          S
R0534    43       1      LAT             H
R0535             2      LONG            H
R0536             3      ALT             Q
R0537    44       1      HAPOX           Q
R0538             2      HPERX           Q
R0539             3      TFF             L
R0540    45       1      VHFCNT          PP
R0541             2      TTOGO           L
R0542             3      +MGA            H
R0543    46       1      DAPDATR1        A
R0544             2      DAPDATR2        A
R0545    47       1      CSMMASS         KK
R0546             2      LEMMASS         KK
R0547    48       1      PACTOFF         FF
R0548             2      YACTOFF         FF
R0549    49       1      N49DISP         Q
R0550             2      N49DISP +2      S
R0551             3      N49DISP +4      C
R0552    50       1      RSP-RREC        LL
R0553             2      HPERX           Q
R0554             3      TFF             L
R0555    51       1      RHOSB           H
R0556             2      GAMMASB         H
R0557    52       1      ACTCENT         H
R0558    53       1      RANGE           JJ
R0559             2      RRATE           S
R0560             3      RTHETA          H
R0561    54       1      RANGE           JJ
R0562             2      RRATE           S
R0563             3      RTHETA          H
R0564    55       1      NN1             C
R0565             2      ELEV            H
R0566             3      CENTANG         H
R0567    56       1      RTEGAM2D        H
R0568             2      RTEDVD          P
R0569    57       1      DELTAR          Q
R0570    58       1      POSTTPI         Q
R0571             2      DELVTPI         S
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L         ASSEMBLY AND OPERATION INFORMATION                                    USER'S PAGE NO. 16      E0

R0572              3        DELVTPF         S
R0573   59         1        DVLOS           S
R0574              2        DVLOS +2        S
R0575              3        DVLOS +4        S
R0576   60         1        GMAX            T
R0577              2        VPRED           P
R0578              3        GAMMAEI         H
R0579   61         1        LAT(SPL)        H
R0580              2        LNG(SPL)        H
R0581              3        HEADSUP         C
R0582   62         1        VMAGI           P
R0583              2        HDOT            P
R0584              3        ALTI            Q
R0585   63         1        RTGO            LL
R0586              2        VIO             P
R0587              3        TTE             L
R0588   64         1        D               MM
R0589              2        VMAGI           P
R0590              3        RTGON64         LL
R0591   65         1        SAMPTIME        K
R0592              2        SAMPTIME        K
R0593              3        SAMPTIME        K
R0594   66         1        ROLLC           H
R0595              2        XRNGERR         VV
R0596              3        DNRNGERR        LL
R0597   67         1        RTGON67         LL
R0598              2        LAT             H
R0599              3        LONG            H
R0600   68         1        ROLLC           H
R0601              2        VMAGI           P
R0602              3        RDOT            UU
R0603   69         1        ROLLC           H
R0604              2        Q7              MM
R0605              3        VL              UU
R0606   70         1        STARCODE        A
R0607              2        LANDMARK        A
R0608              3        HORIZON         A
R0609   71         1        STARCODE        A
R0610              2        LANDMARK        A
R0611              3        HORIZON         A
R0612   72         SPARE
R0613   73         1        P21ALT          Q (MEMORY/100 TO DISPLAY TENS N.M.)
R0614              2        P21VEL          P
R0615              3        P21GAM          H
R0616   74         1        ROLLC           H
R0617              2        VMAGI           P
R0618              3        D               MM
R0619   75         1        DIFFALT         Q
R0620              2        T1TOT2          L
R0621              3        T2TOT3          L
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R0622    76       SPARE
R0623    77       SPARE
R0624    78       1        UTYAW          D
R0625    78       2        UTPIT          D
R0626    78       3        AZIMANGL       D
R0627    79       1        RATEPTC        E (MEMORY/10 TO LOAD X.XXXX DEG/SEC)
R0628             2        DBPTC          D
R0629    80       1        TTOGO          L
R06292            2        VGDISP         P
R06294            3        DVTORAL        P
R0630    81       1        DELVLVC        S
R0631             2        DELVLVC +2     S
R0632             3        DELVLVC +4     S
R0633    82       1        DELVLVC        S
R0634             2        DELVLVC +2     S
R0635             3        DELVLVC +4     S
R0636    83       1        DELVIMU        S
R0637             2        DELVIMU +2     S
R0638             3        DELVIMU +4     S
R0639    84       1        DELVOV         S
R0640             2        DELVOV +2      S
R0641             3        DELVOV +4      S
R0642    85       1        VGBODY         S
R0643             2        VGBODY +2      S
R0644             3        VGBODY +4      S
R0645    86       1        DELVLVC        P
R0646             2        DELVLVC +2     P
R0647             3        DELVLVC +4     P
R0648    87       1        MRKBUF1 +3     D
R0649             2        MRKBUF1 +5     J
R0650    88       1        STARSAV3       ZZ
R0651             2        STARSAV3 +2    ZZ
R0652             3        STARSAV3 +4    ZZ
R0653    89       1        LANDLAT        G
R0654             2        LANDLONG       G
R0655             3        LANDALT        JJ
R0656    90       1        YCSM           JJ
R0657             2        YDOTC          S
R0658             3        YDOTL          S
R0659    91       1        CDUS           D
R0660             2        CDUT           J
R0661    92       1        SAC            D
R0662             2        PAC            J
R0663    93       1        OGC            G
R0664             2        OGC +2         G
R0665             3        OGC +4         G
R0666    94       1        MRKBUF1 +3     D
R0667             2        MRKBUF1 +5     J
R0668    95       1        TTOGO          L
R06681            2        VGTLI          P
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R06682              3         VNOW             P
R0669     96        1         RANGE            JJ
R06691              2         RRATE            S
R06692              3         RRATE2           S
R0670     97        1         DSPTEM1          C
R0671               2         DSPTEM1  +1      C
R0672               3         DSPTEM1  +2      C
R0673     98        1         DSPTEM2          C
R0674               2         DSPTEM2  +1      B
R0675               3         DSPTEM2  +2      C
R0676     99        1         WWPOS            XX
R0677               2         WWVEL            YY
R0678               3         WWOPT            C
```

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P0679    NOUN SCALES AND FORMATS

R0680    -SCALE TYPE-                               PRECISION
R0681    UNITS                  DECIMAL FORMAT      -- AGC FORMAT
R0682    ------------           --------------      -- ----------

R0683    -A-
R0684    OCTAL                  XXXXX               SP OCTAL

R0685    -B-                                                   -14
R0686    FRACTIONAL             .XXXXX              SP BIT 1 = 2     UNITS
R0687                           (MAX .99996)

R0688    -C-
R0689    WHOLE                  XXXXX.              SP BIT 1 = 1 UNIT
R0690                           (MAX 16383.)

R0691    -D-                                                      15
R0692    CDU DEGREES            XXX.XX DEGREES      SP BIT 1 = 360/2    DEGREES
R0693                           (MAX 359.99)           (USES 15 BITS FOR MAGNI-
R0694                                                   TUDE AND 2-S COMP.)

R0695    -E-                                                     14
R0696    ELEVATION DEGREES      XX.XXX DEGREES      SP BIT 1 = 90/2    DEGREES
R0697                           (MAX 89.999)

R0698    -F-                                                      14
R0699    DEGREES (180)          XXX.XX DEGREES      SP BIT 1 = 180/2    DEGREES
R0700                           (MAX 179.99)

R0701    -G-
R0702    DP DEGREES(90)         XX.XXX DEGREES      DP BIT 1 OF LOW REGISTER =
R0703                                                         28
R0704                                                  360/2    DEGREES
R0705    -H-
R0706    DP DEGREES (360)       XXX.XX DEGREES      DP BIT 1 OF LOW REGISTER =
R0707                                                         28
R0708                           (MAX 359.99)           360/2    DEGREES

R0709    -J-                                                     15
R0710    Y OPTICS DEGREES       XX.XXX DEGREES      SP BIT 1 = 90/2    DEGREES
R0711                           (BIAS OF 19.775        (USES 15 BITS FOR MAGNI-
R0712                           DEGREES ADDED FOR      TUDE AND 2-S COMP.)
R0713                           DISPLAY, SUBTRACTED
R0714                           FOR LOAD.)
R0715                           NOTE: NEGATIVE NUM-
R0716                           BERS CANNOT BE
R0717                           LOADED.

R0718    -K-
```

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L       ASSEMBLY AND OPERATION INFORMATION                                               USER'S PAGE NO.  20        E0

R0719   TIME (HR, MIN, SEC)  00XXX. HR              DP BIT 1 OF LOW REGISTER =
R0720                        000XX. MIN                  -2
R0721                        0XX.XX SEC               10    SEC
R0722                        (DECIMAL ONLY.
R0723                        MAX MIN COMP=59
R0724                        MAX SEC COMP=59.99
R0725                        MAX CAPACITY=745 HRS
R0726                                      39 MINS
R0727                                      14.55 SECS.
R0728                        WHEN LOADING, ALL 3
R0729                        COMPONENTS MUST BE
R0730                        SUPPLIED.)

R0731   -L-
R0732   TIME (MIN/SEC)       XXBXX MIN/SEC          DP BIT 1 OF LOW REGISTER =
R0733                        (B IS A BLANK               -2
R0734                        POSITION, DECIMAL        10    SEC
R0735                        ONLY, DISPLAY OR
R0736                        MONITOR ONLY. CANNOT
R0737                        BE LOADED.
R0738                        MAX MIN COMP=59
R0739                        MAX SEC COMP=59
R0740                        VALUES GREATER THAN
R0741                        59 MIN 59 SEC
R0742                        ARE DISPLAYED AS
R0743                        59 MIN 59 SEC.)

R0744   -M-                                                     -2
R0745   TIME (SEC)           XXX.XX SEC             SP BIT 1 = 10    SEC
R0746                        (MAX 163.83)

R0747   -N-
R0748   TIME(SEC) DP         XXX.XX SEC             DP BIT 1 OF LOW REGISTER =
R0749                                                    -2
R0750                                                 10    SEC

R0751   -P-
R0752   VELOCITY 2           XXXXX. FEET/SEC        DP BIT 1 OF HIGH REGISTER =
R0753                        (MAX 41994.)               -7
R0754                                                 2    METERS/CENTI-SEC

R0755   -Q-
R0756   POSITION 4           XXXX.X NAUTICAL MILES DP BIT 1 OF LOW REGISTER =
R0757                                                 2 METERS

R0758   -S-
R0759   VELOCITY 3           XXXX.X FT/SEC          DP BIT 1 OF HIGH REGISTER =
R0760                                                   -7
R0761                                                 2    METERS/CENTI-SEC
```

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R0762   -I-                                                   -2
R0763   G                     XXX.XX G           SP BIT 1 = 10   G
R0764                         (MAX 163.83)

R0765   -FF-
R0766   TRIM DEGREES          XXX.XX DEG.        SP LOW ORDER BIT = 85.41 SEC
R0767                         (MAX 388.69)          OF ARC

R0768   -GG-
R0769   INERTIA               XXXXXBB. SLUG FT SQ  SP FRACTIONAL PART OF
R0770                         (MAX 0773388.)          20    2
R0771                                                2  KG M

R0772   -II-                                                                20
R0773   THRUST MOMENT         XXXXXBB. FT LBS    SP FRACTIONAL PART OF 2
R0774                         (MAX 0773388.)        NEWTON METER

R0775   -JJ-
R0776   PCSITIONS             XXX.XX NAUT MI     DP BIT 1 OF LOW REGISTER =
R0777                                               2 METERS
R0778   -KK-                                                            16
R0779   WEIGHT2               XXXXX. LBS         SP FRACTIONAL PART OF 2    KG

R0780   -LL-
R0781   POSITION6             XXXX.X NAUT MI     DP BIT 1 OF LOW REG =
R0782                                                                    -28
R0783                                               (6,373,338)(2(PI))X2
R0784                                               ----------------------
R0785                                                        1852
R0786                                               NAUT. MI.

R0787   -MM-
R0788   DRAG ACCELERATION     XXX.XX G           DP BIT 1 OF LOW REGISTER =
R0789                         MAX (024.99)                 -28
R0790                                               25X2     G

R0791   -PP-
R0792   2 INTEGERS            +XXBYY             DP BIT 1 OF HIGH REGISTER =
R0793                         (B IS A BLANK          1 UNIT OF XX
R0794                         POSITION. DECIMAL     BIT 1 OF LOW REGISTER =
R0795                         ONLY, DISPLAY OR       1 UNIT OF YY
R0796                         MONITOR ONLY. CANNOT  (EACH REGISTER MUST
R0797                         BE LOADED.)           CONTAIN A POSITIVE INTEGER
R0798                         (MAX 99B99)            LESS THAN 100)

R0799   -UU-
R0800   VELOCITY/2VS          XXXXX. FEET/SEC    DP FRACTIONAL PART OF
R0801                         (MAX 51532.)          2VS FEET/SEC
R0802                                               (VS = 25766.1973)
```

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L        ASSEMBLY AND OPERATION INFORMATION                                                  USER'S PAGE NO.  22      E0

R0803    -VV-
R0804    POSITION8                 XXXX.X NAUT MI          DP BIT 1 OF LOW REGISTER =
R0805                                                                              -28
R0806                                                         4 X 6,373,338 X 2
R0807                                                         ------------------
R0808                                                                1852
R0809                                                         NAUT MI

R0810    -XX-
R0811    POSITION 9                XXXXX. FEET             DP BIT 1 OF LOW REGISTER =
R0812                                                           -9
R0813                                                         2    METERS

R0814    -YY-
R0815    VELOCITY 4                XXXX.X FEET/SEC         DP FRACTIONAL PART OF
R0816                              (MAX 328.0)                METERS/CENTI-SEC

R0817    -ZZ-
R0818    DP FRACTIONAL             .XXXXX                  DP BIT 1 OF HIGH REGISTER =
R0819                                                           -14
R0820                                                         2     UNITS

R0821    THAT-S ALL ON THE NOUNS.
```

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P0822   ALARM CODES
R0823            REPORT DEFICIENCIES TO JOHN SUTHERLAND @ MIT 617-864-6900 X1458

R0824   *9       *18                                       *60                                  *25  COLUMN

R0826   CODE   # TYPE                                      SET BY                               ALARM ROUTINE

R0828   00110    NO MARK SINCE LAST MARK REJECT            SXTMARK                              ALARM
R0830   00113    NO INBITS                                 SXTMARK                              ALARM
R0832   00114    MARK MADE BUT NOT DESIRED                 SXTMARK                              ALARM
R0834   00115    OPTICS TORQUE REQUESTWITH SWITCH NOT AT   EXT VERB OPTICS CDU                  ALARM
R0836             CGC
R0837   00116    OPTICS SWITCH ALTERED BEFORE 15 SEC ZERO  T4RUPT                               ALARM
R0839             TIME ELAPSED.
R0840   00117    OPTICS TORQUE REQUEST WITH OPTICS NOT     EXT VERB OPTICS CDU                  ALARM
R0842             AVAILABLE (OPTIND=-0)
R0843   00120    OPTICS TORQUE REQUEST WITH OPTICS         T4RUPT                               ALARM
R0845             NOT ZEROED
R0846   00121    CDUS NO GOOD AT TIME OF MARK              SXTMARK                              ALARM
R0848   00205    BAD PIPA READING                          SERVICER                             ALARM
R0850   00206    ZERO ENCODE NOT ALLOWED WITH COARSE ALIGN IMU MODE SWITCHING                   ALARM
R0852             + GIMBAL LOCK
R0853   00207    ISS TURNON REQUEST NOT PRESENT FOR 90 SEC T4RUPT                               ALARM
R0855   00210    IMU NOT OPERATING                         IMU MODE SWITCH, IMU-2, R02, P51     ALARM,VARALARM
R0857   00211    COARSE ALIGN ERROR - DRIVE > 2 DEGREES    IMU MODE SWITCH                      ALARM
R0859   00212    PIPA FAIL BUT PIPA IS NOT BEING USED      IMU MODE SWITCH,T4RPT                ALARM
R0861   00213    IMU NOT OPERATING WITH TURN-ON REQUEST    T4RUPT                               ALARM
R0863   00214    PROGRAM USING IMU WHEN TURNED OFF         T4RUPT                               ALARM
R0865   00217    BAD RETURN FROM STALL ROUTINES.           CURTAINS                             ALARM2
R0867   00220    IMU NOT ALIGNED - NO REFSMMAT             R02,P51
R0869   00401    DESIRED GIMBAL ANGLES YIELD GIMBAL LOCK   IMF ALIGN, IMU-2                     ALARM
R08701  00402    CREW MUST HONOR 2ND MINKEY TORQUE REQUEST P52                                  ALARM
R0871   00404    TARGET OUT OF VIEW - TRUN ANGLE > 90 DEG  R52                                  PRIOLARM
R0873   00405    TWO STARS NOT AVAILABLE                   P52,P54                              ALARM
R0875   00406    REND NAVIGATION NOT OPERATING             R21,R23                              ALARM
R0877   00421    W-MATRIX OVERFLOW                         INTEGRV                              VARALARM
R0879   00600    IMAGINARY ROOTS ON FIRST ITERATION        P32, P72                             VARALARM
R0881   00601    PERIGEE ALTITUDE LT PMIN1                 P32,P72,                             VARALARM
R0883   00602    PERIGEE ALTITUDE LT PMIN2                 P32,P72,                             VARALARM
R0885   00603    CSI TO CDH TIME LT PMIN22                 P32,P72,P33,P73                      VARALARM
R0887   00604    CDH TO TPI TIME LT PMIN23                 P32,P72                              VARALARM
R0889   00605    NUMBER OF ITERATIONS EXCEEDS LOOP MAXIMUM P32,P72,P37                          VARALARM
R0891   00606    DV EXCEEDS MAXIMUM                        P32,P72                              VARALARM
R0893   00611    NO TIG FOR GIVEN ELEV ANGLE               P34, P74                             VARALARM
R0895   00612    STATE VECTOR IN WRONG SPHERE OF INFLUENCE P37                                  VARALARM
R0897   00613    REENTRY ANGLE OUT OF LIMITS               P37                                  VARALARM
R0899   00777    PIPA FAIL CAUSED ISS WARNING.             T4RUPT                               VARALARM
R0901   01102    CMC SELF TEST ERROR                                                            ALARM2
R0903   01105    DOWNLINK TOO FAST                         T4RUPT                               ALARM
R0905   01106    UPLINK TOO FAST                           T4RUPT                               ALARM
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L       ASSEMBLY AND OPERATION INFORMATION                                           USER'S PAGE NO. 24       E0

R0907   01107    PHASE TABLE FAILURE. ASSUME              RESATRT                               ALARM
R0909            ERASABLE MEMORY IS DESTROYED
R0910   01301    ARCSIN-ARCCOS ARGUMENT TOO LARGE         INTERPRETER                           ALARM
R0912   01407    VG INCREASING                            S40.8                                 ALARM
R0914   01426    IMU UNSATISFACTORY                       P61, P62                              ALARM
R0916   01427    IMU REVERSED                             P61, P62                              ALARM
R0918   01520    V37 REQUEST NOT PERMITTED AT THIS TIME   V37                                   ALARM
R0920   01600    OVERFLOW IN DRIFT TEST                   OPT PRE ALIGN CALIB                   ALARM
R0922   01601    BAD IMU TORQUE                           OPT PRE ALIGN CALIB                   ALARM
R0924   01703    INSUF. TIME FOR INTEG., TIG WAS SLIPPED  R41                                   ALARM
R0926   03777    ICDU FAIL CAUSED THE ISS WARNING         T4RUPT                                VARALARM
R0928   04777    ICDU , PIPA FAILS CAUSED THE ISS WARNING T4RUPT                                VARALARM
R0930   07777    IMU FAIL CAUSED THE ISS WARNING          T4RUPT                                VARALARM
R0932   10777    IMU , PIPA FAILS CAUSED THE ISS WARNING  T4RUPT                                VARALARM
R0934   13777    IMU , ICDU FAILS CAUSED THE ISS WARNING  T4RUPT                                VARALARM
R0936   14777    IMU,ICDU,PIPA FAILS CAUSED THE ISSWNING  T4RUPT                                VARALARM
R0938   20430  * INTEG. ABORT DUE TO SUB-SURFACE S.V.     ALL CALLS TO INTEG.                   POODOO
R0940   20607  * NO SOLUTION FROM TIME-THETA OR           TIMETHET, TIMERAD                     POODOO
R0942            TIME-RADIUS
R0943   20610  * LAMBDA LESS THAN UNITY                   P37                                   POODOO
R0945   21204  * NEGATIVE OR ZERO WAITLIST CALL           WAITLIST                              POODOO
R0947   21206  * SECOND JOB ATTEMPTS TO GO TO SLEEP       PINBALL                               POODOO
R0949            VIA KEYBOARD AND DISPLAY PROGRAM
R0950   21210  * TWO PROGRAMS USING DEVICE AT SAME TIME   IMU MODE SWITCH                       POODOO
R0952   21302  * SQRT CALLED WITH NEGATIVE ARGUMENT.ABORT INTERPRETER                           POODOO
R0954   21501  * KEYBOARD AND DISPLAY ALARM DURING        PINBALL                               POODOO
R0956            INTERNAL USE (NVSUB). ABORT.
R0957   21502  * ILLEGAL FLASHING DISPLAY                 GOPLAY                                POODOO
R0959   21521  * P01 OR P07 ILLEGALLY SELECTED            P01, P07                              POODOO
R0961   31104  * DELAY ROUTINE BUSY                       SERVICE ROUTINES                      BAILOUT
R0963   31201  * EXECUTIVE OVERFLOW - NO VAC AREAS        EXECUTIVE                             BAILOUT
R0965   31202  * EXECUTIVE OVERFLOW - NO CORE SETS        EXECUTIVE                             BAILOUT
R0967   31203  * WAITLIST OVERFLOW - TOO MANY TASKS       WAITLIST                              BAILOUT
R0969   31211  * ILLEGAL INTERRUPT OF EXTENDED VERB       SXTMARK                               BAILOUT
R0971


R0972          * INDICATES ABORT TYPE. ALL OTHERS NON-ABORTIVE
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L       ASSEMBLY AND OPERATION INFORMATION                                      USER'S PAGE NO. 25      E0

P0973             CHECKLIST CODES FOR 504

R0974             PLEASE REPORT ANY DEFICIENCIES IN THIS LIST TO ASSEMBLY CONTROL
R0975   *9      *17     *26  COLUMN

R0976   R1 CODE    ACTION TO BE EFFECTED

R0977   00014   KEY IN   FINE ALIGNMENT OPTION
R0978   00015   PERFORM  CELESTIAL BODY ACQUISITION
R0979   00016   KEY IN   TERMINATE MARK SEQUENCE
R09795  00017   PERFORM MINKEY RENDEZVOUS
R09796  00020    PERFORM MINKEY PLANE CHANGE PULSE TORQUING
R0980   00041   SWITCH   CM/SM SEPARATION TO UP
R0981   00062   SWITCH   AGC POWER DOWN
R0982   00202   PERFORM  GNCS AUTOMATIC MANEUVER
R0983   00203   SWITCH   TO CMC-AUTO
R0984   00204   PERFORM  SPS GIMBAL TRIM
R0985   00403   SWITCH   OPTICS TO MANUAL OR ZERO
R0986                      SWITCH DENOTES CHANGE POSITION OF A CONSOLE SWITCH
R0987                      PERFORM DENOTES START OR END OF A TASK
R0988                      KEY IN DENOTES KEY IN OF DATA THRU THE DSKY
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L       ASSEMBLY AND OPERATION INFORMATION                                           USER'S PAGE NO.  26      E0

P0989            OPTION CODES FOR 504

R0990            PLEASE REPORT ANY DEFICIENCIES IN THIS LIST TO ASSEMBLY CONTROL
R0991   THE SPECIFIED OPTION CODES WILL BE FLASHED IN COMPONENT R1 IN
R0992   CONJUNCTION WITH VERB04NOUN06 TO REQUEST THE ASTRONAUT TO LOAD INTO
R0993   COMPONENT R2 THE OPTION HE DESIRES.

R0994   *9      *17                                *52                            *11           *25  COLUMN

R0996   OPTION
R0997   CODE    PURPOSE                            INPUT FOR COMPONENT 2          PROGRAM(S)    APPLICABILITY

R0995   00001   SPECIFY IMU ORIENTATION            1=PREF 2=NOM 3=REFSMMAT        P50'S         ALL
R1001   00002   SPECIFY VEHICLE                    1=THIS 2=OTHER                 P21,R30       ALL
R1003   00003   SPECIFY TRACKING ATTITUDE          1=PREFERRED 2=OTHER            R63           ALL
R1005   00004   SPECIFY STATE OF TRACKING=FULTKFLAG 0=FULL 1=PARTIAL              P20           COLOSSUS
R1007   00006   SPECIFY RR COARSE ALIGN OPTION     1=LOCKON 2=CONTINUOUS DESIG.   V41N72        SUNDANCE + LUMINARY
R1009   00007   SPECIFY PROPULSION SYSTEM          1=SPS 2=RCS                    P37           COLOSSUS
R1011   00010   SPECIFY ALIGNMENT MODE             0=ANY TIME 1=REFSMMAT +G       P57           LUMINARY
R1013                                              2=TWO BODIES 3=ONE BODY + G
R1014   00011   SPECIFY SEPARATION MONITOR PHASE   1=DELTAV 2=STATE VECTOR UPDATE P46           LUMINARY
R1016   00012   SPECIFY CSM ORBIT OPTION           1=NO ORBIT CHANGE 2=CHANGE     P22           LUMINARY
R1018                                              ORBIT TO PASS OVER LM
R1020   00024   SPECIFY TRACKING OPTION            0 = RENDEZVOUS, VECPOINT       P20           COLOSSUS
R1022                                              1 = CELESTIAL BODY, VECPOINT
R1023                                              2 = ROTATION
R1024                                              4 = RENDEZVOUS, 3-AXIS
R1025                                              5 = CELESTIAL BODY, 3-AXIS
```

```
L        TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                          USER'S PAGE NO.  1     E

 0001                              44,2000  44,2000    FIXED     MEMORY 120000 - 167777
 0002    REF   1                                                 COUNT   BANKSUM

R00025              MODULE 1 CONTAINS BANKS 0 THROUGH 5

 0003                                 4000                       BLOCK  02
 0004                                 4000             FFTAG1    EQUALS
 0005                                 4000             FFTAG2    EQUALS
 0006                                 4000             FFTAG3    EQUALS
 0007                                 4000             FFTAG4    EQUALS
 0008                                 4000             FFTAG7    EQUALS
 0009                                 4000             FFTAG8    EQUALS
 0010                                 4000             EXECF2    EQUALS
 00105                                4000             WAITF2    EQUALS
 0011                                 4000             FFTAG10   EQUALS
 0012                                 4000             FFTAG12   EQUALS
 00125                                4000             P30SUBS   EQUALS
 00126                                4000             STOPRAT   EQUALS
 0013       0 WORDS LEFT              4000  NO NEED              BNKSUM 02


 0014                                 6000                       BLOCK  03
 0015                                 6000             INTERF3   EQUALS
 0016                                 6000             FFTAG6    EQUALS
 00162                                6000             FFTAG13   EQUALS
 0017      41 WORDS LEFT              7726   07726 0             BNKSUM 03
 0017                                 7727   07727 1


 0018                              00,2000                       BANK    00
 0019                              00,2000             DLAYJOB   EQUALS
 00191                             00,2000             INTERB0   EQUALS
 0020       8 WORDS LEFT           00,3767   03767 1             BNKSUM 00
 0020                              00,3770   03770 1


 0021                              01,2000                       BANK    01
 0022                              01,2000             RESTART   EQUALS
 00222                             01,2000             R02       EQUALS
 0023      22 WORDS LEFT           01,3751   03751 1             BNKSUM 01
 0023                              01,3752   03752 1


 00231                             01,2000             INTERB1   EQUALS
 00232                             01,2000             EXECB1    EQUALS
 0024                              04,2000                       BANK    4
 0025                              04,2000             VERB37    EQUALS
 0026                              04,2000             P50S4     EQUALS
 0028                              04,2000             CSI/CDH1  EQUALS
 0029                              04,2000             INTPRET2  EQUALS
```

```
L          TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                             USER'S PAGE NO.  2      E

 00294                          04,2000                  MIDDGIM  EQUALS
 00295                          04,2000                  P31TAG   EQUALS
 00296                          04,2000                  C13BANK  EQUALS                            C13STALL - CHANGE CODE IF THIS IS MOVED
 00298                          04,2000                  P60S6    EQUALS
 0030        1 WORDS LEFT       04,3776   03776 1                 BNKSUM 04


 0031                           05,2000                           BANK    5
 0032                           05,2000                  FRANDRES EQUALS
 0033                           05,2000                  DOWNTELM EQUALS
 00335                          05,2000                  DAPMASS  EQUALS
 00336                          05,2000                  CONICS4  EQUALS
 00337                          05,2000                  CSITAG1  EQUALS
 00338                          05,2000                  INTINIT3 EQUALS
 0034        3 WORDS LEFT       05,3774   03774 0                 BNKSUM 05
 0034                           05,3775   03775 1


R00345             MODULE 2 CONTAINS BANKS 6 THROUGH 13

 0035                           06,2000                           BANK    6
 0036                           06,2000                  IMUCOMP  EQUALS
 0037                           06,2000                  T4RUP    EQUALS
 00377                          06,2000                  CSIPROG  EQUALS
 00378                          06,2000                  P60S7    EQUALS
 0038        0 WORDS LEFT       06,2000   NO NEED                 BNKSUM 06


 0039                           07,2000                           BANK    7
 0040                           07,2000                  SXTMARKE EQUALS
 0042                           07,2000                  MODESW   EQUALS
 0044                           07,2000                  KEYRUPT  EQUALS
 00445                          07,2000                  CSIPROG6 EQUALS
 00446                          07,2000                  RATEBNK  EQUALS
 0045        0 WORDS LEFT       07,2000   NO NEED                 BNKSUM 07


 0046                           10,2000                           BANK    10
 0047                           10,2000                  DISPLAYS EQUALS
 0048                           10,2000                  PHASETAB EQUALS
 0049                           10,2000                  COMGEOM2 EQUALS
 0051                           10,2000                  P60S4    EQUALS
 0052                           10,2000                  OPTDRV   EQUALS
 00525                          10,2000                  CSIPROG8 EQUALS
 00526                          10,2000                  KALCMON3 EQUALS
 00527                          10,2000                  CONICS5  EQUALS
 0053        0 WORDS LEFT       10,2000   NO NEED                 BNKSUM 10


 0054                           11,2000                           BANK    11
```

```
L        TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                      USER'S PAGE NO.   3

 0055                          11,2000              ORBITAL   EQUALS
 0056                          11,2000              ORBITAL1  EQUALS                  CONSTANTS
 0057                          11,2000              INTVEL    EQUALS
 0058                          11,2000              S52/2     EQUALS
 00585                         11,2000              CONICS3   EQUALS
 00586                         11,2000              INTINIT1  EQUALS
 0059       5 WORDS LEFT       11,3772    03772 0             BNKSUM 11
 0059                          11,3773    03773 1

 0060                          12,2000                        BANK    12
 0061                          12,2000              CONICS    EQUALS
 00611                         12,2000              E/PROG    EQUALS
 00615                         12,2000              CSIPROG2  EQUALS
 00616                         12,2000              CSI/CDH2  EQUALS
 00617                         12,2000              N90TAG    EQUALS
 0062       5 WORDS LEFT       12,3772    03772 0             BNKSUM 12
 0062                          12,3773    03773 1

 0063                          13,2000                        BANK    13
 0064                          13,2000              P76LOC    EQUALS
 0065                          13,2000              LATLONG   EQUALS
 0066                          13,2000              INTINIT   EQUALS
 0067                          13,2000              SR52/1    EQUALS
 00675                         13,2000              ORBITAL2  EQUALS
 00677                         13,2000              E/PROG1   EQUALS
 00678                         13,2000              P24PROG   EQUALS
 0069       6 WORDS LEFT       13,3771    03771 0             BNKSUM 13
 0069                          13,3772    03772 0

R0070   SPACER

R00705            MODULE 3 CONTAINS BANKS 14 THROUGH 21

 0071                          14,2000                        BANK    14
 0072                          14,2000              P50S      EQUALS
 0073                          14,2000              RT53      EQUALS
 0074                          14,2000              P50S1     EQUALS
 0075       4 WORDS LEFT       14,3773    03773 1             BNKSUM 14
 0075                          14,3774    03774 0

 0076                          15,2000                        BANK    15
 0077                          15,2000              STARTAB   EQUALS
 0078                          15,2000              ETRYDAP   EQUALS
 0079                          15,2000              CDHTAGS   EQUALS
 00795                         15,2000              CONICS1   EQUALS
 0080       1 WORDS LEFT       15,3776    03776 1             BNKSUM 15
```

```
L        TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                         USER'S PAGE NO.  4

 0081                          16,2000                         BANK    16
 0082                          16,2000             P40S1       EQUALS
 0083                          16,2000             DAPROLL     EQUALS
 0084                          16,2000             P50S2       EQUALS
 00841                         16,2000             INTVEL1     EQUALS
 00842                         16,2000             RTE2        EQUALS
 00843                         16,2000             CSIPROG5    EQUALS
 00844                         16,2000             LATLONG1    EQUALS
 0085         1 WORDS LEFT     16,3776   03776 1               BNKSUM  16

 0086                          17,2000                         BANK    17
 00865                         17,2000             EXTVRBS1    EQUALS
 0087                          17,2000             DAPS4       EQUALS
 0088                          17,2000             DAPS5       EQUALS
 0089                          17,2000             DAPS7       EQUALS
 00891                         17,2000             P50S3       EQUALS
 00895                         17,2000             CONICS2     EQUALS
 0090         5 WORDS LEFT     17,3772   03772 0               BNKSUM  17
 0090                          17,3773   03773 1

 0091                          20,2000                         BANK    20
 0092                          20,2000             DAPS6       EQUALS
 0093                          20,2000             DAPS1       EQUALS
 0094                          20,2000             DAPS2       EQUALS
 00941                         20,2000             MANUSTUF    EQUALS
 00943                         20,2000             VAC5LOC     EQUALS
 00945                         20,2000             P15LOC      EQUALS
 00946                         20,2000             P29TAG2     EQUALS
 0095        23 WORDS LEFT     20,3750   03750 0               BNKSUM  20
 0095                          20,3751   03751 1

 0096                          21,2000                         BANK    21
 0097                          21,2000             DAPS3       EQUALS
 0098                          21,2000             MYSUBS      EQUALS
 00985                         21,2000             P11THREE    EQUALS
 0099         6 WORDS LEFT     21,3771   03771 0               BNKSUM  21
 0099                          21,3772   03772 0

R00995            MODULE 4 CONTAINS BANKS 22 THROUGH 27

 0100                          22,2000                         BANK    22
 0101                          22,2000             RTBCODES    EQUALS
 0103                          22,2000             DAPS8       EQUALS
 0104                          22,2000             APOPERI     EQUALS
 0106                          22,2000             KALCMON2    EQUALS
 0107                          22,2000             KALCMON1    EQUALS
```

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L         TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                           USER'S PAGE NO.   5      EL

 01075                          22,2000                CSIPROG3 EQUALS
 01076                          22,2000                P36TAG   EQUALS
 0108       4 WORDS LEFT        22,3773   03773 1               BNKSUM 22
 0108                           22,3774   03774 0


 0109                           23,2000                         BANK    23
 0110                           23,2000                P20S2    EQUALS
 0111                           23,2000                INFLIGHT EQUALS
 0112                           23,2000                COMGEOM1 EQUALS
 0113                           23,2000                POWFLITE EQUALS
 0114                           23,2000                POWFLIT1 EQUALS
 0116                           23,2000                POWFLIT2 EQUALS
 0117                           23,2000                R30LOC   EQUALS
 01185                          23,2000                CSIPROG4 EQUALS
 0119       4 WORDS LEFT        23,3773   03773 1               BNKSUM 23
 0119                           23,3774   03774 0


 0120                           24,2000                         BANK    24
 0121                           24,2000                RTBCODE1 EQUALS
 0122                           24,2000                P40S     EQUALS
 01225                          24,2000                CSIPROG7 EQUALS
 01226                          24,2000                R36CM    EQUALS
 01228                          24,2000                P20S5    EQUALS
 0125       7 WORDS LEFT        24,3770   03770 1               BNKSUM 24
 0125                           24,3771   03771 0


 0126                           25,2000                         BANK    25
 0127                           25,2000                REENTRY  EQUALS
 0128       6 WORDS LEFT        25,3771   03771 0               BNKSUM 25
 0128                           25,3772   03772 0


 0129                           26,2000                         BANK    26
 0130                           26,2000                INTPRET1 EQUALS
 0131                           26,2000                REENTRY1 EQUALS
 0132                           26,2000                P60S     EQUALS
 0133                           26,2000                P60S1    EQUALS
 0134                           26,2000                P60S2    EQUALS
 0135                           26,2000                P60S3    EQUALS
 0136                           26,2000                PLANTIN  EQUALS                        LUNAR ROT
 0137                           26,2000                EPHEM    EQUALS
 0138                           26,2000                P05P06   EQUALS
 01381                          26,2000                26P50S   EQUALS
 01383                          26,2000                P30S1A   EQUALS
 01384                          26,2000                P11FOUR  EQUALS
 0139       4 WORDS LEFT        26,3773   03773 1               BNKSUM 26
 0139                           26,3774   03774 0
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L        TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                              USER'S PAGE NO.  6

R0140

 0141                         27,2000                         BANK    27
 0142                         27,2000             TOF-FF      EQUALS
 0144                         27,2000             MANUVER     EQUALS
 0145                         27,2000             MANUVER1    EQUALS
 01455                        27,2000             P40S5       EQUALS
 0146                         27,2000             VECPT       EQUALS
 0147                         27,2000             MGIM        EQUALS
 0148                         27,2000             UPDATE2     EQUALS
 0149                         27,2000             R22S1       EQUALS
 01495                        27,2000             P60S5       EQUALS
 01496                        27,2000             CDHTAG      EQUALS
 01497                        27,2000             JANESUB     EQUALS
 0150     10 WORDS LEFT       27,3765   03765 0               BNKSUM  27
 0150                         27,3766   03766 0

R01505           MODULE 5 CONTAINS BANKS 30 THROUGH 35

 0151                         30,2000                         BANK    30
 0153                         30,2000             LOWSUPER    EQUALS
 0156                         30,2000             P20S1       EQUALS
 0157                         30,2000             P20S6       EQUALS
 01575                        30,2000             P40S3       EQUALS
 01576                        30,2000             P29TAG1     EQUALS
 0158      8 WORDS LEFT       30,3767   03767 1               BNKSUM  30
 0158                         30,3770   03770 1

 0159                         31,2000                         BANK    31
 0161                         31,2000             RT23        EQUALS
 01621                        31,2000             R34         EQUALS
 01625                        31,2000             CDHTAG2     EQUALS
 01626                        31,2000             CSIPROG9    EQUALS
 01627                        31,2000             R31         EQUALS
 01628                        31,2000             P22S        EQUALS
 01629                        31,2000             RTE3        EQUALS
 016295                       31,2000             MEASINC3    EQUALS
 016296                       31,2000             V89TAG      EQUALS
 0163      7 WORDS LEFT       31,3770   03770 1               BNKSUM  31
 0163                         31,3771   03771 0

 0164                         32,2000                         BANK    32
 0165                         32,2000             P20S9       EQUALS
 0166                         32,2000             RTE         EQUALS
 0167                         32,2000             DELRSPL1    EQUALS
 01675                        32,2000             IMUCAL3     EQUALS
 0168      2 WORDS LEFT       32,3775   03775 1               BNKSUM  32
 0168                         32,3776   03776 1
```

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L         TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                  USER'S PAGE NO.   7

  0169                           33,2000                       BANK    33
  0170                           33,2000             TESTLEAD EQUALS
  0171                           33,2000             IMUCAL   EQUALS
  01711                          33,2000             P11TWO   EQUALS
  01715                          33,2000             P15LOC1  EQUALS
  0172       1 WORDS LEFT        33,3776   03776 1            BNKSUM 33

  0173                           34,2000                       BANK    34
  0175                           34,2000             P11ONE   EQUALS
  0176                           34,2000             P20S3    EQUALS
  0177                           34,2000             P20S4    EQUALS
  01771                          34,2000             TOF-FF1  EQUALS
  0178       5 WORDS LEFT        34,3772   03772 0            BNKSUM 34
  0178                           34,3773   03773 1

  0179                           35,2000                       BANK    35
  01795                          35,2000             RTECON1  EQUALS
  0180                           35,2000             CSI/CDH  EQUALS
  0181                           35,2000             P30S1    EQUALS
  0183                           35,2000             P20S8    EQUALS
  01846                          35,2000             INTINIT2 EQUALS
  0185       7 WORDS LEFT        35,3770   03770 1            BNKSUM 35
  0185                           35,3771   03771 0

R01855            MODULE 6 CONTAINS BANKS 36 THROUGH 43

  0186                           36,2000                       BANK    36
  0188                           36,2000             MEASINC  EQUALS
  0189                           36,2000             MEASINC1 EQUALS
  0190                           36,2000             P15LOC2  EQUALS
  01905                          36,2000             P20S7    EQUALS
  0191                           36,2000             RTE1     EQUALS
  01911                          36,2000             S3435LOC EQUALS
  0192       9 WORDS LEFT        36,3766   03766 0            BNKSUM 36
  0192                           36,3767   03767 1

  0193                           37,2000                       BANK    37
  0194                           37,2000             P20S     EQUALS
  0195                           37,2000             BODYATT  EQUALS
  0196                           37,2000             RENDEZ   EQUALS
  0197                           37,2000             SERVICES EQUALS
  01977                          37,2000             CDHTAGS  EQUALS
  0198      59 WORDS LEFT        37,3704   03704 1            BNKSUM 37
  0198                           37,3705   03705 0
```

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L         TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                  USER'S PAGE NO.  5      1

 0199                           40,2000                          BANK    40
 0200                           40,2000              PINSUPER EQUALS
 0202                           40,2000              PINBALL1 EQUALS
 0203      2 WORDS LEFT         40,3775   03775 1             BNKSUM 40
 0203                           40,3776   03776 1


 0204                           41,2000                       BANK    41
 0205                           41,2000              PINBALL2 EQUALS
 0206    145 WORDS LEFT         41,3556   03556 1             BNKSUM 41
 0206                           41,3557   03557 0


 0207                           42,2000                       BANK    42
 0208                           42,2000              SBAND    EQUALS
 0209                           42,2000              PINBALL3 EQUALS
 02095                          42,2000              EXTVBS   EQUALS
 02097                          42,2000              UPDATE3  EQUALS
 0210      2 WORDS LEFT         42,3775   03775 1             BNKSUM 42
 0210                           42,3776   03776 1


 0211                           43,2000                       BANK    43
 0212                           43,2000              SELFCHEC EQUALS
 0213                           43,2000              EXTVERBS EQUALS
 0214     45 WORDS LEFT         43,3722   03722 0             BNKSUM 43
 0214                           43,3723   03723 1


 0215    REF   1                26,3335              HI6ZEROS EQUALS ZEROVECS          ZERO VECTOR ALWAYS IN HIGH MEMORY
 0216    REF   1                04,3761              LO6ZEROS EQUALS ZEROVEC           ZERO VECTOR ALWAYS IN LOW MEMORY
 0217    REF   1                26,3333              HIDPHALF EQUALS UNITX
 0218    REF   1                04,3757              LODPHALF EQUALS XUNIT
 0219    REF   1                26,3325              HIDP1/4  EQUALS DP1/4TH
 0220    REF   1                15,3411              LODP1/4  EQUALS C1/4              2DEC .25
 0221    REF   2  LAST    34    26,3333              HIUNITX  EQUALS UNITX
 0222    REF   1                26,3331              HIUNITY  EQUALS UNITY
 0223    REF   1                26,3327              HIUNITZ  EQUALS UNITZ
 0224    REF   2  LAST    34    04,3757              LOUNITX  EQUALS XUNIT             2DEC .5
 0225    REF   1                04,3755              LOUNITY  EQUALS YUNIT             2DEC 0
 0226    REF   1                04,3753              LOUNITZ  EQUALS ZUNIT             2DEC 0
 0227    REF   1                11,3760              3/4LOWDP EQUALS 3/4               2DEC 3.0 B-2
 0228    REF   1                30,2000                       SBANK= LOWSUPER


R0229    ROPE SPECIFIC ASSIGNS OBVIATING NEED TO CHECK COMPUTER FLAG IN DETERMINING INTEGRATION AREA ENTRIES
 0231    REF   1                13,3161              OTHPREC  EQUALS LEMPREC
 0232    REF   1                13,3034              ATOPOTH  EQUALS ATOPLEM
 0233    REF   1                13,2761              ATOPTHIS EQUALS ATOPCSM
 0234    REF   1                   0173              MOONTHIS EQUALS CMOONFLG
```

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L        TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                      USER'S PAGE NO.  9      1  52

 02345   REF    1                      0174             MOONUTH   EQUALS LMOONFLG
 0235    REF    1                   13,2774             MOVATHIS EQUALS MOVEACSM
 0236    REF    1                   31,2031             STATEST   EQUALS V83CALL            # TEMPORARY
 0237    REF    1                   13,3145             THISPREC EQUALS CSMPREC
 0238    REF    3  LAST    34       26,3333             THISAXIS =       UNITX
 02385   REF    1                      5041             ERASID    EQUALS LOW10              DOWNLINK ERASABLE DUMP ID
 02388   REF    1                      6214             DELAYNUM EQUALS THREE
R0239    ************************************************************************************************************************
```

```
L       ABSOLUTE LOCATIONS FOR UPDATES                                          USER'S PAGE NO.  1     L. 52
R0110                                     ECADR                    MNEMONIC
R0111                                     -----                    --------
 0120   REF    1                          01501 1          =ECADR UPSVFLAG      CSM/LM STATE VECTOR UPDATE
 0130   REF    1                          00306 1          =ECADR XSMD          DESIRED REFSMMAT UPDATE
 0140   REF    1                          01733 1          =ECADR REFSMMAT      REFSMMAT UPDATE
 0150   REF    1                          03404 1          =ECADR DELVSLV       EXTERNAL DELTA-V UPDATE
 0160   REF    1                          03400 0          =ECADR LAT(SPL)      RETROFIRE EXT DELTA-V OR ENTRY UPDATE
 0170   REF    1                          03412 0          =ECADR TIG           LAMBERT TARGET UPDATE
 0180   REF    1                          02025 1          =ECADR RLS           LANDING SITE VECTOR UPDATE
```

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L        SUBROUTINE CALLS                                                                           USER'S PAGE NO.  1      E- 37

  0001                             0000                        SUBRO  ERASTOTL  041
  0002                             0000                        SUBRO  DIOGENES  064
  0003                             0000                        SUBRO  MEDUSA    035
  0004   *                         0000                        SUBRO  MENELAUS  061
  0005                             0000                        SUBRO  ULYSSES   029
  0006                             0000                        SUBRO  ZEUS      046

 *** END OF MAIN PROGRAM ***
```

```
L       ERASABLE ASSIGNMENTS                                                        USER'S PAGE NO.  1       E 57

R0001   CONVENTIONS AND NOTATIONS UTILIZED FOR ERASABLE ASSIGNMENTS.

R0002             EQUALS IS USED IN TWO WAYS.  IT IS OFTEN USED TO CHAIN A GROUP
R0003                    OF ASSIGNMENTS SO THAT THE GROUP MAY BE MOVED WITH THE
R0004                    CHANGING OF ONLY ONE CARD.  EXAMPLE.

A0005                                        X        EQUALS START
A0006                                        Y        EQUALS X          +SIZE.X
A0007                                        Z        EQUALS Y          +SIZE.Y

R0008                    (X, Y, AND Z ARE CONSECUTIVE AND BEGIN AT START.        )
R0009                    (SIZE.X AND SIZE.Y ARE THE RESPECTIVE SIZES OF X AND Y,
R0010                     USUALLY NUMERIC,  IE. 1, 2, 6, 18D ETC.                )

R0011             EQUALS OFTEN IMPLIES THE SHARING OF REGISTERS (DIFFERENT NAMES
R0012                    AND DIFFERENT DATA).  EXAMPLE.

A0013                                        X        EQUALS Y

R0014             = MEANS THAT MULTIPLE NAMES HAVE BEEN GIVEN TO THE SAME DATA.
R0015                    (THIS IS LOGICAL EQUIVALENCE, NOT SHARING)  EXAMPLE.

A0016                                        X        =      Y

R0017             THE SIZE AND UTILIZATION OF AN ERASABLE ARE OFTEN INCLUDED IN
R0018             THE COMMENTS IN THE FOLLOWING FORM.  M(SIZE)N.

R0019                    M REFERS TO THE MOBILITY OF THE ASSIGNMENT.
R0020                         B   MEANS THAT THE SYMBOL IS REFERENCED BY BASIC
R0021                             INSTRUCTIONS AND THUS IS E-BANK SENSITIVE.
R0022                         I   MEANS THAT THE SYMBOL IS REFERENCED ONLY BY
R0023                             INTERPRETIVE INSTRUCTIONS, AND IS THUS E-BANK
R0024                             INSENSITIVE AND MAY APPEAR IN ANY E-BANK.

R0025                    SIZE IS THE NUMBER OF REGISTERS INCLUDED BY THE SYMBOL.

R0026                    N INDICATES THE NATURE OR PERMANENCE OF THE CONTENTS.
R0027                         PL MEANS THAT THE CONTENTS ARE PAD LOADED.
R0028                         DSP MEANS THAT THE REGISTER IS USED FOR A DISPLAY.
R0029                         PRM MEANS THAT THE REGISTER IS PERMANENT, IE. IT
R0030                             IS USED DURING THE ENTIRE MISSION FOR ONE
R0031                             PURPOSE AND CANNOT BE SHARED.
R0032                         TMP MEANS THAT THE REGISTER IS USED TEMPORARILY OR
R0033                             IS A SCRATCH REGISTER FOR THE ROUTINE TO WHICH
R0034                             IT IS ASSIGNED.  THAT IS, IT NEED NOT BE SET
R0035                             PRIOR TO INVOCATION OF THE ROUTINE NOR DOES IT
R0036                             CONTAIN USEFUL OUTPUT TO ANOTHER ROUTINE.  THUS
```

```
R0037                              IT MAY BE SHARED WITH ANY OTHER ROUTINE WHICH
R0038                              IS NOT ACTIVE IN PARALLEL.
R0039                          IN  MEANS INPUT TO THE ROUTINE AND IT IS PROBABLY
R0040                              TEMPORARY FOR A HIGHER-LEVEL ROUTINE/PROGRAM.
R0041                          OUT MEANS OUTPUT FROM THE ROUTINE, PROBABLY
R0042                              TEMPORARY FOR A HIGHER-LEVEL ROUTINE/PROGRAM.
```

```
L       ERASABLE ASSIGNMENTS                                                       USER'S PAGE NO.   3       [illegible]

P0050            SPECIAL REGISTERS.

 0051                              0000         A          EQUALS 0
 0052                              0001         L          EQUALS 1                 L AND Q ARE BOTH CHANNELS AND REGISTERS.
 0053                              0002         Q          EQUALS 2
 0054                              0003         EBANK      EQUALS 3
 0055                              0004         FBANK      EQUALS 4
 0056                              0005         Z          EQUALS 5                 ADJACENT TO FBANK AND BBANK FOR DXCH Z
 0057                              0006         BBANK      EQUALS 6                 (DTCB) AND DXCH FBANK (DTCF)
A0058                                                                               REGISTER 7 IS A ZERO-SOURCE, USED BY ZL.

 0059                              0010         ARUPT      EQUALS 10                INTERRUPT STORAGE.
 0060                              0011         LRUPT      EQUALS 11
 0061                              0012         QRUPT      EQUALS 12
 0062                              0013         SAMPTIME   EQUALS 13                SAMPLED TIME 1 & 2.
 0063                              0015         ZRUPT      EQUALS 15                (13 AND 14 ARE SPARES.)
 0064                              0016         BANKRUPT   EQUALS 16                USUALLY HOLDS FBANK OR BBANK
 0065                              0017         BRUPT      EQUALS 17                RESUME ADDRESS AS WELL

 0066                              0020         CYR        EQUALS 20
 0067                              0021         SR         EQUALS 21
 0068                              0022         CYL        EQUALS 22
 0069                              0023         EDOP       EQUALS 23                EDITS INTERPRETIVE OPERATION CODE PAIRS.


 0070                              0024         TIME2      EQUALS 24
 0071                              0025         TIME1      EQUALS 25
 0072                              0026         TIME3      EQUALS 26
 0073                              0027         TIME4      EQUALS 27
 0074                              0030         TIME5      EQUALS 30
 0075                              0031         TIME6      EQUALS 31
 0076                              0032         CDUX       EQUALS 32
 0077                              0033         CDUY       EQUALS 33
 0078                              0034         CDUZ       EQUALS 34
 0079                              0035         CDUT       EQUALS 35                OPTICS TRUNNION CDU (WAS OPTY)
 0081                              0036         CDUS       EQUALS 36                OPTICS SHAFT CDU (WAS OPTX)
 0083                              0037         PIPAX      EQUALS 37
 0084                              0040         PIPAY      EQUALS 40
 0085                              0041         PIPAZ      EQUALS 41
 0086                              0042         BMAGX      EQUALS 42
 0087                              0043         BMAGY      EQUALS 43
 0088                              0044         BMAGZ      EQUALS 44
 0089                              0045         INLINK     EQUALS 45
 0090                              0046         RNRAD      EQUALS 46
 0092                              0047         GYROCMD    EQUALS 47
 0093                              0050         CDUXCMD    EQUALS 50
 0094                              0051         CDUYCMD    EQUALS 51
 0095                              0052         CDUZCMD    EQUALS 52
 0096                              0053         CDUTCMD    EQUALS 53                OPTICS TRUNNION COMMAND (WAS OPTYCMD).
 0098    REF   1                   0053         TVCYAW     EQUALS CDUTCMD           SPS YAW COMMAND IN TVC MODE.
```

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L       ERASABLE ASSIGNMENTS                                                      USER'S PAGE NO.   4      E0 S?

 0099                           0054             CDUSCMD  EQUALS 54               OPTICS SHAFT COMMAND (WAS OPT&CMD).
 0100   REF   1                 0054             TVCPITCH EQUALS CDUSCMD          SPS PITCH COMMAND IN TVC MODE.
R0105   REGISTERS 55-60 ARE COUNTERS WHICH ARE NOT PRESENTLY WIRED, AND SO MAY BE USED WITH CARE


R0107           INTERPRETIVE REGISTERS ADDRESSED RELATIVE TO VAC AREA.

 0108                           0042             LVSQUARE EQUALS 34D              SQUARE OF VECTOR INPUT TO ABVAL AND UNIT
 0109                           0044             LV       EQUALS 36D              LENGTH OF VECTOR INPUT TO UNIT.
 0110                           0046             X1       EQUALS 38D              INTERPRETIVE SPECIAL REGISTERS RELATIVE
 0111                           0047             X2       EQUALS 39D              TO THE WORK AREA
 0112                           0050             S1       EQUALS 40D
 0113                           0051             S2       EQUALS 41D
 0114                           0052             QPRET    EQUALS 42D
```

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L        ERASABLE ASSIGNMENTS                                                                USER'S PAGE NO.  5       EQ S?

P0115    INPUT/OUTPUT CHANNELS

A01151                                                  *** CHANNEL ZERO IS TO BE USED IN AN INDEXED OPERATION ONLY. ***
 01152  REF    1                     0001              LCHAN      EQUALS L
 01153  REF    1                     0002              QCHAN      EQUALS Q
 0116                                0003              HISCALAR EQUALS 3
 0117                                0004              LOSCALAR EQUALS 4
 0118                                0005              PYJETS     EQUALS 5
 01185  REF    1                     0005              CHAN5      =        PYJETS
 0119                                0006              ROLLJETS EQUALS 6
 01195  REF    1                     0006              CHAN6      =        ROLLJETS
 0120                                0007              SUPERBNK EQUALS 7
 0121                                0010              OUT0       EQUALS 10
 0122                                0011              DSALMOUT EQUALS 11
 0123                                0012              CHAN12     EQUALS 12
 0124                                0013              CHAN13     EQUALS 13
 0125                                0014              CHAN14     EQUALS 14
 0126                                0015              MNKEYIN    EQUALS 15
 0127                                0016              NAVKEYIN EQUALS 16
 01271                               0030              CHAN30     EQUALS 30
 01272                               0031              CHAN31     EQUALS 31
 01273                               0032              CHAN32     EQUALS 32
 0128                                0033              CHAN33     EQUALS 33
 0129                                0034              DNTM1      EQUALS 34
 0130                                0035              DNTM2      EQUALS 35
 01301                               0076              CHAN76     EQUALS 76
 01302                               0077              CHAN77     EQUALS 77
R0131   END OF CHANNEL ASSIGNMENTS
```

```
P0135              FLAGWORDS


R0136    FLAGWRD0          STATE +0         (000-014)
R0137    FLAGWRD1          STATE +1         (015-029)
R0138    FLAGWRD2          STATE +2         (030-044)
R0139    FLAGWRD3          STATE +3         (045-059)
R0140    FLAGWRD4          STATE +4         (060-074)
R0141    FLAGWRD5          STATE +5         (075-089)
R0142    FLAGWRD6          STATE +6         (090-104)
R0143    FLAGWRD7          STATE +7         (105-119)
R0144    FLAGWRD8          STATE +8D        (120-134)
R0145    FLAGWRD9          STATE +9D        (135-149)
A0146

R0147              SORTED LIST OF

R0148              INTERPITIVE SWITCH BIT ASSIGNMENTS

R0149    INTERPRETIVE SWITCH BIT ASSIGNMENTS
R0150    FLAGWORD        DEC NUM          BIT + FLAG          EQUIVALENT FLAGWORDS

R01505 *.05GSW           102D             BIT 3 FLAG 6
R0151     22DSPFLG       032D             BIT 13 FLAG 2
R0152     360SW          134D             BIT 1 FLAG 8
R0153     3AXISFLG       084D             BIT 6 FLAG 5
R0156     ADVTRK         125D             BIT 10 FLAG 8
R01565    AMOONFLG       13D              BIT 2 FLAG 0
R0157     APSESW         130D             BIT 5 FLAG 8
R0159     ASTNFLAG       108D             BIT 12 FLAG 7
R0161     ATTCHFLG       118D             BIT 2 FLAG 7
R0162     AUTOSEQ        158D             BIT 7  FLAG 10
R0164     AVEGFLAG       029D             BIT 1 FLAG 1
R0165     AVEMIDSW       149D             BIT 1 FLAG 9
R0166     AVFLAG         040D             BIT 5 FLAG 2
R0167     AZIMFLAG       172D             BIT 8 FLAG 11
R0168     BURNFLAG       155D             BIT 10 FLAG 10
R0169     CALCMAN2       043D             BIT 2 FLAG 2
R0171     CMDAPARM       093D             BIT 12 FLAG 6
R0172     CMOONFLG       123D             BIT 12 FLAG 8
R0173     CM/DSTBY       103D             BIT 2 FLAG 6
R0174     COGAFLAG       131D             BIT 4 FLAG 8
R0175     COMPUTER       082D             BIT 8 FLAG 5
R01765    CSISFLAG       174D             BIT 6  FLAG11
R0177     CULTFLAG       053D             BIT 7 FLAG 3
R0178     CYC61FLG       110              BIT 4  FLAG 0
R0179     D6OR9FLG       058D             BIT 2 FLAG 3
R0180     DAPBIT1        090D             BIT 15 FLAG 6
R0181     DAPBIT2        091D             BIT 14 FLAG 6
```

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L         ERASABLE ASSIGNMENTS                                                          USER'S PAGE NO.  1     EL 52

R0182    DIMOFLAG        059D           BIT 1 FLAG 3
R0184    DMENFLG         081D           BIT 9 FLAG 5
R0185    DRIFTFLG        030D           BIT 15 FLAG 2
R0186    DSKYFLAG        075D           BIT 15 FLAG 5
R0187    EGSW            97D            BIT 8 FLAG 6        KNOWNFLG  R57FLAG
R0190    ENG2FLAG        019D           BIT 11 FLAG 1
R0191    ENGONFLG        083D           BIT 7 FLAG 5
R0192   *ENTRYDSP        047D           BIT 13 FLAG 6
R0193    ERADFLAG        017D           BIT 13 FLAG 1
R0194    ETPIFLAG        038D           BIT 7 FLAG 2        FIRSTFLG  OPTNSW
R0196    F2RTE           10D            BIT 5  FLAG 0
R0197    FINALFLG        039D           BIT 6 FLAG 2
R0198    FIRSTFLG        38D            BIT 7  FLAG 2       ETPIFLAG  OPTNSW
R0201    FREEFLAG        012D           BIT 3 FLAG 0
R02015   FULTKFLG        163D           BIT 2 FLAG 10
R0202    GAMDIFSW        094D           BIT 11 FLAG 6
R0204    GLOKFAIL        046D           BIT 14 FLAG 3
R0207    GONEBY          112D           BIT 8 FLAG 7
R0208    GONEPAST        095D           BIT 10 FLAG 6
R0209    GRRBKFLG        085D           BIT 5 FLAG 5
R0211    GUESSW          028D           BIT 2 FLAG 1
R0212    GYMDIFSW        104D           BIT 1 FLAG 6
R02135   HAFLAG          173D           BIT 7  FLAG 11
R02136   HDSUPFLG        154D           BIT 11 FLAG 10
R0214    HIND            099D           BIT 6 FLAG 6
R02152   IDLEFAIL        024D           BIT 6 FLAG 1
R0217    IGNFLAG         107D           BIT 13 FLAG 7
R0218    IMPULSW         036D           BIT 9 FLAG 2
R0219    IMUSE           007D           BIT 8 FLAG 0
R0220    INCORFLG        079D           BIT 11 FLAG 5
R0221    INFINFLG        128D           BIT 7 FLAG 8
R0222    INRLSW          100D           BIT 5 FLAG 6
R02221   INTFLAG         151D           BIT 14 FLAG 10
R0225    INTYPFLG        056D           BIT 4 FLAG 3
R0227    ITSWICH         106D           BIT 14 FLAG 7
R0228   *JSWITCH         001D           BIT 14 FLAG 0
R0232    KNOWNFLG        097D           BIT 8  FLAG 6       EGSW  R57FLAG
R0234    LATSW           101D           BIT 4  FLAG 6
R0235    LMOONFLG        124D           BIT 11 FLAG 8
R0238    LUNAFLAG        048D           BIT 12 FLAG 3
R02385   MANEUFLG        160D           BIT 5 FLAG 10
R0239    MARKFLG         026D           BIT 4 FLAG 1
R02395   MAXDBFLG        138D           BIT 12 FLAG 9
R0240    MGLVFLAG        088D           BIT 2 FLAG 5
R0241    MID1FLAG        147D           BIT 3 FLAG 9
R0242    MIDAVFLG        148D           BIT 2 FLAG 9
R0243    MIDFLAG         002D           BIT 13 FLAG 0
R0244    MKOVFLAG        072D           BIT 3 FLAG 4
R0245    MOONFLAG        003D           BIT 12 FLAG 0
R0246    MRKIDFLG        060D           BIT 15 FLAG 4
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R0247    MRKNVFLG         066D              BIT 9 FLAG 4
R0248    MRUPTFLG         070D              BIT 5 FLAG 4
R0251    MWAITFLG         064D              BIT 11 FLAG 4
R0252    N22ORN17         144D              BIT 6 FLAG 9
R0254    NEEDLFLG         006D              BIT 9 FLAG 0
R0255    NEWIFLG          122D              BIT 13 FLAG 8
R02551   NEWLMFLG         121D              BIT 14 FLAG  8
R02552   NEWTFLAG         80D               BIT 10 FLAG 5
R0256    NJETSFLG         015D              BIT 15 FLAG 1
R0258    NODOFLAG         044D              BIT 1 FLAG 2
R02581   NODOP01          018D              BIT 12 FLAG 1
R0259    NORFHOR          004D              BIT 11 FLAG 0
R0260    NORMSW           110D              BIT 10 FLAG 7
R0261    NOSWITCH         098D              BIT 7  FLAG 6
R0265    NRMIDFLG         062D              BIT 13 FLAG 4
R0266    NRMNVFLG         067D              BIT 8 FLAG 4
R0267    NRUPTFLG         071D              BIT 4 FLAG 4
R0269    NWAITFLG         065D              BIT 10 FLAG 4
R0274    ORBWFLAG         054D              BIT 6  FLAG 3
R0275    ORDERSW          129D              BIT 6 FLAG 8
R0276    P21FLAG  033D                      BIT 12 FLAG 2
R02765   P22MKFLG         49D               BIT 11 FLAG 3
R02766   P24FLAG          136D              BIT 14 FLAG  9
R02767   P24MKFLG         042D              BIT  3 FLAG  2
R0277    P29FLAG          14D               BIT 1 FLAG 0
R0278    P35FLAG          157D              BIT 8 FLAG 10
R02785   PCFLAG           164D              BIT 1 FLAG 10
R02788   PCMANFLG         150D              BIT 15 FLAG 10
R0279    PDSPFLAG         063D              BIT 12 FLAG 4
R0280    PFRATFLG         041D              BIT 4 FLAG 2
R0281    PINBRFLG         069D              BIT 6 FLAG 4
R02815   PCOFLAG          051D              BIT 9  FLAG 3
R0282    PRECIFLG         052D              BIT 8 FLAG 3
R0284    PRIODFLG         061D              BIT 14 FLAG 4
R0285    PRONVFLG         068D              BIT 7 FLAG 4
R02855   PTV93FLG         161D              BIT 4 FLAG 10
R0286    QUITFLAG         145D              BIT 5 FLAG 9
R0287    R21MARK          031D              BIT 14 FLAG 2
R0288    R22CAFLG         143D              BIT 7 FLAG 9
R0291    R31FLAG          146D              BIT 4 FLAG 9
R0293    R53FLAG          009D              BIT 6 FLAG 0
R029601  R67FLAG          133D              BIT 2  FLAG 8
R02961   RANGFLAG         156D              BIT 9 FLAG 10
R0297    REFSMFLG         047D              BIT 13 FLAG 3
R02971   REINTFLG         152D              BIT 13 FLAG 10
R02972   REJCTFLG         153D              BIT 12 FLAG 10
R0298    RELVELSW         096D              BIT 9 FLAG 6
R0299    RENDWFLG         089D              BIT 1 FLAG 5
R02995   RETROFLG         76D               BIT 14 FLAG 5
R0300    RNDVZFLG         008D              BIT 7 FLAG 0
```

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L        ERASABLE ASSIGNMENTS                                                                        USER'S PAGE NO.   9       E2 S?

R0304    RPQFLAG          120D              BIT 15 FLAG 8
R0308    RVSW             111D              BIT 9 FLAG 7
R0309   *S32.1F1          165D              BIT 15 FLAG 11
R0310   *S32.1F2          166D              BIT 14 FLAG 11
R0311   *S32.1F3A         167D              BIT 13 FLAG 11
R0312   *S32.1F3B         168D              BIT 12 FLAG 11
R0313    SAVECFLG         140D              BIT 10 FLAG 9
R03135   SKIPVHF 035D                       BIT 10 FLAG 2
R0314    SLOPESW          027D              BIT 3 FLAG 1
R03145   SLOWFLG          77D               BIT 13 FLAG 5
R0315    SOLNSW           087D              BIT 3 FLAG 5
R0316    SOURCFLG         142D              BIT 8 FLAG 9
R0318    STATEFLG         055D              BIT 5 FLAG 3
R0319    STEERSW          034D              BIT 11 FLAG 2
R0320    STIKFLAG         016D              BIT 14 FLAG 1
R03201   STRULLSW         92D               BIT 13 FLAG 6
R0321    SURFFLAG         127D              BIT 8  FLAG 8
R0323    SWTOVER          135D              BIT 15 FLAG 9
R0324    TARG1FLG         020D              BIT 10 FLAG 1
R0325    TARG2FLG         021D              BIT 9 FLAG 1
R0326    TERMIFLG         105D              BIT 15 FLAG 7
R0327    TFFSW            119D              BIT 1 FLAG 7
R0328    TIMRFLAG         109D              BIT 11 FLAG 7
R03285   TPIMNFLG         162D              BIT 3 FLAG 10
R0329    TRACKFLG         025D              BIT 5 FLAG 1
R0332    UPDATFLG         023D              BIT 7 FLAG 1
R0334    UPLOCKFL         116D              BIT 4 FLAG 7
R03341   UTFLAG           126D              BIT 9 FLAG 8
R0335    V37FLAG          114D              BIT 6 FLAG 7
R03355   V50N18FL         045D              BIT 15 FLAG 3
R0336    V59FLAG          078D              BIT 12 FLAG 5
R03362   VE2EMFLG         137D              BIT 13 FLAG 9
R0337    V94FLAG          139D              BIT 11 FLAG 9
R03375   V96ONFLG         132D              BIT 3 FLAG 8
R0338    VEHUPFLG         022D              BIT 8 FLAG 1
R0339    VERIFLAG         117D              BIT 3 FLAG 7
R0340    VFLAG            050D              BIT 10 FLAG 3
R0341    VHFRFLAG         141D              BIT 9 FLAG 9
R0343    VINTFLAG         057D              BIT 3 FLAG 3
R03435   VNFLAG           073D              BIT 2 FLAG 4
R0344    XDELVFLG         037D              BIT 8 FLAG 2
R0345    XDSPFLAG         074D              BIT 1 FLAG 4
R0346   *ZMEASURE         005D              BIT 10 FLAG 0
```

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P0352    INTERPRETIVE SWITCH BIT ASSIGNMENTS
 0353    REF   1                0074           FLAGWRD0 =      STATE +0        (000-014)

A0354                                                                          (SET)                (RESET)

A0355                                                          BIT 15 FLAG 0
A0356                                                     =    0000
A0358                                                          BIT 14 FLAG 0
 0359                           0001           JSWITCH  =      0010            INTEGRATION OF W     INTEGRATION OF STATE
A0360                                                                          MATRIX               VECTOR

 03605   REF   1                4753           JSWCHBIT =      BIT14

A0361                                                          BIT 13 FLAG 0
 0362                           0002           MIDFLAG  =      0020            INTEGRATION WITH     INTEGRATION WITHOUT
A0363                                                                          SOLAR PERTURBATIONS SOLAR PERTURBATIONS

 03635   REF   1                4754           MIDFLBIT =      BIT13

A0364                                                          BIT 12 FLAG 0
 0365                           0003           MOONFLAG =      0030            MOON IS SPHERE OF    EARTH IS SPHERE OF
A0366                                                                          INFLUENCE            INFLUENCE

 03665   REF   1                4755           MOONBIT  =      BIT12

A0369                                                          BIT 11 FLAG 0
 0370                           0004           NORFHOR  =      0040            FAR HORIZON          NEAR HORIZON


 03705   REF   1                4756           NORFBIT  =      BIT11

A0373                                                          BIT 10 FLAG 0
 0374                           0005           ZMEASURE =      0050            MEASUREMENT PLANET   MEASUREMENT PLANET
A0375                                                                          AND PRIMARY PLANET   AND PRIMARY PLANET
A0376                                                                          DIFFERENT            SAME

 03775   REF   1                4757           ZMEASBIT =      BIT10

A0379                                                          BIT 9 FLAG 0
 0380                           0006           NEEDLFLG =      0060            TOTAL ATTITUDE       A/P FOLLOWING ERROR
A0381                                                                          ERROR DISPLAYED      DISPLAYED

 03815   REF   1                4760           NEEDLBIT =      BIT9

A0382                                                          BIT 8 FLAG 0
 0383                           0007           IMUSE    =      0070            IMU IN USE           IMU NOT IN USE

 03835   REF   1                4761           IMUSEBIT =      BIT8

A0384                                                          BIT 7 FLAG 0
```

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L       ERASABLE ASSIGNMENTS                                                  USER'S PAGE NO.  11      E0 5?

 0385                           0010       RNDVZFLG =     008D          P20 RUNNING           P20 NOT RUNNING
 03865  REF   1                 4762       RNDVZBIT =     BIT7

A0390                                                     BIT 6 FLAG 0
 0391                           0011       R53FLAG  =     009D          V51 INITIATED         V51 NOT INITIATED

 03915  REF   1                 4763       R53FLBIT =     BIT6

A0395                                                     BIT 5 FLAG 0
 0396                           0012       F2RTE    =     010D          IN TIME CRITICAL      NOT IN TIME CRITICAL
A0397                                                                   MODE                  MODE

 03975  REF   1                 4764       F2RTEBIT =     BIT5

A0398                                                     BIT 4 FLAG 0
 0399                           0013       CYC61FLG =     11D           KALCMAN3 TO RETURN    KALCMAN3 TO DO
A0400                                                                   TO R61 AFTER          MANEUVER

 0401   REF   1                 4765       CYC61BIT =     BIT4          COMPUTING TM

A0403                                                     BIT 3 FLAG 0
 0404                           0014       FREEFLAG =     012D          (TEMPORARY FLAG USED IN MANY ROUTINES)

 04045  REF   1                 4766       FREEFBIT =     BIT3

A0405                                                     BIT 2 FLAG 0
 0406                           0015       AMOONFLG =     013D          STATE VECTOR IN       STATE VECTOR IN
 0407   REF   1                 4767       AMOONBIT =     BIT2          LUNAR SPHERE AT       EARTH SPHERE AT
A04071                                                                  MIDTOAVE              MIDTOAVE

A0408                                                     BIT 1 FLAG 0
 0409                           0016       P29FLAG  =     14D           P29 RUNNING. 1ST      P29 FINISHED WITH
 0410   REF   1                 4770       P29BIT   =     BIT1          PASS IN PROGRESS.     1ST PASS.

 0411   REF   2  LAST   47      0075       FLAGWRD1 =     STATE +1      (015-029)

A0412                                                                   (SET)                 (RESET)

A0413                                                     BIT 15 FLAG 1
 0414                           0017       NJETSFLG =     015D          TWO JET RCS BURN      FOUR JET RCS BURN

 04145  REF   1                 4752       NJETSBIT =     BIT15

A0415                                                     BIT 14 FLAG 1
 0416                           0020       STIKFLAG =     016D          RHC CONTROL           CMC CONTROL
```

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L        ERASABLE ASSIGNMENTS                                                       USER'S PAGE NO.  12      EU 52

 04165  REF   2  LAST   47      4753            STIKBIT   =       BIT14

A0417                                                             BIT 13 FLAG 1
 0418                           0021            ERADFLAG =        0170          EARTH, COMPUTE       EARTH, USE FIXED
A04191                                                                           FISCHER ELLIPSOID    RADIUS
A04191                                                                           RADIUS
A04192                                                                          MOON, USE FIXED      MOON, USE RLS FOR
A04193                                                                                RADIUS               LUNAR RADIUS

 04195  REF   2  LAST   47      4754            ERADFBIT =        BIT13

A0420                                                             BIT 12 FLAG 1
 0421                           0022            NODOP01   =       0180          P01 NOT ALLOWED      P01 ALLOWED

 04211  REF   2  LAST   47      4755            NOP01BIT =        BIT12

A0422                                                             BIT 11 FLAG 1
 0423                           0023            ENG2FLAG =        0190          RCS BURN             SPS BURN

 04235  REF   2  LAST   47      4756            ENG2BIT   =       BIT11

A0427                                                             BIT 10 FLAG 1
 0428                           0024            TARG1FLG =        0200          SIGHTING LEM         NOT SIGHTING LEM

 04285  REF   2  LAST   47      4757            TARG1BIT =        BIT10

A0429                                                             BIT 9 FLAG 1
 0430                           0025            TARG2FLG =        0210          SIGHTING LANDMARK    SIGHTING STAR

 04305  REF   2  LAST   47      4760            TARG2BIT =        BIT9

A0434                                                             BIT 8 FLAG 1
 0435                           0026            VEHUPFLG =        0220          CSM STATE VECTOR     LEM STATE VECTOR
A0436                                                                           BEING UPDATED        BEING UPDATED

 04365  REF   2  LAST   47      4761            VEHUPBIT =        BIT8

A0437                                                             BIT 7 FLAG 1
 0438                           0027            UPDATFLG =        0230          UPDATING BY MARKS    UPDATING BY MARKS
A0439                                                                           ALLOWED              NOT ALLOWED

 04395  REF   2  LAST   48      4762            UPDATBIT =        BIT7

A0440                                                             BIT 6 FLAG 1
 04411                          0030            IDLEFAIL =        0240          INHIBIT R41          ENABLE R41 (ENGFAIL)

 04415  REF   2  LAST   48      4763            IDLEBIT   =       BIT6
```

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A0442                                                      BIT 5 FLAG 1
 0443                         0031          TRACKFLG =     0250             TRACKING ALLOWED      TRACKING NOT ALLOWED

 04435  REF   2  LAST   48    4764          TRACKBIT =     BIT5

A0444                                                      BIT 4 FLAG 1
 0445                         0032          MARKFLG  =     0260             A MARK HAS BEEN       NO MARK HAS BEEN
 0446   REF   2  LAST   48    4765          MARKBIT  =     BIT4             ACCEPTED. ALLOW       ACCEPTED. DO NOT
A0447                                                                       MARK REJECT.          MARK REJECT.


A0450                                                      BIT 3 FLAG 1
 0451                         0033          SLOPESW  =     270              ITERATE WITH BIAS     ITERATE WITH REGULA
A0452                                                                       METHOD IN ITERATOR    FALSI METHOD IN
A04521                                                                                            ITERATOR


 04525  REF   2  LAST   48    4766          SLOPEBIT =     BIT3

A0456                                                      BIT 2 FLAG 1
 0457                         0034          GUESSW   =     0280             NO STARTING VALUE     STARTING VALUE FOR
A0458                                                                       FOR ITERATION         ITERATION EXISTS

 04585  REF   2  LAST   48    4767          GUESSBIT =     BIT2

A0459                                                      BIT 1 FLAG 1
 0460                         0035          AVEGFLAG =     0290             AVERAGEG (SERVICER) AVERAGEG (SERVICER)
A0461                                                                       TO CONTINUE           TO CEASE

 04615  REF   2  LAST   48    4770          AVEGBIT  =     BIT1

 0462   REF   3  LAST   48    0076          FLAGWRD2 =     STATE +2         (030-044)

A0463                                                                       (SET)                 (RESET)

A0464                                                      BIT 15 FLAG 2
 0465                         0036          DRIFTFLG =     0300             T3RUPT CALLS GYRO     T3RUPT DOES NO GYRO
A0466                                                                       COMPENSATION          COMPENSATION

 04665  REF   2  LAST   48    4752          DRFTBIT  =     BIT15

A0470                                                      BIT 14 FLAG 2
 0471                         0037          R21MARK  =     0310             OPTION ONE FOR        OPTION TWO FOR
A0472                                                                       MARKRUPT              MARKRUPT

 04725  REF   3  LAST   49    4753          R21BIT   =     BIT14

A0476                                                      BIT 13 FLAG 2
 0477                         0040          22DSPFLG =     0320             DISPLAY DR,DV         DO NOT DISPLAY DR,DV
```

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L        ERASABLE ASSIGNMENTS                                                         USER'S PAGE NO.  14      E0 S?

 04775  REF   3  LAST   49      4754            22DSPBIT =      BIT13

A0478                                                           BIT 12 FLAG 2
 0479                           0041            P21FLAG   =     0330          SUCCEEDING PASS      1ST PASS THRU P21,
A0480                                                                         THRU P21, USE BASE   CALCULATE BASE
 0481   REF   3  LAST   49      4755            P21BIT    =     BIT12         VECTOR FOR CALC.     VECTOR
 0482                           0042            STEERSW   =     0340          STEERING TO BE DONE STEERING OMITTED

 04825  REF   3  LAST   49      4756            STEERBIT =      BIT11

A0483                                                           BIT 10 FLAG 2
 0484                           0043            SKIPVHF   =     0350          DISREGARD RADAR      RADAR READ TO
A0485                                                                         READ BECAUSE OF      PROCEED NORMALLY
 04851  REF   3  LAST   49      4757            SKIPVBIT =      BIT10         SFTWRE OR HDWRE
A04852                                                                        RESTART

A0486                                                           BIT 9 FLAG 2
 0487                           0044            IMPULSW   =     0360          MINIMUM IMPULSE      STEERING BURN (NO
A0488                                                                         BURN (CUTOFF TIME    CUTOFF TIME YET
A0489                                                                         SPECIFIED)           AVAILABLE)

 04895  REF   3  LAST   49      4760            IMPULBIT =      BIT9

A0490                                                           BIT 8 FLAG 2
 0491                           0045            XDELVFLG =      0370          EXTERNAL DELTAV VG   LAMBERT (AIMPOINT)
A0492                                                                         COMPUTATION          VG COMPUTATION

 04925  REF   3  LAST   49      4761            XDELVBIT =      BIT8
A0493                                                           BIT 7 FLAG 2
 0494                           0046            ETPIFLAG =      0380          ELEVATION ANGLE      TPI TIME SUPPLIED
A0495                                                                         SUPPLIED FOR P34,74 FOR P34,74

 04955  REF   3  LAST   49      4762            ETPIBIT   =     BIT7

A0496                                                           BIT 7 FLAG 2
 0497   REF   1                 0046            FIRSTFLG =      ETPIFLAG      FIRST PASS           SUCCEEDING PASS THRU
A0498                                                                         THRU S40.9           S40.9

 04985  REF   4  LAST   51      4762            FIRSTBIT =      BIT7

 05025  REF   3  LAST   49      4763            FINALBIT =      BIT6

A0503                                                           BIT 6 FLAG 2
 0504                           0047            FINALFLG =      0390          LSAT PASS THROUGH    INTERIM PASS THROUGH
A0505                                                                         RENDEZVOUS PROGRAM   RENDEZVOUS PROGRAM
A0506                                                                         COMPUTATIONS         COMPUTATIONS

 05065  REF   3  LAST   50      4764            AVFLBIT   =     BIT5

A0507                                                           BIT 5 FLAG 2
```

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L       ERASABLE ASSIGNMENTS                                                          USER'S PAGE NO. 15     ED 57

 0508                               0050            AVFLAG   =      040D           LEM IS ACTIVE        CSM IS ACTIVE
A0509                                                                              VEHICLE              VEHICLE

A0510                                                               BIT 4 FLAG 2
 0511                               0051            PFRATFLG =      041D           PREFERRED ATTITUDE   PREFERRED ATTITUDE
A0512                                                                              COMPUTED             NOT COMPUTED

 05125   REF   3  LAST   50         4765            PFRATBIT =      BIT4

A0513                                                               BIT 3 FLAG 2
 0514                               0052            P24MKFLG =      042D           P24 MARKING          P24 NOT MARKING
 0515    REF   3  LAST   50         4766            P24MKBIT =      BIT3

A0516                                                               BIT 2 FLAG 2
 0517                               0053            CALCMAN2 =      043D           PERFORM MANEUVER     BYPASS STARTING
A0518                                                                              STARTING PROCEDURE   PROCEDURE

 05185   REF   3  LAST   50         4767            CALC2BIT =      BIT2

A0519                                                               BIT 1 FLAG 2
 0520                               0054            NODOFLAG =      044D           V37 NOT PERMITTED    V37 PERMITTED

 05205   REF   3  LAST   50         4770            NODOBIT  =      BIT1

 0521    REF   4  LAST   50         0077            FLAGWRD3 =      STATE +3       (045-059)

A0522                                                                              (SET)                (RESET)

A0523                                                               BIT 15 FLAG 3
 0524                               0055            V50N18FL =      045D           ENABLE R60 ATT       INHIBIT R60 ATTITUDE
 0525    REF   3  LAST   50         4752            V50N18BT =      BIT15           MANEUVER             MANEUVER

A0526                                                               BIT 14 FLAG 3
 0527                               0056            GLOKFAIL =      046D           GIMBAL LOCK HAS      NOT IN GIMBAL LOCK
A0528                                                                              OCCURED

 05285   REF   4  LAST   50         4753            GLOKFBIT =      BIT14

A0529                                                               BIT 13 FLAG 3
 0530                               0057            REFSMFLG =      047D           REFSMMAT GOOD        REFSMMAT NO GOOD

 05305   REF   4  LAST   51         4754            REFSMBIT =      BIT13

A0531                                                               BIT 12 FLAG 3
 0532                               0060            LUNAFLAG =      048D           LUNAR LAT-LONG       EARTH LAT-LONG

 05325   REF   4  LAST   51         4755            LUNABIT  =      BIT12

A0533                                                               BIT 11 FLAG 3
```

```
 0534                         0061          P22MKFLG =        049D           P22 DOWNLINKED MARK P22 DOWLINK MARK
A0535                                                                        DATA WAS JUST TAKEN DATA NOT JUST TAKEN
----------------------------------------------------------------------------------------------------------------------
 05355  REF    4  LAST    51  4756          P22MKBIT =        BIT11

A0537                                                         BIT 10 FLAG 3
 0538                         0062          VFLAG    =        050D           LESS THAN TWO STARS TWO STARS IN FIELD
A0539                                                                        IN FIELD OF VIEW    OF VIEW
----------------------------------------------------------------------------------------------------------------------
 05395  REF    4  LAST    51  4757          VFLAGBIT =        BIT10

A0540                                                         BIT 9 FLAG 3
 0541                         0063          POOFLAG  =        051D           INHIBIT BACKWARDS   ALLOW BACKWARDS
 05415  REF    4  LAST    51  4760          POOBIT   =        BIT9           INTEGRATION         INTEGRATION
A0542                                                         BIT 8 FLAG 3
----------------------------------------------------------------------------------------------------------------------
 0543                         0064          PRECIFLG =        052D           CSMPREC, LEMPREC    INTGRV CALLED
 0544   REF    4  LAST    51  4761          PRECIBIT =        BIT8           OR INTEGRVS CALLED

A0545                                                         BIT 7 FLAG 3
 0546                         0065          CULTFLAG =        053D           STAR OCCULTED       STAR NOT OCCULTED
----------------------------------------------------------------------------------------------------------------------
 05465  REF    5  LAST    51  4762          CULTBIT  =        BIT7

A0547                                                         BIT 6 FLAG 3
 0548                         0066          ORBWFLAG =        054D           W MATRIX VALID FOR  W MATRIX INVALID FOR
A0549                                                                        ORBITAL NIVIGATION  ORBITAL NAVIGATION
----------------------------------------------------------------------------------------------------------------------
 05495  REF    4  LAST    51  4763          ORBWFBIT =        BIT6

A0550                                                         BIT 5 FLAG 3
 0551                         0067          STATEFLG =        055D           PERMANENT STATE     PERMANENT STATE
A0552                                                                        VECTOR UPDATED      VECTOR NOT UPDATED
----------------------------------------------------------------------------------------------------------------------
 05525  REF    4  LAST    51  4764          STATEBIT =        BIT5

A0553                                                         BIT 4 FLAG 3
 0554                         0070          INTYPFLG =        056D           CONIC INTEGRATION   ENCKE INTEGRATION

 05545  REF    4  LAST    52  4765          INTYBIT  =        BIT4
----------------------------------------------------------------------------------------------------------------------
A0555                                                         BIT 3 FLAG 3
 0556                         0071          VINTFLAG =        057D           CSM STATE VECTOR    LEM STATE VECTOR
A0557                                                                        BEING INTEGRATED    BEING INTEGRATED

 05575  REF    4  LAST    52  4766          VINTFBIT =        BIT3
----------------------------------------------------------------------------------------------------------------------
A0558                                                         BIT 2 FLAG 3
 0559                         0072          D6OR9FLG =        058D           DIMENSION OF W IS 9 DIMENSION OF W IS 6
A0560                                                                        FOR INTEGRATION     FOR INTEGRATION
----------------------------------------------------------------------------------------------------------------------
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L        ERASABLE ASSIGNMENTS                                                  USER'S PAGE NO. 17      E3 5?

  05605  REF   4  LAST   52      4767          D6OR9BIT =       BIT2

 A0561                                                          BIT 1 FLAG 3
  0562                           0073          DIMOFLAG =       0590          W MATRIX IS TO BE    W MATRIX IS NOT TO
 A0563                                                                        USED                 BE USED

  0564   REF   5  LAST   52      0100          FLAGWRD4 =       STATE +4      (060-074)

 A0565                                                                        (SET)                (RESET)

  05655  REF   4  LAST   52      4770          DIMOBIT  =       BIT1

 A0566                                                          BIT 15 FLAG 4
  0567                           0074          MRKIDFLG =       060D          MARK DISPLAY IN      NO MARK DISPLAY IN
 A0568                                                                        ENDIDLE              ENDIDLE

  05685  REF   4  LAST   52      4752          MRKIDBIT =       BIT15

 A0569                                                          BIT 14 FLAG 4
  0570                           0075          PRIODFLG =       061D          PRIORITY DISPLAY IN NO PRIORITY DISPLAY
 A0571                                                                        ENDIDLE              IN ENDIDLE

  05715  REF   5  LAST   52      4753          PRIODBIT =       BIT14

 A0572                                                          BIT 13 FLAG 4
  0573                           0076          NRMIDFLG =       062D          NORMAL DISPLAY IN    NO NORMAL DISPLAY
 A0574                                                                        ENDIDLE              IN ENDIDLE

  05745  REF   5  LAST   52      4754          NRMIDBIT =       BIT13

 A0575                                                          BIT 12 FLAG 4
  0576                           0077          PDSPFLAG =       063D          CAN'T INTERRUPT      SEE M. HAMILTON
 A0577                                                                        PRIORITY DISPLAY

  05775  REF   5  LAST   52      4755          PDSPFBIT =       BIT12

 A0578                                                          BIT 11 FLAG 4
  0579                           0100          MWAITFLG =       064D          HIGHER PRIORITY      NO HIGHER PRIORITY
 A0580                                                                        DISPLAY OPERATING    DISPLAY OPERATING
 A0581                                                                        WHEN MARK DISPLAY    WHEN MARK DISPLAY
 A0582                                                                        INITIATED            INITIATED

  05825  REF   5  LAST   53      4756          MWAITBIT =       BIT11

 A0583                                                          BIT 10 FLAG 4
  0584                           0101          NWAITFLG =       065D          HIGHER PRIORITY      NO HIGHER PRIORITY
 A0585                                                                        DISPLAY OPERATING    DISPLAY OPERATING
 A0586                                                                        WHEN NORMAL          WHEN NORMAL DISPLAY
 A0587                                                                        DISPLAY INITIATED    INITIATED
 05875  REF   5  LAST   53      4757          NWAITBIT =     BIT10

A0588                                                        BIT 9 FLAG 4
 0589                           0102          MRKNVFLG =     066D            ASTRONAUT USING        ASTRONAUT NOT USING
A0590                                                                        KEYBOARD WHEN MARK     KEYBOARD WHEN MARK
A0591                                                                        DISPLAY INITIATED      DISPLAY INITIATED

 05915  REF   5  LAST   53      4760          MRKNVBIT =     BIT9

A0592                                                        BIT 8 FLAG 4
 0593                           0103          NRMNVFLG =     067D            ASTRONAUT USING        ASTRONAUT NOT USING
A0594                                                                        KEYBOARD WHEN          KEYBOARD WHEN
A0595                                                                        NORMAL DISPLAY         NORMAL DISPLAY
A0596                                                                        INITIATED              INITIATED

 05965  REF   5  LAST   53      4761          NRMNVBIT =     BIT8

A0597                                                        BIT 7 FLAG 4
 0598                           0104          PRONVFLG =     068D            ASTRONAUT USING        ASTRONAUT NOT USING
A0599                                                                        KEYBOARD WHEN          KEYBOARD WHEN
A0600                                                                        PRIORITY DISPLAY       PRIORITY DISPLAY
A0601                                                                        INITIATED              INITIATED

 06015  REF   6  LAST   53      4762          PRONVBIT =     BIT7

A0602                                                        BIT 6 FLAG 4
 0603                           0105          PINBRFLG =     069D            ASTRONAUT HAS          ASTRONAUT HAS NOT
A0604                                                                        INTERFERED WITH        INTERFERED WITH
A0605                                                                        EXISTING DISPLAY       EXISTING DISPLAY

 06055  REF   5  LAST   53      4763          PINBRBIT =     BIT6

A0606                                                        BIT 5 FLAG 4
 0607                           0106          MRUPTFLG =     070D            MARK DISPLAY           MARK DISPLAY NOT
A0608                                                                        INTERRUPTED BY         INTERRUPTED BY
A0609                                                                        PRIORITY DISPLAY       PRIORITY DISPLAY

 06095  REF   5  LAST   53      4764          MRUPTBIT =     BIT5

A0610                                                        BIT 4 FLAG 4
 0611                           0107          NRUPTFLG =     071D            NORMAL DISPLAY         NORMAL DISPLAY NOT
A0612                                                                        INTERRUPTED BY         INTERRUPTED BY
A0613                                                                        PRIORITY OR MARK       PRIORITY OR MARK
A0614                                                                        DISPLAY                DISPLAY

 06145  REF   5  LAST   53      4765          NRUPTBIT =     BIT4

A0615                                                        BIT 3 FLAG 4
 0616                           0110          MKOVFLAG =     072D            MARK DISPLAY OVER      NO MARK DISPLAY OVER
A0617                                                                        NORMAL                 NORMAL
```

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L        ERASABLE ASSIGNMENTS                                                         USER'S PAGE NO. 19       E. 52

 06175  REF   5  LAST   53     4766          MKOVBIT   =      BIT3

A06179                                                        BIT 2 FLAG 4     DISPLAY BIT
  0618                         0111          VNFLAG    =      730D             DISPLAY IS A          DISPLAY IS NOT A
  0619  REF   5  LAST   54     4767          VNBIT     =      BIT2             VNFLASH TYPE          VNFLASH TYPE

A0620                                                         BIT 1 FLAG 4     MARK DISPLAY NOT TO NO SPECIAL MARK
  0621                         0112          XDSPFLAG  =      0740D            BE INTERRUPTED        INFORMATION.

 06215  REF   5  LAST   54     4770          XDSPBIT   =      BIT1

  0622  REF   6  LAST   54     0101          FLAGWRD5  =      STATE +5         (075-099)

A0623                                                                          (SET)                 (RESET)

A0624                                                         BIT 15 FLAG 5
  0625                         0113          DSKYFLAG  =      0750D            DISPLAYS SENT TO      NO DISPLAYS TO DSKY
A0626                                                                          DSKY
A06265

 062655 REF   5  LAST   54     4752          DSKYBIT   =      BIT15

A0627                                                         BIT 14 FLAG 5
  0628                         0114          RETROFLG  =      760D             P37 PREMANEUVER       ORBIT NOT RETROGRADE
 06285  REF   6  LAST   54     4753          RETROBIT  =      BIT14            ORBIT IS RETROGRADE

A0630                                                         BIT 13 FLAG 5
  0631                         0115          SLOWFLG   =      770D             P37 TRANSEARTH        SLOW DOWN IS NOT
  0632  REF   6  LAST   54     4754          SLOWBIT   =      BIT13            COAST SLOW DOWN       DESIRED
A0633                                                                          IS DESIRED

A0637                                                         BIT 12 FLAG 5
  0638                         0116          V59FLAG   =      0780D            CALIBRATING FOR       NORMAL MARKING FOR
A0639                                                                          P 23                  P 23

 06395  REF   6  LAST   54     4755          V59FLBIT  =      BIT12

A0640                                                         BIT 11 FLAG 5
  0641                         0117          INCORFLG  =      0790D            FIRST INCORPORATION SECOND INCORPORATION

 06415  REF   6  LAST   54     4756          INCORBIT  =      BIT11

A0642                                                         BIT 10 FLAG 5
  0643                         0120          NEWTFLAG  =      800D             RETURN TO P29 SKIP-  NORMAL OPERATION
  0644  REF   6  LAST   55     4757          NEWTBIT   =      BIT10            PING LONGITUDE DIS-
A0645                                                                          PLAY

A0649                                                         BIT 9 FLAG 5
  0650                         0121          DMENFLG   =      0810D            DIMENSION OF W IS 9 DIMENSION OF W IS 6
A0651                                                                          FOR INCORPORATION     FOR INCORPORATION
```

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 06515  REF   6  LAST   55       4760              DMENFBIT =       BIT9

A0652                                                               BIT 8 FLAG 5
 0653                            0122              COMPUTER =       082D          COMPUTER IS CMC     COMPUTER IS LGC

 06535  REF   6  LAST   55       4761              COMPTBIT =       BIT8

A0654                                                               BIT 7 FLAG 5
 0655                            0123              ENGONFLG =       083D          ENGINE TURNED ON    ENGINE TURNED OFF

 06555  REF   7  LAST   55       4762              ENGONBIT =       BIT7

A0656                                                               BIT 6 FLAG 5
 0657                            0124              3AXISFLG =       084D          MANEUVER SPECIFIED  MANEUVER SPECIFIED
A0658                                                                             BY THREE AXES       BY ONE AXIS

 06585  REF   6  LAST   55       4763              3AXISBIT =       BIT6

A0662                                                               BIT 5 FLAG 5
 0663                            0125              GRRBKFLG =       085D          BACKUP GRR RECEIVED BACKUP GRR NOT
A0664                                                                                                 RECEIVED

 06645  REF   6  LAST   55       4764              GRRBKBIT =       BIT5

A0665                                                               BIT 4 FLAG 5
A0666                                                       =       086D
A0667

A0672                                                               BIT 3 FLAG 5
 0673                            0127              SOLNSW   =       87D           LAMBERT DOES NOT    LAMBERT CONVERGES OR
A0674                                                                             CONVERGE, OR TIME-  TIME-RADIUS NON
A06741                                                                            RADIUS NEARLY CIRC. CIRCULAR.

 06745  REF   6  LAST   56       4766              SOLNSBIT =       BIT3

A0675                                                               BIT 2 FLAG 5
 0676                            0130              MGLVFLAG =       088D          LOCAL VERTICAL      MIDDLE GIMBAL ANGLE
A0677                                                                             COORDINATES         COMPUTED
A0678                                                                             COMPUTED

 06785  REF   6  LAST   56       4767              MGLVFBIT =       BIT2

A0679                                                               BIT 1 FLAG 5
 0680                            0131              RENDWFLG =       089D          W MATRIX VALID      W MATRIX INVALID
A0681                                                                             FOR RENDEZVOUS      FOR RENDEZVOUS
A0682                                                                             NAVIGATION          NAVIGATION

 06825  REF   6  LAST   56       4770              RENDWBIT =       BIT1
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L        ERASABLE ASSIGNMENTS                                                USER'S PAGE NO.  21       EQ S?

 0683   REF   7  LAST   56       0102          FLAGWRD6 =      STATE +6        (090-104)
A0684                                                                          (SET)               (RESET)

A0687                                                          BIT 15 FLAG 6
 0688                            0132          DAPBIT1  =      090D            1 SATURN 1 TVC       0 RCS     0 NO

 06885  REF   6  LAST   56       4752          DAP1BIT  =      BIT15

A0689                                                          BIT 14 FLAG 6
 0690                            0133          DAPBIT2  =      091D            1 A/P      0 A/P      1 A/P      0 A/P

 06905  REF   7  LAST   56       4753          DAP2BIT  =      BIT14

A0694                                                          BIT 13 FLAG 6
 0695                            0134          STRULLSW =      92D             DO STEERULL          DO ULAGEOFF ONLY
A0696
 06965  REF   7  LAST   56       4754          STRULBIT =      BIT13

A0697                                                          BIT 13 FLAG 6
 0698   REF   1                  0134          ENTRYDSP =      STRULLSW        DO ENTRY DISPLAY     OMIT ENTRY DISPLAY
A0699                                                                          VIA ENTRYVN.

 06995  REF   8  LAST   56       4754          ENDSPBIT =      BIT13

A0706                                                          BIT 12 FLAG 6
 0707                            0135          CMDAPARM =      093D            ALOW ENTRY FIRINGS   INHIBIT ENTRY FIRING
A0708                                                                          AND CALCULATIONS     AND CONTROL FUNCTION

 07085  REF   7  LAST   56       4755          CMARMBIT =      BIT12

A07086                                                                   DO NOT SHARE BIT12 WITH PROGRAMS USING SERVICER

A0709                                                          BIT 11 FLAG 6
 0710                            0136          GAMDIFSW =      094D            CALCULATE GAMDOT     GAMDOT NOT TO BE
A0711                                                                                               CALCULATED

 07115  REF   7  LAST   56       4756          GMDIFBIT =      BIT11

A0714                                                          BIT 10 FLAG 6
 0715                            0137          GONEPAST =      095D            LATERAL CONTROL      LATERAL CONTROL
A0716                                                                          CALCULATIONS TO BE   CALCULATIONS TO BE
A0717                                                                          OMITTED              DONE

 07175  REF   7  LAST   56       4757          GONEBIT  =      BIT10

A0718                                                          BIT 9 FLAG 6
 0719                            0140          RELVELSW =      096D            TARGETING USES       TARGETING USES
A0720                                                                          EARTH-RELATIVE       INERTIAL VELOCITY
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L        ERASABLE ASSIGNMENTS                                                    USER'S PAGE NO.  22       E0 57

A0721                                                                       VELOCITY

 07215  REF   7  LAST    57      4760           RELVBIT   =     BIT9

A0724                                                           BIT 8 FLAG 6
 0725                            0141           EGSW      =     0970           IN FINAL PHASE      NOT IN FINAL PHASE

 07255  REF   7  LAST    57      4761           EGFLGBIT  =     BIT8

A0726                                                           BIT 8 FLAG 6
 0727   REF   1                  0141           KNOWNFLG  =     EGSW           LANDMARK KNOWN      LANDMARK UNKNOWN

 07275  REF   8  LAST    59      4761           KNOWNBIT  =     BIT8

A0735                                                           BIT 7 FLAG 6
 0736                            0142           NOSWITCH  =     0980           LATERAL ROLL        LATERAL ROLL MANUVER
 0737   REF   8  LAST    57      4762           NOSWBIT   =     BIT7           MANUVER INHIBITED   PERMITED IN ENTRY
A07375                                                                         IN ENTRY


A0740                                                           BIT 6 FLAG 6
 0741                            0143           HIND      =     0990           ITERATING HUNTEST   ITERATING OF HUNTEST
A0742                                                                          CALCULATIONS TO BE  CALCULATIONS TO BE
A0743                                                                          DONE AFTER RANGE    OMITTED AFTER RANGE
A0744                                                                          PREDICTION          PREDICTION

 07445  REF   7  LAST    57      4763           HINDBIT   =     BIT6

A0748                                                           BIT 5 FLAG 6
 0749                            0144           INRLSW    =     1000           INITIAL ROLL        INITIAL ROLL
A0750                                                                          V(LV)               V(LV)

 07505  REF   7  LAST    57      4764           INRLBIT   =     BIT5

A0751                                                                          ATTITUDE NOT HELD   ATTITUDE HELD

A0754                                                           BIT 4 FLAG 6
 0755                            0145           LATSW     =     1010           DOWNLIFT NOT        DOWNLIFT INHIBITED
A0756                                                                          INHIBITED

 07565  REF   6  LAST    55      4765           LATSWBIT  =     BIT4

A0759                                                           BIT 3 FLAG 6
 0760                            0146           .05GSW    =     1020           DRAG OVER .05G      DRAG LESS THAN .05G

 07605  REF   7  LAST    57      4766           .05GBIT   =     BIT3

A0761                                                                DO NOT SHARE BIT3  WITH PROGRAMS USING SERVICER

A0764                                                           BIT 2 FLAG 6
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L        ERASABLE ASSIGNMENTS                                                          USER'S PAGE NO.  23       EQ S?

 0765                            0147          CM/DSTBY =      103D           ENTRY DAP ACTIVATED ENTRY DAP NOT
A0766                                                                                             ACTIVATED

 07665  REF   7  LAST   57       4767          CM/DSBIT =      BIT2

A07666                                                                DO NOT SHARE BIT2  WITH PROGRAMS USING SERVICER

A0769                                                          BIT 1 FLAG 6
 0770                            0150          GYMDIFSW =      104D           CDU DIFFERENCES AND CDU DIFFERENCES AND
A0775                                                                         BODY RATES COMPUTED BODY RATES NOT
A0776                                                                                             COMPUTED

 07765  REF   7  LAST   57       4770          GYMDIBIT =      BIT1

 0777   REF   8  LAST   58       0103          FLAGWRD7 =      STATE +7       (105-119)

A0778                                                                         (SET)               (RESET)

A0779                                                          BIT 15 FLAG 7
 0780                            0151          TERMIFLG =      1050           TERMINATE R52       DO NOT TERMINATE R52
 0781   REF   7  LAST   58       4752          TERMIBIT =      BIT15

A0786                                                          BIT 14 FLAG 7
 0787                            0152          ITSWICH  =      1060           ACCEPT NEXT LAMBERT TEST LAMBERT ANSWER
A0788                                                                         TPI SEARCH SOLUTION AGAINST LIMITS

 07885  REF   8  LAST   58       4753          ITSWBIT  =      BIT14

A0789                                                          BIT 13 FLAG 7
 0790                            0153          IGNFLAG  =      1070           TIG HAS ARRIVED     TIG HAS NOT ARRIVED

 07905  REF   9  LAST   58       4754          IGNFLBIT =      BIT13

A0791                                                          BIT 12 FLAG 7
 0792                            0154          ASTNFLAG =      108D           ASTRONAUT HAS       ASTRONAUT HAS NOT
A0793                                                                         OKAYED IGNITION     OKAYED IGNITION

 07935  REF   8  LAST   58       4755          ASTNBIT  =      BIT12

A0794                                                          BIT 11 FLAG 7
 0795                            0155          TIMRFLAG =      109D           CLOKTASK OPERATING  CLOKTASK INOPERATIVE

 07955  REF   8  LAST   58       4756          TIMRBIT  =      BIT11

A0799                                                          BIT 10 FLAG 7
 0800                            0156          NORMSW   =      110D           UNIT NORMAL INPUT   LAMBERT COMPUTE ITS
A0801                                                                         TO LAMBERT.         OWN UNIT NORMAL.


 08015  REF   8  LAST   58       4757          NORMSBIT =      BIT10
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L        ERASABLE ASSIGNMENTS                                                       USER'S PAGE NO.  24       EQ 5?

A0806                                                           BIT 9 FLAG 7
 0807                        0157            RVSW      =        1110              DO NOT COMPUTE FINAL COMPUTE FINAL STATE
A08071                                                                            STATE VECTOR IN     VECTOR IN TIME-THETA
A08075                                                                            TIME-THETA.

 080755 REF   8  LAST   59   4760            RVSWBIT   =        BIT9

A0808                                                           BIT 8 FLAG 7
 0809                        0160            GONEBY    =        1120              PASSED TARGET       APPROACHING TARGET

 08095  REF   9  LAST   59   4761            GONBYBIT  =        BIT8

A0810                                                           BIT 7 FLAG 7
A0811                                                  =        1130

A0812                                                           BIT 6 FLAG 7
 0813                        0162            V37FLAG   =        1140              AVERAGEG (SERVICER) AVERAGEG (SERVICER)
A0814                                                                             RUNNING             OFF

 08145  REF   8  LAST   59   4763            V37FLBIT  =        BIT6

A0815                                                           BIT 5 FLAG 7
A0816                                                  =        1150

A0819                                                           BIT 4 FLAG 7
 0820                        0164            UPLOCKFL  =        1160              K-KBAR-K FAIL       NO K-KBAR-K FAIL

 08205  REF   7  LAST   59   4765            UPLOCBIT  =        BIT4

A0821                                                           BIT 3 FLAG 7
 0822                        0165            VERIFLAG  =        1170              CHANGED WHEN V33E OCCURS AT END OF P27

 08225  REF   8  LAST   59   4766            VERIFBIT  =        BIT3

A0823                                                           BIT 2 FLAG 7
 0824                        0166            ATTCHFLG  =        1180              LM,CM ATTACHED      LM,CM NOT ATTACHED

 08245  REF   3  LAST   60   4767            ATTCHBIT  =        BIT2

A0825                                                           BIT 1 FLAG 7
 0826                        0167            TFFSW     =        1190              CALCULATE TPERIGEE  CALCULATE TFF

 08265  REF   8  LAST   60   4770            TFFSWBIT  =        BIT1

 0827   REF   9  LAST   60   0104            FLAGWRD8  =        STATE +8D         (120-134)

A0828                                                                             (SET)               (RESET)

A0829                                                           BIT 15 FLAG 8
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L     ERASABLE ASSIGNMENTS                                                      USER'S PAGE NO. 25    E0 S?

 0830                         0170          RPQFLAG  =    1200            RPQ NOT COMPUTED   RPQ COMPUTED

 08305  REF   8  LAST   60    4752          RPQFLBIT =    BIT15

A0831                                                     BIT 14 FLAG 8
 0832                         0171          NEWLMFLG =    1210            NEW LANDMARK COORD  OLD LANDMARK COORD
 0833   REF   9  LAST   60    4753          NEWLMBIT =    BIT14

A0834                                                     BIT 13 FLAG 8
 0835                         0172          NEWIFLG  =    1220            FIRST PASS THROUGH  SUCCEEDING ITERATION
A0836                                                                     INTEGRATION         OF INTEGRATION

 08365  REF  10  LAST   60    4754          NEWIBIT  =    BIT13

A0837                                                     BIT 12 FLAG 8
 0838                         0173          CMOONFLG =    1230            PERMANENT CSM STATE PERMANENT CSM STATE
 0839   REF   9  LAST   60    4755          CMOONBIT =    BIT12           IN LUNAR SPHERE     IN EARTH SPHERE

A0840                                                     BIT 11 FLAG 8
 0841                         0174          LMOONFLG =    1240            PERMANENT LM  STATE PERMANENT LM  STATE
 0842   REF   9  LAST   60    4756          LMOONBIT =    BIT11           IN LUNAR SPHERE     IN EARTH SHPERE

A0843                                                     BIT 10 FLAG 8
 0844                         0175          ADVTRK   =    1250            ADVANCE GROUND TRACK NOT ADVANCED
A0845                                                                     SIGHTING WANTED       GROUND TRACK

 08455  REF   9  LAST   60    4757          ADVTKBIT =    BIT10

A0846                                                     BIT 9 FLAG 8
 0847                         0176          UTFLAG   =    1260            UNIVERSAL TRACKING  NO UNIVERSAL TRACK
 0848   REF   9  LAST   61    4760          UTBIT    =    BIT9

A0849                                                     BIT 8 FLAG 8
 0850                         0177          SURFFLAG =    1270            LM ON LUNAR SURFACE LM NOT ON LUNAR
A0851                                                                                         SURFACE

 08515  REF  10  LAST   61    4761          SURFFBIT =    BIT8

A0854                                                     BIT 7 FLAG 8
 0855                         0200          INFINFLG =    1280            NO CONIC SOLUTION   CONIC SOLUTION
A0856                                                                     (CLOSURE THROUGH    EXISTS.
A08561                                                                    INFINITY REQUIRED).

 08565  REF   9  LAST   59    4762          INFINBIT =    BIT7

A0857                                                     BIT 6 FLAG 8
 0858                         0201          ORDERSW  =    1290            ITERATOR USES 2ND   ITERATOR USES 1ST
A08581                                                                    ORDER MINIMUM MODE. ORDER STANDARD MODE.
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 08585  REF   9  LAST   61      4763             CRDERBIT =       BIT6

A0859                                                             BIT 5 FLAG 8
 0860                           0202             APSESW   =       1300            RDESIRED OUTSIDE     RDESIRED INSIDE
A08605                                                                            PERICENTER-APOCENTER PERICENTER-APOCENTE
A0861                                                                             RANGE IN TIME-RAD    RANGE IN TIME-RADIUS


 08615  REF   8  LAST   59      4764             APSESBIT =       BIT5

A0862                                                             BIT 4 FLAG 8
 08625                          0203             COGAFLAG =       1310            NO CONIC  SOLUTION   CONIC SOLUTION
A0863                                                                             TOO CLOSE TO         EXISTS (COGA DOES
A08631                                                                            RECTILINEAR (COGA    NOT  OVERFLOW).
A0864                                                                             OVERFLOWS).


 08645  REF   5  LAST   61      4765             COGAFBIT =       BIT4

A0865                                                             BIT 3 FLAG 8
 0866                           0204             V96ONFLG =       1320            P00 INTEGRATION HAS  P00 INTEGRATION IS
A0867                                                                             BEEN INHIBITED BY    PROCEEDING REGULARLY
 08675  REF   9  LAST   61      4766             V96ONBIT =       BIT3            V96

A0868                                                             BIT 2 FLAG 8
 0869                           0205             R67FLAG  =       1330            R67 CALLING R60      NOT R67 CALLING R60
 08695  REF   9  LAST   61      4767             R67BIT   =       BIT2

A0870                                                             BIT 1 FLAG 8
 0871                           0206             360SW    =       1340            TRANSFER ANGLE NEAR  TRANSFER ANGLE NOT
A0872                                                                             360 DEGREES          NEAR 360 DEGREES

 08725  REF   9  LAST   61      4770             360SWBIT =       BIT1

 0873   REF  10  LAST   61      0105             FLAGWRD9 =       STATE +9D       (135 - 149)

A0874                                                                             (SET)                (RESET)
A0875                                                             BIT 15 FLAG 9
 0876                           0207             SWTOVER  =       1350            SWITCHOVER HAS       NO SWITCHOVER YET
A0877                                                                             OCCURRED

 08775  REF   9  LAST   62      4752             SWTOVBIT =       BIT15

A0878                                                             BIT 14 FLAG 9
 0879                           0210             P24FLAG  =       1360            P24 RUNNING          P24 NOT RUNNING
 087965 REF  10  LAST   62      4753             P24BIT   =       BIT14

A0880                                                             BIT 13 FLAG 9
 0881                           0211             V82EMFLG =       1370            MOON VICINITY        EARTH VICINITY
A08815
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L        ERASABLE ASSIGNMENTS                                                        USER'S PAGE NO.  27      E  57

 088155 REF  11  LAST   62      4754           V82EMBIT =      BIT13

A0882                                                          BIT 12 FLAG 9
 0883                           0212           MAXDBFLG =      1380             MAX DB SELECTED      MIN DB SELECTED
A0884

 08845  REF  10  LAST   62      4755           MAXDBBIT =      BIT12

A0885                                                          BIT 11 FLAG 9
 0886                           0213           V94FLAG  =      1390             V94 ALLOWED DURING  V94 NOT ALLOWED
A0887                                                                           P23

 08875  REF  10  LAST   62      4756           V94FLBIT =      BIT11

A0888                                                          BIT 10 FLAG 9
 0889                           0214           SAVECFLG =      1400             P23 DISPLAY AND      P23 DISPLAY AND
A0890                                                                           DATA STORAGE AFTER  DATA STORAGE BEFORE
A0891                                                                           MARK IS DONE         MARK IS DONE

 08915  REF  10  LAST   62      4757           SAVECBIT =      BIT10

A0892                                                          BIT  9 FLAG 9
 0893                           0215           VHFRFLAG =      1410             ALLOW R22 TO         STOP ACCEPTANCE
A0894                                                                           ACCEPT RANGE         OF RANGE DATA
A0895                                                                           DATA

 08955  REF  10  LAST   62      4760           VHFRBIT  =      BIT9

A0896                                                          BIT  8 FLAG 9
 0897                           0216           SOURCFLG =      1420             SOURCE OF INPUT      SOURCE OF INPUT
A0898                                                                           DATA IS FROM         DATA IS FROM
A0899                                                                           VHF RADAR            OPTICS MARK

 08995  REF  11  LAST   62      4761           SOURCBIT =      BIT8

A0900                                                          BIT  7 FLAG 9
 0901                           0217           R22CAFLG =      1430             R22 IS PROCESSING  R22 IS NOT PROCESSING
A0902                                                                           AN OPTICS MARK     AN OPTICS MARK

 09025  REF  10  LAST   62      4762           R22CABIT =      BIT7

A0903                                                          BIT  6 FLAG 9
 0904                           0220           N22ORN17 =      1440             COMPUTE TOTAL        COMPUTE TOTAL
A0905                                                                           ATTITUDE ERRORS      ATTITUDE ERRORS
A0906                                                                           WRT N22 (V62)        WRT N17 (V63)

 09065  REF  10  LAST   63      4763           N2217BIT =      BIT6

A0907                                                          BIT  5 FLAG 9
 0908                           0221           QUITFLAG =      1450             TERMINATE AND EXIT  CONTINUE INTEGRATION
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L      ERASABLE ASSIGNMENTS                                                          USER'S PAGE NO. 26      E 52

 09085 REF   9 LAST  63      4764          QUITBIT  =     BIT5            FROM INTEGRATION

A0909                                                     BIT  4 FLAG 9
 0910                        0222          R31FLAG  =     145D            R31 SELECTED (V83)  R34 SELECTED (V85)

 09105 REF   9 LAST  63      4765          R31FLBIT =     BIT4

A0911                                                     BIT  3 FLAG 9
 0912                        0223          MID1FLAG =     147D            INTEGRATE TO TDEC   INTEGRATE TO THE
A0913                                                                                         THEN-PRESENT TIME

 09135 REF  10 LAST  63      4766          MID1FBIT =     BIT3

A0914                                                     BIT  2 FLAG 9
 0915                        0224          MIDAVFLG =     148D            INTEGRATION ENTERED INTEGRATION WAS
A0916                                                                     FROM ONE OF MIDTOAV NOT ENTERED VIA
A0917                                                                      PORTALS            MIDTOAV

 09175 REF  10 LAST  63      4767          MIDAVBIT =     BIT2

A0918                                                     BIT  1 FLAG 9
 0919                        0225          AVEMIDSW =     149D            AVETOMID CALLING    NO AVETOMID W INTEGR
A0920                                                                     FOR W.MATRIX INTEGR ALLOW SET UP RN,VN,
A0921                                                                     DONT WRITE OVER RN, PIPTIME
A0922                                                                     VN,PIPTIME

 09225 REF  10 LAST  63      4770          AVEMDBIT =     BIT1

A0923                                                                     (SET)               (RESET)

 0924  REF  11 LAST  63      0106          FLGWRD10 =     STATE   +10D    (150-164)
A0925

A0926                                                     BIT 15 FLAG 10
 0927                        0226          PCMANFLG =     150D            P20 MANEUVER          NOT P20 PC
A0928                                                                     AT PLANE CHANGE       MANEUVER
 09285 REF  10 LAST  63      4752          PCMANBIT =     BIT15

A0929                                                     BIT 14 FLAG 10
 0930                        0227          INTFLAG  =     151D            INTEGRATION IN      INTEGRATION NOT IN
A0931                                                                     PROGRESS            PROGRESS
 09315 REF  11 LAST  63      4753          INTFLBIT =     BIT14

A0932                                                     BIT 13 FLAG 10
 0933                        0230          REINTFLG =     152D            INTEGRATION ROUTINE  INTEGRATION ROUTINE
A09335                                                                    TO BE RESTARTED      NOT TO BE RESTARTED
 0934  REF  12 LAST  64      4754          REINTBIT =     BIT13
```

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L      ERASABLE ASSIGNMENTS                                                                    USER'S PAGE NO. 29       L  52

A0935                                                       BIT 12 FLAG 10
 0936                             0231          REJCTFLG =  1530          MARK TO BE REJECTED    NO MARK REJECT BY
A09361                                                                    IN R22                 R22
 0937    REF  11  LAST   64       4755          REJCTBIT =  BIT12

A0938                                                       BIT 11 FLAG 10
 0939                             0232          HDSUPFLG =  1540
 0940    REF  11  LAST   64       4756          HDSUPBIT =  BIT11         HEADS UP ATTITUDE   HEADS DOWN ATTITUDE

A0941                                                       BIT 10 FLAG 10
 0942                             0233          BURNFLAG =  1550          CSM DID BURN           LM DID BURN
 0943    REF  11  LAST   64       4757          BURNBIT  =  BIT10

A0944                                                       BIT  9 FLAG 10
 0945                             0234          RANGFLAG =  1560          RANGE < 329 N.M     RANGE > 328 N.M.
 0946    REF  11  LAST   64       4760          RANGBIT  =  BIT9

A0947                                                       BIT  8 FLAG 10
 0948                             0235          P35FLAG  =  1570          MCC TARGETING DONE  NOT YET MCC
 0949    REF  12  LAST   64       4761          P35BIT   =  BIT8

A0950                                                       BIT  7 FLAG 10
 0951                             0236          AUTOSEQ  =  1580          AUTOMATIC RENDEZVOUS   AUTOMATIC RENDEZ-

A0952                                                                     SEQUENCE IS RUNNING    VOUS NOT RUNNING
 09525   REF  11  LAST   64       4762          AUTSQBIT =  BIT7

A0953                                                       BIT  6 FLAG 10
A0954                                                    =  1590
A0956                                                       BIT  5 FLAG 10
 0957                             0240          MANEUFLG =  1600          MANEUVER,P76,          MARK INCORPORATED
A09571                                                                    OR PLANNED MANEUVER
 0958    REF  10  LAST   65       4764          MANEUBIT =  BIT5

A0959                                                       BIT  4 FLAG 10
 0960                             0241          PTV93FLG =  1610          V93 TO BE DONE         MANEUVER AND
A09601                                                                    AFTER MANEUVER         V93 DONE
 0961    REF  10  LAST   65       4765          PTV93BIT =  BIT4

A0962                                                       BIT  3 FLAG 10
 0963                             0242          TPIMNFLG =  1620          TPI MANEUVER HAS
A09631                                                                    BEEN DONE
 0964    REF  11  LAST   65       4766          TPIMNBIT =  BIT3

A0965                                                       BIT  2 FLAG 10
 0966                             0243          FULTKFLG =  1630          ONLY OPTICS OR VHF  OPTICS AND VHF
A09661                                                                    MARKS BEING TAKEN   MARKS TAKEN
 0967    REF  11  LAST   65       4767          FULTKBIT =  BIT2
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L       ERASABLE ASSIGNMENTS                                                USER'S PAGE NO.  30     E0 S?

A0968                                                        BIT  1 FLAG 11
 0969                               0244       PCFLAG   =     1640              PLANE CHANGE        NOT PLANE CHANGE
A0970                                                                           TARGETTING
 0971   REF  11  LAST   65          4770       PCBIT    =     BIT1
 0972   REF  12  LAST   65          0107       FLGWRD11 =     STATE +110        (165 - 179)

A0973                                                                           (SET)               (RESET)

A0974                                                        BIT 15 FLAG 11
 0975                               0245       S32.1F1  =     1650              DELTAN AT CSI TIME  DVT1 LESS THAN MAX
 0976   REF  11  LAST   65          4752       S32BIT1  =     BIT15             ONE EXCEEDS MAX

A0977                                                        BIT 14 FLAG 11
 0978                               0246       S32.1F2  =     1660              FIRST PASS OF       REITERATION OF
 0979   REF  12  LAST   65          4753       S32BIT2  =     BIT14             NEWTON INTERATION   NEWTON

A0980                                                        BIT 13 FLAG 11
 0981                               0247       S32.1F3A =     1670              BIT 13 AND BIT 12 FUNCTION AS AN ORDERED
 09811  REF  13  LAST   65          4754       S32BIT3A =     BIT13             PAIR (13,12) INDICATING THE POSSIBLE OC-
A0982                                                                           CURRENCE OF 2NEWTON ITERATIONS FOR S32.1
A0983                                                        BIT 12 FLAG 11    IN THE PROGRAM IN THE FOLLOWING ORDER:
 0984                               0250       S32.1F3B =     1680              (0,1) (I.E.BIT 13 RESET, BIT 12 SET)
 0985   REF  12  LAST   66          4755       S32BIT3B =     BIT12                   = FIRST NEWTON ITERATION BEING DONE
A09851                                                                          (0,0)= FIRST PASS OF 2ND NEWTON ITER.
A09852                                                                          (1,1)= 50 FPS STAGE OF 2ND NEWT ITER.
A09853                                                                          (1,0)= REMAINDER OF 2ND NEWTON ITER.

A0986                                                        BIT 11 FLAG 11
A0987                                                   =     1690

A0989                                                        BIT 10 FLAG 11
A0990                                                   =     1700

A0992                                                        BIT  9 FLAG 11
A0993                                                   =     1710

A0995                                                        BIT  8 FLAG 11
 0996                               0254       AZIMFLAG =     1720              3-AXIS UT           VECPOINT UT
 0997   REF  13  LAST   66          4761       AZIMBIT  =     BIT8

A0998                                                        BIT  7 FLAG 11
 0999                               0255       HAFLAG   =     1730              HEIGHT ADJUST       NOT HEIGHT ADJUST
 1000   REF  12  LAST   66          4762       HABIT    =     BIT7              MANEUVER PROG

A1001                                                        BIT  6 FLAG 11
 1002                               0256       CSISFLAG =     1740              MULTIPLE CSI S         NOT MULTIPLE CSI
A1003

A10031                                                                          REQUESTED
 10032  REF  11  LAST   64          4763       CSISBIT  =     BIT6
```

```
A10033

A1004                                                      BIT  5 FLAG 11
A1005                                           =          175D
A1006

A1007                                                      BIT  4 FLAG 11
A1008                                           =          176D
A1009

A1010                                                      BIT  3 FLAG 11
A1011                                           =          177D
A1012

A1013                                                      BIT  2 FLAG 11
A1014                                           =          178D
A1015

A1016                                                      BIT  1 FLAG 11
A1017                                           =          179D
A1018
```

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L        ERASABLE ASSIGNMENTS                                                                         USER'S PAGE NO. 32     E0 S?

P 1019   GENERAL ERASABLE ASSIGNMENTS.

  1020                                  0061                     SETLOC 61
R 1021                    INTERRUPT TEMPORARY STORAGE POOL.  (11D)
R 1022                      (ITEMP1 THROUGH RUPTREG4)

R 1023                    ANY OF THESE MAY BE USED AS TEMPORARIES DURING INTERRUPT OR WITH INTERRUPT INHIBITED. THE ITEMP SERIES
R 1025   IS USED DURING CALLS TO THE EXECUTIVE AND WAITLIST - THE RUPTREGS ARE NOT.

  1027                                  0061     0061    ITEMP1   ERASE
  1028   REF    1                       0061             WAITEXIT EQUALS ITEMP1
  1029   REF    2  LAST    69           0061             EXECTEM1 EQUALS ITEMP1

  1030                                  0062     0062    ITEMP2   ERASE
  1031   REF    1                       0062             WAITBANK EQUALS ITEMP2
  1032   REF    2  LAST    69           0062             EXECTEM2 EQUALS ITEMP2

  1033                                  0063     0063    ITEMP3   ERASE
  1035   REF    1                       0063             WAITADR  EQUALS ITEMP3
  1036   REF    2  LAST    69           0063             NEWPRIO  EQUALS ITEMP3

  1037                                  0064     0064    ITEMP4   ERASE
  1038   REF    1                       0064             LOCCTR   EQUALS ITEMP4
  1039   REF    2  LAST    69           0064             WAITTEMP EQUALS ITEMP4

  1040                                  0065     0065    ITEMP5   ERASE
  1041   REF    1                       0065             NEWLOC   EQUALS ITEMP5

  1042                                  0066     0066    ITEMP6   ERASE
A 1043                                                   NEWLOC+1 EQUALS ITEMP6               DP ADDRESS.

  1044                                  0067                      SETLOC 67
  1045                                  0067     0067    NEWJOB   ERASE                       MUST BE AT LOC 67 DUE TO WIRING.


  1046                                  0070     0070    RUPTREG1 ERASE
  1047                                  0071     0071    RUPTREG2 ERASE
  1048                                  0072     0072    RUPTREG3 ERASE
  1049                                  0073     0073    RUPTREG4 ERASE
  1050   REF    1                       0073             KEYTEMP1 EQUALS RUPTREG4
  1051   REF    2  LAST    69           0073             DSRUPTEM EQUALS RUPTREG4

R 1052                    FLAGWORD RESERVATIONS.                                              (12D)

  1054                                  0074     0107    STATE    ERASE   +11D

R 1055                    UNSWITCHED DAP ERASABLE.                                            (4D)

  1057                                  0110     0110    T6LOC    ERASE
  1058                                  0111     0111    T6ADR    ERASE
```

```
 1059                          0112    0113   T5LOC     ERASE  +1


R1060                  EXEC TEMPORARIES WHICH MAY BE USED BETWEEN CCS NEWJOBS.
R1061                  (INTB15+ THROUGH RUPTMXM)                                    (320)

 1063                          0114    0114   INTB15+   ERASE                       REFLECTS 15TH BIT OF INDEXABLE ADDRESSES
 1064   REF   1                0114           DSEXIT    EQUALS INTB15+              RETURN FOR DSPIN
 1065   REF   2  LAST    70    0114           EXITEM    EQUALS INTB15+              RETURN FOR SCALE FACTOR ROUTINE SELECT
 1067                          0115    0115   INTBIT15  ERASE                       SIMILAR TO ABOVE.
 1069   REF   1                0115           WDRET     EQUALS INTBIT15             RETURN FOR DSPWD
 1070   REF   2  LAST    70    0115           DECRET    EQUALS INTBIT15             RETURN FOR PUTCOM(DEC LOAD)
 1071   REF   3  LAST    70    0115           21/22REG  EQUALS INTBIT15             TEMP FOR CHARIN

R1072                  THE REGISTERS BETWEEN ADDRWD AND PRIORITY MUST STAY IN THE FOLLOWING ORDER FOR INTERPRETIVE TRACE.

 1074                          0116    0116   ADDRWD    ERASE                       12 BIT INTERPRETIVE OPERAND SUB-ADDRESS.
 1075                          0117    0117   POLISH    ERASE                       HOLDS CADR MADE FROM POLISH ADDRESS.
 1076   REF   1                0117           UPDATRET  EQUALS POLISH               RETURN FOR UPDATNN, UPDATVB
 1077   REF   2  LAST    70    0117           CHAR      EQUALS POLISH               TEMP FOR CHARIN
 1078   REF   3  LAST    70    0117           ERCNT     EQUALS POLISH               COUNTER FOR ERROR LIGHT RESET
 1079   REF   4  LAST    70    0117           DECOUNT   EQUALS POLISH               COUNTER FOR SCALING AND DISPLAY (DEC)

 1080                          0120    0120   FIXLOC    ERASE                       WORK AREA ADDRESS.
 1081                          0121    0121   OVFIND    ERASE                       SET NON-ZERO ON OVERFLOW.

 1082                          0122    0127   VBUF      ERASE  +5                   TEMPORARY STORAGE USED FOR VECTORS.
 1083   REF   1                0122           SGNON     EQUALS VBUF                 TEMP FOR +,- ON
 1084   REF   2  LAST    70    0122           NOUNTEM   EQUALS VBUF                 COUNTER FOR MIXNOUN FETCH
 1085   REF   3  LAST    70    0122           DISTEM    EQUALS VBUF                 COUNTER FOR OCTAL DISPLAY VERBS
 1086   REF   4  LAST    70    0122           DECTEM    EQUALS VBUF                 COUNTER FOR FETCH (DEC DISPLAY VERBS)

 1087   REF   5  LAST    70    0123           SGNOFF    EQUALS VBUF       +1        TEMP FOR +,- ON
 1088   REF   6  LAST    70    0123           NVTEMP    EQUALS VBUF       +1        TEMP FOR NVSUB
 1089   REF   7  LAST    70    0123           SFTEMP1   EQUALS VBUF       +1        STORAGE FOR SF CONST HI PART(=SFTEMP2-1)
 1090   REF   8  LAST    70    0123           HITEMIN   EQUALS VBUF       +1        TEMP FOR LOAD OF HRS, MIN, SEC
A1091                                                                                         MUST = LOTEMIN-1.
 1092   REF   9  LAST    70    0124           CODE      EQUALS VBUF       +2        FOR DSPIN
 1093   REF  10  LAST    70    0124           SFTEMP2   EQUALS VBUF       +2        STORAGE FOR SF CONST LO PART(=SFTEMP1+1)
 1094   REF  11  LAST    70    0124           LOTEMIN   EQUALS VBUF       +2        TEMP FOR LOAD OF HRS, MIN, SEC
A1095                                                                                         MUST = HITEMIN+1.
 1096   REF  12  LAST    70    0125           MIXTEMP   EQUALS VBUF       +3        FOR MIXNOUN DATA
R1098   ALSO MIXTEMP+1 = VBUF+4, MIXTEMP+2 = VBUF+5.

 1099                          0130    0132   BUF       ERASE  +2                   TEMPORARY SCALAR STORAGE.
 1100                          0133    0134   BUF2      ERASE  +1
 1101   REF   1                0130           INDEXLOC  EQUALS BUF                  CONTAINS ADDRESS OF SPECIFIED INDEX.
 1102   REF   2  LAST    70    0130           SWWORD    EQUALS BUF                  ADDRESS OF SWITCH WORD.
 1103   REF   3  LAST    70    0131           SWBIT     EQUALS BUF +1               SWITCH BIT WITHIN SWITCH WORD.
 1104                          0135    0135   MPTEMP    ERASE                       TEMPORARY USED IN MULTIPLY AND SHIFT.
 1106                         0136    0136    DOTINC    ERASE                      COMPONENT INCREMENT FOR DOT SUBROUTINE.
 1107   REF   1               0136            DVSIGN    EQUALS DOTINC              DETERMINES SIGN OF DDV RESULT.
 1108   REF   2  LAST   71    0136            ESCAPE    EQUALS DOTINC              USED IN ARCSIN/ARCCOS.
 1109   REF   3  LAST   71    0136            ENTRET    EQUALS DOTINC              EXIT FROM ENTER

 11095  REF   1               0136            ENTEXIT   =      ENTRET

 1110                         0137    0137    DOTRET    ERASE                      RETURN FROM DOT SUBROUTINE.
 1111   REF   1               0137            DVNORMCT  EQUALS DOTRET              DIVIDEND NORMALIZATION COUNT IN DDV.
 1112   REF   2  LAST   71    0137            ESCAPE2   EQUALS DOTRET              ALTERNATE ARCSIN/ARCCOS SWITCH.
 1113   REF   3  LAST   71    0137            WDCNT     EQUALS DOTRET              CHAR COUNTER FOR DSPWD
 1114   REF   4  LAST   71    0137            INREL     EQUALS DOTRET              INPUT BUFFER SELECTOR ( X,Y,Z, REG )

 1115                         0140    0140    MATINC    ERASE                      VECTOR INCREMENT IN MXV AND VXM.
 1116   REF   1               0140            MAXDVSW   EQUALS MATINC              +0 IF DP QUOTIENT IS NEAR ONE - ELSE -1.
 1117   REF   2  LAST   71    0140            POLYCNT   EQUALS MATINC              POLYNOMIAL LOOP COUNTER
 1118   REF   3  LAST   71    0140            DSPMMTEM  EQUALS MATINC              DSPCOUNT SAVE FOR DSPMM
 1119   REF   4  LAST   71    0140            MIXBR     EQUALS MATINC              INDICATOR FOR MIXED OR NORMAL NOUN

 1120                         0141    0141    TEM1      ERASE                      EXEC TEMP
 1121   REF   1               0141            POLYRET   EQUALS TEM1
 1122   REF   2  LAST   71    0141            DSREL     EQUALS TEM1                REL ADDRESS FOR DSPIN

 1123                         0142    0142    TEM2      ERASE                      EXEC TEMP
 1124   REF   1               0142            DSMAG     EQUALS TEM2                MAGNITUDE STORE FOR DSPIN
 1126                         0143    0143    TEM3      ERASE                      EXEC TEMP
 1127   REF   1               0143            COUNT     EQUALS TEM3                FOR DSPIN

 1128                         0144    0144    TEM4      ERASE                      EXEC TEMP
 1130   REF   1               0144            RELRET    EQUALS TEM4                RETURN FOR RELDSP
 1132   REF   2  LAST   71    0144            DSPWDRET  EQUALS TEM4                RETURN FOR DSPSIGN
 1133   REF   3  LAST   71    0144            SEPSCRET  EQUALS TEM4                RETURN FOR SEPSEC
 1134   REF   4  LAST   71    0144            SEPMNRET  EQUALS TEM4                RETURN FOR SEPMIN

 1135                         0145    0145    TEM5      ERASE                      EXEC TEMP
 1136   REF   1               0145            NOUNADD   EQUALS TEM5                TEMP STORAGE FOR NOUN ADDRESS

 1137                         0146    0146    NNADTEM   ERASE                      TEMP FOR NOUN ADDRESS TABLE ENTRY
 1138                         0147    0147    NNTYPTEM  ERASE                      TEMP FOR NOUN TYPE TABLE ENTRY
 1139                         0150    0150    IDAD1TEM  ERASE                      TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A1140                                                                              MUST = IDAD2TEM-1, = IDAD3TEM-2.
 1141                         0151    0151    IDAD2TEM  ERASE                      TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A1142                                                                              MUST = IDAD1TEM+1, = IDAD3TEM-1.
 1143                         0152    0152    IDAD3TEM  ERASE                      TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A1144                                                                              MUST = IDAD1TEM+2, = IDAD2TEM+1.
 1145                         0153    0153    RUTMXTEM  ERASE                      TEMP FOR SF ROUT TABLE ENTRY(MIXNN ONLY)

R1146           AX*SR*T STORAGE.                                                   (6D)

 1148   REF   2  LAST   71    0142            DEXDEX    EQUALS TEM2                B(1)TMP
```

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L         ERASABLE ASSIGNMENTS                                                                USER'S PAGE NO.  35      EQ S?

  1149    REF    2  LAST    71        0143            DEX1      EQUALS TEM3             B(1)TMP
  1150    REF    5  LAST    71        0144            DEX2      EQUALS TEM4             B(1)TMP
  1151    REF    2  LAST    71        0145            RTNSAVER  EQUALS TEM5             B(1)TMP
  1152    REF    1                    0133            TERM1TMP  EQUALS BUF2             B(2)TMP

  1153    REF    1                    0143            DEXI      =      DEX1
```

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L        ERASABLE ASSIGNMENTS                                                         USER'S PAGE NO.  36      E0 S?

P1154             DYNAMICALLY ALLOCATED CORE SETS FOR JOBS.                           (84D)

 1156                            0154     0162   MPAC       ERASE  +6                 MULTI-PURPOSE ACCUMULATOR.
 1157                            0163     0163   MODE       ERASE                     +1 FOR TP, +0 FOR DP, OR -1 FOR VECTOR.
 1158                            0164     0164   LOC        ERASE                     LOCATION ASSOCIATED WITH JOB.
 1159                            0165     0165   BANKSET    ERASE                     USUALLY CONTAINS BBANK SETTING.
 1160                            0166     0166   PUSHLOC    ERASE                     WORD OF PACKED INTERPRETIVE PARAMETERS.
 1161                            0167     0167   PRIORITY   ERASE                     PRIORITY OF PRESENT JOB AND WORK AREA.

 1162                            0170     0277              ERASE  +71D               SEVEN SETS OF 12 REGISTERS EACH.

R1163             SPECIAL DOWNLINK BUFFER.-OVERLAYED BY P27 STORAGE-

R1164             P27(UPDATE PROGRAM) STORAGE. -OVERLAYS SPEC DNLNK BUFF-             (24D)

 1166                            0300     0327   COMPNUMB   ERASE             +23D    B(1)TMP NUMBER OF ITEMS TO BE UPLINKED.
 1167     REF   1                0301            UPOLDMOD   EQUALS COMPNUMB +1        B(1)TMP HOLDS INTERRUPTED PROGRAM NUMBER
 1168     REF   1                0302            UPVERB     EQUALS UPOLDMOD +1        B(1) TMP VERB NUMBER
 1169     REF   1                0303            UPCOUNT    EQUALS UPVERB   +1        B(1)TMP UPBUFF INDEX
 1170     REF   1                0304            UPBUFF     EQUALS UPCOUNT  +1        B(20D)

R1171             MORE P27 STORAGE.                                                   (2D)

 1173                            0330     0330   UPTEMP     ERASE                     B(1)TMP SCRATCH
 1174                            0331     0331   UPVERBSV   ERASE                     B(1)TMP
A1175

R1176             ENTRY DOWNLINK STORAGE

R1177                    (20 REGISTERS OF ENTRY DOWNLINK WILL GO HERE.)

A1178                                                         THE FOLLOWING ARE INDEXED FOR TM. IN ENTRY DAP.

 1179     REF   1                0304            CMTMTIME =        UPBUFF             B(1) (VEHICLE BODY RATE INFO IS
 1180     REF   1                0305            SW/NDX   =        CMTMTIME +1        B(1)  TELEMETERED EACH 0.2 SEC. DURING
 1181     REF   2  LAST   73     0324            ENDBUF   =        CMTMTIME +16D      B(1)  ENTRY.)

 1182     REF   1                0325            V1       =        ENDBUF   +1        I(2) REENTRY, P64-P65
 1183     REF   1                0327            A0       =        V1       +2        I(2) REENTRY, P64-P65
A1184                                                                                 HI-ORDER WORD ONLY ON DNLNK.
R1185

R1186             ALIGNMENT STORAGE.                                                  (5D)
R1188             (CANNOT SHARE WITH PRECISION INTEGRATION OR KEPLER STORAGE.)

 1189     REF   2  LAST   73     0300            QMAJ       EQUALS COMPNUMB           B(1)TMP
 1190     REF   1                0301            MARKINDX   EQUALS QMAJ     +1        B(1)TMP
 1191     REF   1                0302            BESTI      EQUALS MARKINDX +1        I(1)TMP
 1192     REF   1                0303            BESTJ      EQUALS BESTI    +1        I(1)TMP
 1193     REF   1                0304            STARIND    EQUALS BESTJ    +1        I(1)TMP
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L       ERASABLE ASSIGNMENTS                                                           USER'S PAGE NO. 37      EO S?

R1194              ALIGNMENT/S40.2,3 COMMON STORAGE.                                   (18D)

 1196    REF   2  LAST   73      0306               XSMD      EQUALS UPBUFF   +2       I(6)TMP
 1197    REF   2  LAST   36      0314               YSMD      EQUALS XSMD     +6       I(6)TMP
 1198    REF   1                 0322               ZSMD      EQUALS YSMD     +6       I(6)TMP

 1199    REF   3  LAST   74      0306               XSCREF    =      XSMD                       SPACE CRAFT AXES IN REF COORDS
 1200    REF   2  LAST   74      0314               YSCREF    =      YSMD
 1201    REF   1                 0322               ZSCREF    =      ZSMD


R12015             ALIGNMENT TEMPS IN VAC

 1202                            0026               ZPRIME    =      22D
 1203                            0026               PDA       =      22D
 1204                            0020               COSTH     =      16D
 1205                            0022               SINTH     =      18D
 1206                            0024               THETA     =      20D
 1207                            0040               STARM     =      32D


R12071  R52 AUTO-OPTICS (1)

 120723 REF    2  LAST   74      0330               PACTEMP   EQUALS ZSMD +6D          B(1)TMP

R1208              DOWNLINK STORAGE.                                                   (17D)

 1210    REF   1                 0332               DNLSTADR EQUALS DNLSTCOD           CONTENTS NO LONGER AN ADDR BUT A CODE

 1211                            0332      0332     DNLSTCOD ERASE                     B(1)PRM ID CODE OF DOWNLIST
 1212                            0333      0333     CTLIST    ERASE
 1213                            0334      0334     DNTMGOTO ERASE                     B(1)
 1214                            0335      0335     TMINDEX   ERASE                    B(1)
 12145   REF   1                 0335               DNECADR   EQUALS TMINDEX           B(1) ADDRESS OF CURRENT DNLST WORD
 1215    REF   2  LAST   74      0335               DUMPLOC   EQUALS TMINDEX           CONTAINS ECADR OF AGC DP WORD BEING DUMP
A1216                                                                                  ED AND COUNT OF COMPLETE DUMPS ALREADY S
A1217                                                                                  ENT.
 1218                            0336      0336     SUBLIST   ERASE                    B(1)
 1219                            0337      0352     DNTMBUFF ERASE    +11D             B(12) PRM DOWNLINK SNAPSHOT BUFFER
A1220

R1221              OPTICS MARKING . UNSHARED.                                          (8D)

 1223                            0353      0353     MKNDX     ERASE
 1224                            0354      0355     MKT2T1    ERASE  +1
 1225                            0356      0356     MKCDUY    ERASE
 1226                            0357      0357     MKCDUS    ERASE
 1227                            0360      0360     MKCDUZ    ERASE
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L       ERASABLE ASSIGNMENTS                                                                          USER'S PAGE NO.  38      E: 57

  1228                              0361      0361   MKCDUT    ERASE
  1229                              0362      0362   MKCDUX    ERASE
A 1230

R 1231             R52 TIME SAVE STORAGE                                                             (2)
  1232                              0363      0364   ADPOLD    ERASE  +1
A 1233

R 1234             UNSWITCHED FOR DISPLAY INTERFACE ROUTINES.                                        (7D)

  1236                              0365      0365   RESTREG   ERASE                                B(1)PRM FOR DISPLAY RESTARTS
  1237                              0366      0366   NVWORD    ERASE
  1238                              0367      0367   MARKNV    ERASE
  1239                              0370      0370   NVSAVE    ERASE                                 PURPOSES)
  1242                              0371      0371   CADRFLSH ERASE                                 B(1)TMP
  1243                              0372      0372   CADRMARK ERASE                                 B(1)TMP
  1244                              0373      0373   TEMPFLSH ERASE                                 B(1)TMP
A 1245

R 12451  CHANNEL FAIL REGISTER                                                                        (1D)

  12453                             0374      0374   C31FLWRD ERASE                                   B(1)PRM

R 124541 C31FLWRD HAS THE FOLLOWING OCTAL FORMAT AXXBX WHERE A + B HAVE THE FOLLOWING INTERPRETATION. IF THE ASTRONAUT
R 124543 DESIRES TO BYPASS THE CHANNEL REPRESENTATION, HE SHOULD LOAD C31FLWRD   VIA V21 N01 TO THE VALUES SHOWN IN THE
R 124545 FOLLOWING TABLES:

R 12455      A VALUE      MEANING FOR CHANNEL 31                                                    B VALUE       MEANING FOR CHANNEL 33

R 124552     0 OR 4       BITS 15,14, + 13 OF CHANNEL 31 ARE VALID                                  0 OR 4        BITS 4 + 5 OF CHANNEL 33
R 124554     1            G&N CONTROL FREE                                                          1 OR 5        OPTICS MODE CMC
R 124556     2            G&N CONTROL ATT. HOLD                                                     2 OR 6        OPTICS MODE ZERO
R 124558     3            G&N CONTROL AUTO                                                          3 OR 7        OPTICS MODE MANUAL
R 12456      5            SCS CONTROL FREE
R 124562     6            SCS CONTROL ATT. HOLD
R 124564     7            SCS CONTROL AUTO

R 12457  ALARM REGISTERS                                                                              (3D)

  12459                             0375      0377   FAILREG   ERASE  +2                            B(3)PRM ALARM ABORT CODES

  1246                              0400                         SETLOC 400
R 1247              VAC AREAS.  -BE CAREFUL OF PLACEMENT-                                             (220D)

  1249                              0400      0400   VAC1USE   ERASE                                B(1)PRM
  1250                              0401      0453   VAC1      ERASE  +42D                          B(43)PRM
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L       ERASABLE ASSIGNMENTS                                                     USER'S PAGE NO.  39      60 57

 1251                          0454     0454   VAC2USE  ERASE                    B(1)PRM
 1252                          0455     0527   VAC2     ERASE  +42D              B(43)PRM
 1253                          0530     0530   VAC3USE  ERASE                    B(1)PRM
 1254                          0531     0603   VAC3     ERASE  +42D              B(43)PRM
 1255                          0604     0604   VAC4USE  ERASE                    B(1)PRM
 1256                          0605     0657   VAC4     ERASE  +42D              B(43)PRM
 1257                          0660     0660   VAC5USE  ERASE                    B(1)PRM
 1258                          0661     0733   VAC5     ERASE  +42D              B(43)PRM

R12584           TEMP STORAGE FOR RESTARTS ROUTINE -- STARTS AT VAC5 + 19D

 12585  REF   1                0705            GOLOC    EQUALS VAC5 +20D         B(4) GOLOC -1 THRU GOLOC +2 USED
A12586                                                                              TO SET EXEC AND WTLST CALL

R1259            V82, V90 STORAGE        (1D)

 1260                          0734     0734   VEHRET   ERASE

R12601           P24-RATE AIDED OPTICS (PAD LOAD)*****                           (3D)

 12602                         0735     0735   TRATE    ERASE
 12603                         0736     0736   SRATE    ERASE
 126032                        0737     0737   NO.PASS  ERASE

R126034          P24-RATE AIDED OPTICS UNSHARED ERASABLES                        (2D)

 126045                        0740     0740   TOLD     ERASE
 12605                         0741     0741   SOLD     ERASE
R1261

R1263            SINGLE PRECISION SUBROUTINE TEMPORARIES.                        (2D)

A1265                                                                            SPSIN, SPCOS VARIABLES

A1266                                                                  DO NOT SHARE. THESE ARE USED BY DAPS IN INTERRUPT
A1267                                                                  AND CURRENTLY ARE NOT PROTECTED. IF OTHER USERS
A1268                                                                  MATERIALIZE, THEN THIS CAN BE CHANGED.

 1269                          0742     0742   TEMK     ERASE
 1270                          0743     0743   SQ       ERASE
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L         ERASABLE ASSIGNMENTS                                                    USER'S PAGE NO. 4

P1274              UNSWITCHED FOR ORBIT INTEGRATION.                              (21D)

  1276                              0744      0770   TDEC      ERASE  +200             I(2)
  1277   REF   1                    0746             LAT       EQUALS TDEC      +2     I(2)DSP NOUN 43,67 FOR P20,22,51,R52,53.
  1278   REF   1                    0746             LANDLAT   =      LAT                         NOUN 89    FOR P22.
  1279   REF   2  LAST    77        0750             LONG      EQUALS LAT       +2     I(2)DSP NOUN 43,67 FOR P20,22,51 R52,53.
  1280   REF   1                    0752             ALT       EQUALS LONG      +2     I(2)DSP NOUN 43    FOR P20,22,51 R52,53.
  1281   REF   1                    0754             YV        EQUALS ALT       +2     I(6)
  1282   REF   1                    0762             ZV        EQUALS YV        +6     I(6)
  1283   REF   1                    0770             COLREG    EQUALS ZV        +6     I(1)
R1284


R1285              MARK STORAGE.                                                  (2)

  1287                              0771      0771   VHFCNT    ERASE                   B(1) PRM NO. OF VHF MARKS(P20(R22)).
  1288                              0772      0772   TRKMKCNT  ERASE                   B(1) PRM NO  OF VHF MARKS (P20(R22))

R1289              P24 STORAGE                                                    (1D)

  12894  REF   1                    0771             RATETEMP  EQUALS VHFCNT             B(1) TMP

R1290              MISCELLANEOUS UNSWITCHED.                                      (150)

  1292                              0773      0773   IRETURN1  ERASE                   B(1)   RET ADDR USED BY MIDTOAV1 AND 2
A1293                                                                                   CALLED BY P40,P41,P42,  P61,P62
  1294                              0774      0774   RATEINDX  ERASE                    (1)     USED BY KALCMANU
  1295                              0775      0775   OPTION1   ERASE                   B(1)    NOUN 06 USES THIS
  1296                              0776      0776   OPTION2   ERASE                   B(1)    NOUN 06 USES THIS
  12965                             0777      0777   NVWORD1   ERASE                   B(1)
  1297                              1000      1003   DELAYLOC  ERASE            +3
  1299                              1004      1004   TEMPR60   ERASE                   B(1)
  1300                              1005      1005   PRIOTIME  ERASE                   B(1)
  1302                              1006      1007   TIME2SAV  ERASE  +1               B(2)TMP
  1303                              1010      1011   SCALSAVE  ERASE  +1               B(2)TMP
R1304              P20, CONICS   (SHARING WITH TIME 2 SAV AND SCAL SAV ONLY)      (30)

  1306   REF   1                    1006             POINTEX   EQUALS TIME2SAV           I(1) POINT AXS EXIT
  1307   REF   1                    1007             VHFTIME   EQUALS POINTEX   +1       I(2) DOWNLINK OF VHF RANGE TIME +1M
A1308


R1309              MINKEY RENDEZVOUS                                              (10)

  1311                              1012      1012   AUTPOINT  ERASE                   B(1) CONTROLLER RETURN
A1312


A1313
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R1314          CRS61.1 STORAGE.  -USED IN R63 (VERB 89)-                    (3D)

 1316                          1013    1015  CPHIX    ERASE  +2             B(3)DSP NOUN 96 CALCULATED BY CRS61.1
A1317


R131701        NOUN 26 ERASABLES                                            (3D)

 131703                        1016    1016  N26/PRI  ERASE                 B(1D)  PRIO/TIME DELAY
 131704                        1017    1020  N26/2CAD ERASE  +1             B(2D)  2CADR OF JOB/TASK


R13175  DOWNLINK TIME OF EVENT

 1318                          1021    1022  TEVENT   ERASE  +1             B(2)      TIME OF EVENT FOR DOWNLIST
 1319   REF  1                 1021          TLIFTOFF =      TEVENT


R1320          P34-P35 STORAGE                                              (1D)

 1322                          1023    1023  NORMEX   ERASE
A1323


R1324          R57 STORAGE. -MUST BE UNSHARED EXCEPT IN BOOST OR ENTRY-     (1D)

 1326                          1024    1024  TRUNBIAS ERASE                 B(1)PRM RESULT OF R57 CALIBR OF TRUNION
A1327


R1328          KEPLER  STORAGE                                              (2D)

 1330                          1025    1026  EPSILONT ERASE         +1      I(2) TMP
A1331


R1332          PERM STATE VECTORS FOR BOOST AND DOWNLINK -WHOLE MISSION-    (14D)

 1334                          1027    1034  RN       ERASE  +5             B(6)PRM
 1335                          1035    1042  VN       ERASE  +5             B(6)PRM
 1336                          1043    1044  PIPTIME  ERASE  +1             B(2)PRM (MUST BE FOLLOWED BY GDT/2)


R1337          SERVICER STORAGE.                                            (45D)

R1339          (SERVICER STORAGE AND P11 STORAGE IN UNSWITHCHED SHOULD NOT
R1340          OVERLAY EACH OTHER AND THE TOTAL ERASABLE REQUIRED SHOULD NOT
R1341          EXCEED THE ERASABLE STORAGE REQUIRED BY RENDEZVOUS GUIDANCE)

 1342   REF  1                 1045          GDT/2    EQUALS PIPTIME  +2    B(6)TMP (MUST FOLLOW PIPTIME)
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L         ERASABLE ASSIGNMENTS                                                              USER'S PAGE NO. 42      E0 S2

  1343    REF   1                     1053              GOBL/2    EQUALS GOT/2     +6     B(6)TMP
  1344    REF   1                     1061              AVEGEXIT  EQUALS GOBL/2    +6     B(2)TMP
  1345    REF   1                     1061              AVGEXIT   =      AVEGEXIT
  1346    REF   2  LAST    79         1063              TEMX      EQUALS AVEGEXIT  +2     B(1)TMP
  1347    REF   1                     1064              TEMY      EQUALS TEMX      +1     B(1)TMP
  1348    REF   1                     1065              TEMZ      EQUALS TEMY      +1     B(1)TMP
  1349    REF   1                     1066              PIPCTR    EQUALS TEMZ      +1     B(1)TMP
  1350    REF   1                     1067              PIPAGE    EQUALS PIPCTR    +1     B(1)TMP


  1351    REF   1                     1070              RN1       EQUALS PIPAGE    +1     B(6)TMP
  1352    REF   1                     1076              VN1       EQUALS RN1       +6     B(6)TMP
  1353    REF   1                     1104              PIPTIME1  EQUALS VN1       +6     B(2)TMP
  1354    REF   1                     1106              GDT1/2    EQUALS PIPTIME1  +2     B(6)TMP
  1355    REF   1                     1114              GOBL1/2   EQUALS GDT1/2    +6     B(6)TMP
 A1356


 R1357               ENTRY STORAGE.                                                     (1D)

  1359    REF   1                     1122              ENTRYVN   EQUALS GOBL1/2   +6     B(1)TMP VN CODE FOR ENTRY DISPLAYS P60S.
 A1360


 R1361               RENDEZVOUS NAVIGATION STORAGE.(SEE COMMENT IN SERVICER STORAGE)(56D)

  1363                                1045      1134    CSMPOS    ERASE  +55D               I(6)TMP
  1364    REF   1                     1053              LEMPOS    EQUALS CSMPOS    +6     I(6)TMP
  1366    REF   1                     1061              MARKTIME  EQUALS LEMPOS    +6     B(2) TEMP MUST PRECEDE VTEMP FOR GENTRAN
  1367    REF   1                     1063              VTEMP     EQUALS MARKTIME  +2     B(6)TMP
  1368    REF   1                     1071              UM        EQUALS VTEMP     +6     I(6)TMP
  1369    REF   1                     1077              MARKDATA  EQUALS UM        +6     B(2)TMP
  1370    REF   1                     1101              USTAR     EQUALS MARKDATA  +2     I(6)TMP
  1371    REF   1                     1107              WIXA      EQUALS USTAR     +6     B(1)TMP
  1372    REF   1                     1110              WIXB      EQUALS WIXA      +1     B(1)TMP
  1373    REF   1                     1111              ZIXA      EQUALS WIXB      +1     B(1)TMP
  1374    REF   1                     1112              ZIXB      EQUALS ZIXA      +1     B(1)TMP
  1375    REF   1                     1113              DELTAX    EQUALS ZIXB      +1     I(18)TMP

  1376    REF   1                     1113              VHFRANGE  EQUALS DELTAX              (2)
  1377    REF   2  LAST    79         1127              UCL       EQUALS DELTAX    +12D      (6)     LM-CSM LINE OF SIGHT 1/2 UNIT V


 R137701             P22 TEMPORARIES

  13771   REF   2  LAST    79         1053              S22UOFF   EQUALS LEMPOS             I(6)TMP  UM OFFSET
  137715  REF   3  LAST    79         1053              9DWXX     EQUALS LEMPOS             I(1)TMP QSAVE REGISTER
  13772   REF   3  LAST    79         1113              S22UUT    EQUALS DELTAX             I(18)
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R13773          MINKEY RENDEZVOUS *** (1D)

 137731 REF   4  LAST   79      1113             TEMPMM   EQUALS DELTAX          B(1) MAJOR MODE DURING P20 STARTUP


R13774          USED FOR SUMMATION OF UPRUPT DURING PRELAUNCH & SYS TEST LEADIN(3D)

 13775  REF   1                 1116             UPSUM    EQUALS EBUF2 +2        (3)


R13776          PRELAUNCH ERASEABLE PROGRAM ENTRANCE                             (2D)

 13777  REF   2  LAST   79      1114             EBUF2    EQUALS GOBL1/2         (2)


R13778          FOR STALL ROUTINE FOR VHF RADAR

 137782 REF   2  LAST   79      1063             RADTIME  EQUALS VTEMP           B(1)
 137784 REF   1                 1064             RADDEL   EQUALS RADTIME +1      B(1)


R1378           P11 STORAGE.                                                     (9D)

 1380   REF   1                 1126             LIFTTEMP EQUALS UCL      -1     (2)TMP
 1381   REF   1                 1130             TEPHEM1  EQUALS LIFTTEMP +2      (3)TMP
 1382   REF   1                 1133             PGNCSALT EQUALS TEPHEM1  +3      (2)PL  ALTITUDE
 1383   REF   1                 1135             PADLONG  EQUALS PGNCSALT +2     (2)PL LONGITUDE F LAUNCH PAD


R1384         **** CONICSEX (MEAS INC) ****                                      (6D)

 1385   REF   5  LAST   80      1113             TRIPA    EQUALS DELTAX
 1386   REF   6  LAST   80      1116             TEMPVAR  EQUALS DELTAX    +3
A1387


R13871             P24   RATE AIDED OPTICS

 13872  REF   2  LAST   80      1131             PASSCNT  EQUALS TEPHEM1  +1     B(1)


R13873          P20-P22 PROCESSING STORAGE                                       (2D)

 1388                           1135     1136    TEMPOR1  ERASE  +1              B(2)TMP


R1389           WAITLIST REPEAT FLAG.                                            (1D)

 1391                           1137     1137    RUPTAGN  ERASE                  B(1)PRM
 1392  REF  1                 1137              KEYTEMP2 =      RUPTAGN

R1393               STARALIGN ERASABLES.                                        (13D)

 1395                          1140     1140     STARCODE ERASE                 B(1)DSP NOUN 70 FOR P22,51 AND R52,53.
 1396                          1141     1154     STARALGN ERASE  +11D
 1397  REF  1                  1141              SINCDU   =      STARALGN
 1398  REF  2  LAST   81       1147              COSCDU   =      STARALGN +6

 1399  REF  1                  1145              SINCDUX  =      SINCDU   +4
 1400  REF  2  LAST   81       1141              SINCDUY  =      SINCDU
 1401  REF  3  LAST   81       1143              SINCDUZ  =      SINCDU   +2
 1402  REF  1                  1153              COSCDUX  =      COSCDU   +4
 1403  REF  2  LAST   81       1147              COSCDUY  =      COSCDU
 1404  REF  3  LAST   81       1151              COSCDUZ  =      COSCDU   +2


R1405               PHASE TABLE AND RESTART COUNTERS.                           (12D)

 1407                          1155     1155     -PHASE1  ERASE                 B(1)PRM
 1408                          1156     1156     PHASE1   ERASE                 B(1)PRM
 1409                          1157     1157     -PHASE2  ERASE                 B(1)PRM
 1410                          1160     1160     PHASE2   ERASE                 B(1)PRM
 1411                          1161     1161     -PHASE3  ERASE                 B(1)PRM
 1412                          1162     1162     PHASE3   ERASE                 B(1)PRM
 1413                          1163     1163     -PHASE4  ERASE                 B(1)PRM
 1414                          1164     1164     PHASE4   ERASE                 B(1)PRM
 1415                          1165     1165     -PHASE5  ERASE                 B(1)PRM
 1416                          1166     1166     PHASE5   ERASE                 B(1)PRM
 1417                          1167     1167     -PHASE6  ERASE                 B(1)PRM
 1418                          1170     1170     PHASE6   ERASE                 B(1)PRM


R1419               AX*SR*T STORAGE.                                            (6D)

 1421                          1171     1176     CDUSPOT  ERASE  +5             B(6)

 1422  REF  1                  1171              CDUSPOTY =      CDUSPOT
 1423  REF  2  LAST   81       1173              CDUSPOTZ =      CDUSPOT  +2
 1424  REF  3  LAST   81       1175              CDUSPOTX =      CDUSPOT  +4


R1425               VERB 37 STORAGE.                                            (2D)

 1427                          1177     1177     MINDEX   ERASE                 B(1)TMP  INDEX FOR MAJOR MODE
 1428                          1200     1200     MMNUMBER ERASE                 B(1)TMP  MAJOR MODE REQUESTED VIA V37


R1429               PINBALL INTERRUPT STORAGE.                                  (1D)
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L        ERASABLE ASSIGNMENTS                                                 USER'S PAGE NO.  45      E0 57

 1431                          1201      1201   DSPCNT    ERASE                      B(1)PRM DSPOUT COUNTER

R1432                 PINBALL  EXECUTIVE ACTION.                                     (440)

 1434                          1202      1202   DSPCOUNT  ERASE                      DISPLAY POSITION INDICATOR
 1435                          1203      1203   DECBRNCH  ERASE                      +DEC, - DEC, OCT INDICATOR
 1436                          1204      1204   VERBREG   ERASE                      VERB CODE
 1437                          1205      1205   NOUNREG   ERASE                      NOUN CODE
 1438                          1206      1206   XREG      ERASE                      R1 INPUT BUFFER
 1439                          1207      1207   YREG      ERASE                      R2 INPUT BUFFER
 1440                          1210      1210   ZREG      ERASE                      R3 INPUT BUFFER
 1441                          1211      1211   XREGLP    ERASE                      LO PART OF XREG (FOR DEC CONV ONLY)
 1442                          1212      1212   YREGLP    ERASE                      LO PART OF YREG (FOR DEC CONV ONLY)
 1443   REF    1               1212             HITEMOUT  =        YREGLP            TEMP FOR DISPLAY OF HRS, MIN, SEC
A1444                                                                                          MUST = LOTEMOUT-1.
 1445                          1213      1213   ZREGLP    ERASE                      LO PART OF ZREG (FOR DEC CONV ONLY)
 1446   REF    1               1213             LOTEMOUT  =        ZREGLP            TEMP FOR DISPLAY OF HRS, MIN, SEC
A1447                                                                                          MUST = HITEMOUT+1.
 1448                          1214      1214   MODREG    ERASE                      MODE CODE
 1449                          1215      1215   DSPLOCK   ERASE                      KEYBOARD/SUBROUTINE CALL INTERLOCK
 1450                          1216      1216   REQRET    ERASE                      RETURN REGISTER FOR LOAD
 1451                          1217      1217   LOADSTAT  ERASE                      STATUS INDICATOR FOR LOADTST
 1452                          1220      1220   CLPASS    ERASE                      PASS INDICATOR CLEAR
 1453                          1221      1221   NOUT      ERASE                      ACTIVITY COUNTER FOR DSPTAB
 1454                          1222      1222   NOUNCADR  ERASE                      MACHINE CADR FOR NOUN
 1455                          1223      1223   MONSAVE   ERASE                      N/V CODE FOR MONITOR. (= MONSAVE1-1)
 1456                          1224      1224   MONSAVE1  ERASE                      NOUNCADR FOR MONITOR(MATBS) =MONSAVE +1
 1457                          1225      1225   MONSAVE2  ERASE                      B(1)PRM NVMONOPT OPTIONS
 1458                          1226      1241   DSPTAB    ERASE   +11D               0-10D, DISPLAY PANEL BUFF. 11D, C/S LTS.
 1459                          1242      1242   NVQTEM    ERASE                      NVSUB STORAGE FOR CALLING ADDRESS
A1460                                                                                MUST = NVBNKTEM-1
 1461                          1243      1243   NVBNKTEM  ERASE                      NVSUB STORAGE FOR CALLING BANK
A1462                                                                                MUST = NVQTEM+1
 1463                          1244      1244   VERBSAVE  ERASE                      NEEDED FOR RECYCLE
 1464                          1245      1245   CADRSTOR  ERASE                      ENDIDLE STORAGE
 1465                          1246      1246   DSPLIST   ERASE                      WAITING REG FOR DSP SYST INTERNAL USE
 1466                          1247      1247   EXTVBACT  ERASE                      EXTENDED VERB ACTIVITY INTERLOCK
 1467                          1250      1252   DSPTEM1   ERASE           +2         BUFFER STORAGE AREA 1 (MOSTLY FOR TIME)
 1468                          1253      1255   DSPTEM2   ERASE           +2         BUFFER STORAGE AREA 2 (MOSTLY FOR DEG)

 1469   REF    1               1254             DSPTEMX   EQUALS DSPTEM2  +1         B(2) S-S DISPLAY BUFFER FOR EXT. VERBS.
 1470   REF    1               1250             NORMTEM1  EQUALS DSPTEM1             B(3)DSP NORMAL DISPLAY REGISTERS.
A1471

R1472                 DISPLAY FOR EXTENDED VERBS                                     (20)

 1474   REF    1               1255             OPTIONX   EQUALS DSPTEMX +1          B(2) EXT V8 OPTION CODE
 1475                         1256     1256    OPTIONEV ERASE

A1476

R1477               TBASE S AND PHSPRDT S.                                  (12D)

 1479                         1257     1257    TBASE1   ERASE               B(1)PRM
 1480                         1260     1260    PHSPRDT1 ERASE               B(1)PRM
 1481                         1261     1261    TBASE2   ERASE               B(1)PRM
 1482                         1262     1262    PHSPRDT2 ERASE               B(1)PRM
 1483                         1263     1263    TBASE3   ERASE               B(1)PRM
 1484                         1264     1264    PHSPRDT3 ERASE               B(1)PRM
 1485                         1265     1265    TBASE4   ERASE               B(1)PRM
 1486                         1266     1266    PHSPRDT4 ERASE               B(1)PRM
 1487                         1267     1267    TBASE5   ERASE               B(1)PRM
 1488                         1270     1270    PHSPRDT5 ERASE               B(1)PRM
 1489                         1271     1271    TBASE6   ERASE               B(1)PRM
 1490                         1272     1272    PHSPRDT6 ERASE               B(1)PRM


R14901  V37 TEMP STORAGE                                                    (2D)

 14903  REF    1              1264             MMTEMP   EQUALS PHSPRDT3     B(1)TMP
 14904  REF    1              1265             BASETEMP EQUALS TBASE4       B(1)TMP

R1491               MORE UNSWITCHED FOR DISPLAY INF                         (4D)

 1493                         1273     1273    EBANKSAV ERASE
 14935  REF    1              1273             DSPFLG   =      EBANKSAV
 1494                         1274     1274    MARKFLAG ERASE
 1495                         1275     1275    EBANKTEM ERASE
 1496                         1276     1276    MARK2PAC ERASE


R1497   MISCELLANEOUS UNSWITCHED                                            (19D)
 1499                         1277     1277    1/PIPADT ERASE               B(1)PRM
 1500   REF    1              1277             OLDBT1   =      1/PIPADT

 1501                         1300     1301    LONGCADR ERASE  +1           B(2)     LONGCALL REGISTER
 1502                         1302     1303    LONGBASE ERASE  +1           B(2)     LONGCALL REGISTER
 1503                         1304     1305    LONGTIME ERASE  +1           B(2)     LONGCALL REGISTER
A1504


R1505               MISC.  INCLUDING RESTART COUNTER, GIMBAL ANGLE  SAVE  AND
R1506               STANDBY VERB ERASABLES. REDOCTR BEFORE THETAD (DWNLNK)

 1508                         1306     1306    REDOCTR  ERASE               B(1)PRM CONTAINS NUMBER OF RESTARTS.
 1509                         1307     1311    THETAD   ERASE  +2           B(3)PRM DESIRED GIM ANGLES FOR MANEUVER.
 1510   REF    1              1307             CPHI     =      THETAD               (OUTER)
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L       ERASABLE ASSIGNMENTS                                                         USER'S PAGE NO. 47      E0 S?

 1511   REF   2  LAST   83     1310              CTHETA   =        THETAD    +1          (INNER)
 1512   REF   3  LAST   84     1311              CPSI     =        THETAD    +2          (MIDDLE)

R1513               ENTRY VARIABLES SHARED FOR TM.                                 (4D)

 1514   REF   4  LAST   84     1307              RODTREF  =        THETAD              I(2)    P65
 1515   REF   1                1311              VREF     =        RODTREF +2          I(2)    P65   HI-ORDER WORD ONLY DNLNK'D
 1516                          1312      1312    DESOPTT  ERASE                        B(1)DSP NOUN 92 FOR P20,22,52, R52.
 1518                          1313      1313    DESOPTS  ERASE                        B(1)DSP NOUN 92 FOR P20,22,52, R52.

 1519                          1314      1321    DELV     ERASE  +5                    I(6)
 1520   REF   1                1314              DELVX    =        DELV
 1521   REF   2  LAST   84     1316              DELVY    =        DELV      +2
 1522   REF   3  LAST   84     1320              DELVZ    =        DELV      +4

R1523               T4RUPT ERASABLE.                                               (6D)

 1525                          1322      1322    DSRUPTSW ERASE
 1526                          1323      1323    OPTIND   ERASE
 1527                          1324      1324    LGYRO    ERASE
 1528                          1325      1326    COMMANDO ERASE  +1
 1529                          1327      1327    ZONE     ERASE                        B(1)PRM USED IN SHAFT STOP MONITOR
R1530

R1532               MODE SWITCHING ERASABLE.                                       (09D)

 1535                          1330      1330    DESOPMOD ERASE                        B(1)PRM
 1536                          1331      1331    WTOPTION ERASE                        B(1)PRM
 1537                          1332      1332    ZOPTCNT  ERASE                        B(1)PRM
A15375

 1538                          1333      1333    IMODES30 ERASE                        B(1)PRM
 153805 REF  12  LAST   67     4752              TLIMBIT  =        BIT15               IMU TEMP NOT         IMU TEMP WITHIN
A153806                                                                                WITHIN LIMITS        LIMITS

 15381  REF  13  LAST   67     4753              TONISSBT =        BIT14               ISS OFF              ISS ON

 153815 REF  14  LAST   67     4754              IMUFLBIT =        BIT13               IMU OK               IMU FAIL IS ON

 15382  REF  13  LAST   67     4755              ICDUFLBT =        BIT12               IMU CDU OK           IMU CDU FAIL IS ON

 153825 REF  12  LAST   66     4756              CAGEBIT  =        BIT11               IMU CAGE NOT ON      IMU CAGE ON

 15383  REF  12  LAST   66     4757              PIPAFLBT =        BIT10               PIPA OK              PIPA FAIL IS ON

 153835 REF  12  LAST   66     4760              IMUOPBIT =        BIT9                IMU OFF OR NOT OK    IMU ON AND OK

 15384  REF  14  LAST   67     4761              ITNON2BT =        BIT8                IMU TURN ON DELAYED IMU TURN ON ALLOWED
 153845 REF  13  LAST  67     4762           ITNONIBT =     BIT7        IMU TURN ON DELAYED IMU TURN ON ALLOWED

 15385  REF  12  LAST  67     4763           IMUNITBT =     BIT6        IMU INIT IN PROCESS IMU NOT BEING INIT.

 153855 REF  11  LAST  66     4764           NOACCALM =     BIT5        INHIBIT PIPA ALARM  ALLOW PIPA ALARM

 15386  REF  11  LAST  66     4765           IMUFINHT =     BIT4        INHIBIT IMU WARNING ALLOW IMU WARNING

 153865 REF  12  LAST  66     4766           ICDUINHT =     BIT3        INHIBIT CDU WARNING ALLOW CDU WARNING

 15387  REF  12  LAST  66     4767           DLAYFAIL =     BIT2        TURNON DELAY FAIL   TURN DELAY OK

 153875 REF  12  LAST  67     4770           ACCFINHT =     BIT1        INHIBIT PIPA        ALLOW PIPA WARNING
A153876                                                                         WARNING

 1539                         1334    1334   IMODES33 ERASE             B(1)PRM
 15391  REF  14  LAST  84     4753           PROCDBIT =     BIT14       PROCEED OFF         PROCEED ON

 153915 REF  15  LAST  84     4754           PIP2FLBT =     BIT13       PIPA OK             PIPA FAIL IS ON

 15392  REF  14  LAST  84     4755           DNLKFAIL =     BIT12       DOWNLINK OK         DOWNLINK FAIL

 153925 REF  13  LAST  84     4756           UPLKFAIL =     BIT11       UPLINK OK           UPLINK TOO FAST

 15395  REF  13  LAST  85     4763           NOIMUDAP =     BIT6        DONT USE IMU FOR    OK TO USE IMU FOR
A153951                                                                   VEHICLE ATTITUDE      VEHICLE ATTITUDE

 153955 REF  12  LAST  85     4764           IMUZROBT =     BIT5        IMU ZEROING         IMU NOT ZEROING

 153975 REF  13  LAST  85     4770           LMPTSTBT =     BIT1        LAMP TEST REQUESTED LAMP TEST NOT ON

A15399
 1540                         1335    1336   MODECADR ERASE +1          B(2)TMP
 1541   REF   1               1335           IMUCADR  =     MODECADR
 1542   REF   2  LAST  85     1336           OPTCADR  =     MODECADR +1
A15425

 1543                         1337    1337   OPTMODES ERASE             B(1)PRM *****MUST PRECEDE HOLDFLAG
A154301                                                                              FOR DOWNLINK
 15433  REF  13  LAST  84     4757           ZROPTFIN =     BIT10       OPTICS ZERO FINISH  OPTICS BEING ZEROED

 154345 REF  14  LAST  85     4762           OCDUFBIT =     BIT7        OPTICS CDU OK       OPTICS CDU FAIL

 154355 REF  13  LAST  85     4764           OPMD1BIT =     BIT5        OPTICS MODE NOT SET OPTICS MODE SET TO
A154356                                                             TO COMPUTER CONTROL   COMPUTER CONTROL

 15436  REF  12  LAST  85     4765           OPMD2BIT =     BIT4        OPTICS MODE NOT SET OPTICS MODE SET TO
A154361                                                               TO ZERO OPTICS        ZERO OPTICS

 154365 REF  13  LAST  85     4766           ZOPTICS  =     BIT3        OPTICS MODE         OPTICS MODE NOT
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L      ERASABLE ASSIGNMENTS                                                   USER'S PAGE NO. 49      EQ S?

A154366                                                               SWITCHED TO ZERO    SWITCHED TO ZERO
A154367                                                               OPTICS              OPTICS

 15437  REF  13  LAST   85       4767          OCDUINHT =      BIT2   INHIBIT TRACKER     ALLOW TRACKER ALARM
A154371                                                                ALARM

 15439                           1340    1340  HOLDFLAG ERASE         B(1)PRM  **** MUST FOLLOW OPTMODES
A154391                                                                             FOR DOWNLINK
A1544


R1545             ERASABLE FOR SXTMARK CDU CHECK DELAY. -PAD LOADED-  (1D)

 1547                            1341    1341  CDUCHKWD ERASE         B(1) PL

R1548             P37   **RETURN TO EARTH  (PAD LOAD) ****            (2D)

 1550                            1342    1343  RTED1    ERASE      +1 I(2)PL VGAMMA POLY COEF                B-3

R1551             P40   ***STEERING ROUTINE*** PAD LOAD               (1D)

 1553                            1344    1344  DVTHRESH ERASE         I(1)PL  DELTA V THRESHOLD FOR LOW THRUST
A1554                                                                         ROUTINE                         B-2

R1555             P23    ***PAD LOAD****                              (2D)

 1557                            1345    1346  HORIZALT ERASE      +1 I(2)PL  HORIZION ALTITUDE        M  B-29

R1558             P-20        ALTERNATE LOS VARIANCE    PAD LOAD***** (1D)

A1560                                                                                                  -16
 1561                            1347    1347  ALTVAR   ERASE         I(2)PL MILLARD. SQUARED SCALED 2

R1562             PAD LAOAD FOR DAP                                   (1D)

 1564                            1350    1350  EMDOT    ERASE         I(1)PL  SPS FLOW RATE   KG/CS B+3

R15641            UNIVERSAL TRACKING STORAGE                          (3D)

 15643                           1351    1351  OPTNTYPE ERASE         B(1)
 15644                           1352    1353  AZIMANGL ERASE  +1     B(2)
R15649
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L        ERASABLE ASSIGNMENTS                                                        USER'S PAGE NO.  50       EC S?

R 156491             MODE SW. ERASABLE                (1D)

  156492                               1354      1354    SWSAMPLE ERASE                    B(1)PRM


R 156493             UT PERMANENT STORAGE                                                 (2D)

  156495                               1355      1356    R67TIME  ERASE  +1               B(2)
  156496 REF     1                     1355              UTSTARNO EQUALS R67TIME          B(1)


R 156497             MINKEY CONTROLLER TEMP RESTART STORAGE                               (1D)

  156499 REF     2   LAST    87        1356              AUTTEMP  EQUALS R67TIME   +1     B(1)


R 1565               SELF-CHECK ASSIGNMENTS.                                              (17D)

R 1567                                          (DO NOT MOVE, S-C IS ADDRESS SENSITIVE)

  1568                                 1357      1377    SELFERAS ERASE  1357 - 1377      ***MUST NOT BE MOVED***
  1569      REF     1                  1357              SFAIL    EQUALS SELFERAS         B(1)
  1570      REF     1                  1360              ERESTORE EQUALS SFAIL     +1     B(1)
  1571      REF     1                  1361              SELFRET  EQUALS ERESTORE  +1     B(1)     RETURN
  1572      REF     1                  1362              SMODE    EQUALS SELFRET   +1     B(1)
  1573      REF     1                  1363              ALMCADR  EQUALS SMODE     +1     B(2)      ALARM-ABORT USER'S 2CADR
  1574      REF     1                  1365              ERCOUNT  EQUALS ALMCADR   +2     B(1)
  1575      REF     1                  1366              SCOUNT   EQUALS ERCOUNT   +1     B(3)
  1576      REF     1                  1371              SKEEP1   EQUALS SCOUNT    +3     B(1)
  1577      REF     1                  1372              SKEEP2   EQUALS SKEEP1    +1     B(1)
  1578      REF     1                  1373              SKEEP3   EQUALS SKEEP2    +1     B(1)
  1579      REF     1                  1374              SKEEP4   EQUALS SKEEP3    +1     B(1)
  1580      REF     1                  1375              SKEEP5   EQUALS SKEEP4    +1     B(1)
  1581      REF     1                  1376              SKEEP6   EQUALS SKEEP5    +1     B(1)
  1582      REF     1                  1377              SKEEP7   EQUALS SKEEP6    +1     B(1)

A 1583
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L       ERASABLE ASSIGNMENTS                                                        USER'S PAGE NO.  51     EQ 57

P3000                   EBANK-3 ASSIGNMENTS

 3001                         E3,1400                   SETLOC 1400

R3002              WAITLIST TASK LISTS.                                         (26D)

 3004                         E3,1400  E3,1407   LST1      ERASE  +7            B(8D)PRM  DELTA T S.
 3005                         E3,1410  E3,1431   LST2      ERASE  +17D          B(18D)PRM TASK 2CADR ADDRESSES.

R3006              RESTART STORAGE.                                             (2D)

 3008                         E3,1432  E3,1433   RSBBQ     ERASE  +1            B(2)PRM SAVE BB AND Q FOR RESTARTS.

R3009              MORE LONGCALL STORAGE. (MUST BE IN LST1 S BANK).             (2D)

 3011                         E3,1434  E3,1435   LONGEXIT ERASE  +1             B(2)TMP MAY BE SELDOM OVERLAYED.

R3012              PHASE-CHANGE LISTS PART II.                                  (12D)

 3014                         E3,1436  E3,1436   PHSNAME1 ERASE                 B(1)PRM
 3015                         E3,1437  E3,1437   PHSBB1   ERASE                 B(1)PRM
 3016                         E3,1440  E3,1440   PHSNAME2 ERASE                 B(1)PRM
 3017                         E3,1441  E3,1441   PHSBB2   ERASE                 B(1)PRM
 3018                         E3,1442  E3,1442   PHSNAME3 ERASE                 B(1)PRM
 3019                         E3,1443  E3,1443   PHSBB3   ERASE                 B(1)PRM
 3020                         E3,1444  E3,1444   PHSNAME4 ERASE                 B(1)PRM
 3021                         E3,1445  E3,1445   PHSBB4   ERASE                 B(1)PRM
 3022                         E3,1446  E3,1446   PHSNAME5 ERASE                 B(1)PRM
 3023                         E3,1447  E3,1447   PHSBB5   ERASE                 B(1)PRM
 3024                         E3,1450  E3,1450   PHSNAME6 ERASE                 B(1)PRM
 3025                         E3,1451  E3,1451   PHSBB6   ERASE                 B(1)PRM

R3026              IMU COMPENSATION PARAMETERS.                                 (22D)

 3028                         E3,1452  E3,1452   PBIASX   ERASE                 B(1)   PIPA BIAS, PIPA SCALE FACTR TERMS
 3029   REF   1               E3,1452            PIPABIAS =        PBIASX              INTERMIXED.
 3030                         E3,1453  E3,1453   PIPASCFX ERASE
 3031   REF   1               E3,1453            PIPASCF  =        PIPASCFX
 3032                         E3,1454  E3,1454   PBIASY   ERASE
 3033                         E3,1455  E3,1455   PIPASCFY ERASE
 3034                         E3,1456  E3,1456   PBIASZ   ERASE
 3035                         E3,1457  E3,1457   PIPASCFZ ERASE

 3036                         E3,1460  E3,1460   NBDX     ERASE                 GYRO BIAS DRIFTS
 3038                         E3,1461  E3,1461   NBDY     ERASE
 3039                         E3,1462  E3,1462   NBDZ     ERASE
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L        ERASABLE ASSIGNMENTS                                                              USER'S PAGE NO. 52      E0 52

 3040                        E3,1463  E3,1463  ADIAX     ERASE                             ACCELERATION SENSITIVE DRIFT ALONG THE
 3041                        E3,1464  E3,1464  ADIAY     ERASE                                 INPUT AXIS
 3042                        E3,1465  E3,1465  ADIAZ     ERASE

 3043                        E3,1466  E3,1466  ADSRAX    ERASE                             ACCELERATION SENSITIVE DRIFT ALONG THE
 3044                        E3,1467  E3,1467  ADSRAY    ERASE                                 SPIN REFERENCE AXIS
 3045                        E3,1470  E3,1470  ADSRAZ    ERASE

 3046                        E3,1471  E3,1476  GCOMP     ERASE  +5                         CONTAINS COMPENSATING TORQUES

 3047                        E3,1477  E3,1477  GCOMPSW   ERASE
 3048   REF   1              E3,1471           COMMAND   EQUALS GCOMP
 3049   REF   2  LAST   89   E3,1474           CDUIND    EQUALS GCOMP     +3


R3050               STATE VECTORS FOR ORBIT INTEGRATION.                                   (44D)

R3052                                         (DIFEQCNT THRU XKEP MUST BE IN SAME
R3053                                           EBANK AS RRECTCSM, RRECTLEM ETC
R3054                                           BECAUSE THE COPY-CYCLES (ATOPCSM,
R3055                                           PTOACSM ETC) ARE EXECUTED IN BASIC.
R3056                                             ALL OTHER REFERENCES TO THIS GROUP
R3057                                           ARE BY INTERPRETIVE INSTRUCTIONS.)

 3058                        E3,1500  E3,1553  DIFEQCNT ERASE  +43D                        B(1)TMP
R3059                                         (UPSVFLAG...XKEP MUST BE KEPT IN ORDER)

 3060   REF   1              E3,1501           UPSVFLAG EQUALS DIFEQCNT +1                 B(1)PRM UPDATE FLAG
 3061   REF   2  LAST   36   E3,1502           RRECT    EQUALS UPSVFLAG +1                 B(6)TMP POS AT RECT             KM*2(-14)
 3062   REF   1              E3,1510           VRECT    EQUALS RRECT    +6                 B(6)TMP VEL AT RECT         KM(-1/2)*2(6)
 3063   REF   1              E3,1516           TET      EQUALS VRECT    +6                 B(2)TMP TIME OF STATE VECT  CSECS*2(-28)
 3064   REF   1              E3,1520           TDELTAV  EQUALS TET      +2                 B(6)TMP POSITION DEVIATION       KM*2(14)
 3065   REF   1              E3,1526           TNUV     EQUALS TDELTAV  +6                 B(6)TMP VEL DEVIATION      KM(-1/2)*2(14)
 3066   REF   1              E3,1534           RCV      EQUALS TNUV     +6                 B(6)TMP CONIC POSITION          KM*2(-14)
 3068   REF   1              E3,1542           VCV      EQUALS RCV      +6                 B(6)TMP CONIC VELOCITY      KM(-1/2)*2(6)
 3070   REF   1              E3,1550           TC       EQUALS VCV      +6                 B(2)TMP TIME SINCE RECTIFICATION
 3071   REF   1              E3,1552           XKEP     EQUALS TC       +2                 B(2)TMP ROOT OF KEPLER EQ KM(1/2.*2(-10)

 30715  REF   1              E3,1552           XPREV    =        XKEP                      I(2)TMP
R3072           **** TEMP - IN VAC AREA ****
 3073                           0022           RRECT1   EQUALS 18D
 3074                           0030           VRECT1   EQUALS 24D
 3075                           0036           TET1     EQUALS 30D
A3076

R3077               PERMANENT STATE VECTORS AND TIMES.                                     (99D)

R3079               (DO NOT OVERLAY WITH ANYTHING AFTER BOOST)
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L        ERASABLE ASSIGNMENTS                                                                USER'S PAGE NO. 53     EQ S?

R3080            (RRECTCSM ...XKEPCSM MUST BE KEPT IN THIS ORDER)

  3081                             E3,1554  E3,1561   RRECTCSM ERASE  +5               B(6)PRM CSM VARIABLES.
  3082   REF    1                  E3,1554            RRECTHIS =      RRECTCSM
  3083                             E3,1562  E3,1567   VRECTCSM ERASE  +5               B(6)PRM
  3084                             E3,1570  E3,1571   TETCSM   ERASE  +1               B(2)PRM
  3085   REF    1                  E3,1570            TETTHIS  =      TETCSM
  3086                             E3,1572  E3,1577   DELTACSM ERASE  +5               B(6)PRM
  3087                             E3,1600  E3,1605   NUVCSM   ERASE  +5               B(6)PRM
  3088                             E3,1606  E3,1613   RCVCSM   ERASE  +5               B(6)PRM
  3089                             E3,1614  E3,1621   VCVCSM   ERASE  +5               B(6)PRM
  3090                             E3,1622  E3,1623   TCCSM    ERASE  +1               B(2)PRM
  3091                             E3,1624  E3,1625   XKEPCSM  ERASE  +1               B(2)PRM

R3092            (RRECTLEM ...XKEPLEM MUST BE KEPT IN THIS ORDER)

  3093                             E3,1626  E3,1633   RRECTLEM ERASE  +5               B(6)PRM LEM VARIABLES
  3094   REF    1                  E3,1626            RRECTOTH =      RRECTLEM
  3095                             E3,1634  E3,1641   VRECTLEM ERASE  +5               B(6)PRM
  3096                             E3,1642  E3,1643   TETLEM   ERASE  +1               B(2)PRM
  3097   REF    1                  E3,1642            TETOTHER =      TETLEM
  3098                             E3,1644  E3,1651   DELTALEM ERASE  +5               B(6)PRM
  3099                             E3,1652  E3,1657   NUVLEM   ERASE  +5               B(6)PRM
  3100                             E3,1660  E3,1665   RCVLEM   ERASE  +5               B(6)PRM
  3101                             E3,1666  E3,1673   VCVLEM   ERASE  +5               B(6)PRM
  3102                             E3,1674  E3,1675   TCLEM    ERASE  +1               B(2)PRM
  3103                             E3,1676  E3,1677   XKEPLEM  ERASE  +1               B(2)PRM

  3104                             E3,1700  E3,1705   X789     ERASE  +5
  3105                             E3,1706  E3,1710   TEPHEM   ERASE          +2
  3107                             E3,1711  E3,1716   UNITW    ERASE          +5
  3108   REF    1                  E3,1711            -AYO     EQUALS UNITW             (2)
  3109   REF    2  LAST    90      E3,1713            AXO      EQUALS UNITW   +2        (2)
A31095

R3110            STATE VECTORS FOR DOWNLINK.                                           (12D)

  3112                             E3,1717  E3,1724   R-OTHER  ERASE  +5               B(6)PRM POS VECT (OTHER VECH) FOR DNLINK
  3113                             E3,1725  E3,1732   V-OTHER  ERASE  +5               B(6)PRM VEL VECT (OTHER VECH) FOR DNLINK

  3114   REF    2  LAST    90      E3,1642            T-OTHER  =      TETLEM                           TIME (OTHER VECH) FOR DNLINK

R3115            REFSMMAT.                                                             (18D)

  3117                             E3,1733  E3,1754   REFSMMAT ERASE  +17D             I(18D)PRM

R3118            AVERAGEG INTEGRATOR STORAGE.                                          (6D)
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 3120                          E3,1755  E3,1762   UNITR     ERASE  +5
A3121

R31211              TEMP STORAGE FOR N90 DISPLAY IN RENDEZVOUS TARGETING PROGRAMS  (6D)
 31213  REF    1               E3,1755            YCSM      EQUALS UNITR
 31214  REF    1               E3,1757            YDOTC     EQUALS YCSM      +2
 31215  REF    1               E3,1761            YDOTL     EQUALS YDOTC     +2

R3122               P40 PAD LOADS                                                  (3D)

 3124                          E3,1763  E3,1763   EIMP1SEC  ERASE                  I(1)PL E-2 B-14 NEWT-SEC BR-PT AT 1 SEC
 31241                         E3,1764  E3,1764   EFIMP01   ERASE                  I(1)PL E-2 B-14 NEWT SLOPE 0-1 SEC SEG
 31242                         E3,1765  E3,1765   EFIMP16   ERASE                  I(1)PL E-2 B-14 NEWT SLOPE 1-6 SEC SEG
A31251

R31255  *********LUNAR MODULE CHANGE  ***********                                  (2D)

 31256  REF    1               E3,1766            E3J22R2M  EQUALS EFIMP16 +1
 31257  REF    1               E3,1767            E32C31RM  EQUALS E3J22R2M +1
R31258

R3126           **** CONICSEX (PLANETARY INERT. ORIEN.) ****

 3127   REF    1               E3,1706            TIMSUBO   EQUALS TEPHEM          CSEC B-42 (TRIPLE PREC)
A31275

R3128               P23 PAD LOAD (2D)

R3129   ** P24  PAD LOADS **     (2D)

 3130   REF    1               E3,1770            TRUNSF    EQUALS E32C31RM +1     I(1)PL
 3131   REF    1               E3,1771            SHAFTSF   EQUALS TRUNSF   +1     I(1)PL
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L        ERASABLE ASSIGNMENTS                                                        USER'S PAGE NO. 55        E  S?

P4000                  EBANK-4 ASSIGNMENTS

 4001                             E4,1400                     SETLOC 2000


 40015                            E4,1400             ERASPIP  EQUALS                 ENTRANCE TO ERASABLE PIPA TEST PROGRAM
R4002          P20 STORAGE.               -PAD LOADED-                                (40)

 4004                             E4,1400  E4,1400    WRENDPOS ERASE                  B(1)PL                               M B-14
 4005                             E4,1401  E4,1401    WRENDVEL ERASE                  B(1)PL                             M/CSECB0
 4006                             E4,1402  E4,1402    RMAX     ERASE                  B(1)PL                         METERS*2(-19)
 4007                             E4,1403  E4,1403    VMAX     ERASE                  B(1)PL                          M/CSEC*2(-7)

R4008          P22 STORAGE.               -PAD LOADED-                                (5D)

 4010                             E4,1404  E4,1404    WORBPOS  ERASE                  B(1)PL                               M B-14
 4011                             E4,1405  E4,1405    WORBVEL  ERASE                  B(1)PL                             M/CSECB0
 4012                             E4,1406  E4,1406    S22WSUBL ERASE                  B(1)PL                               M B-14
 40125                            E4,1407  E4,1410    RPVAR    ERASE          +1      B(2)PL

R4013          CONISEX STORAGE.           -PAD LOADED-                                (6D)

 4015                             E4,1411  E4,1416    504LM    ERASE          +5      I(6)MOON LIBRATION VECTOR
A4016

R4017          ENTRY STORAGE.             -PAD LOADED-                                (2D)

 4019                             E4,1417  E4,1420    EMSALT   ERASE  +1              I(2)PL

R4020          P35 CONSTANTS.             -PAD LOADED-                                (4D)

 4022                             E4,1421  E4,1422    ATIGINC  ERASE  +1              B(2)PL
 4023                             E4,1423  E4,1424    PTIGINC  ERASE  +1              B(2)PL

R40341         LUNAR LANDING SIGHT DATA. -PAD LOADED-                                 (6D)
R40342         (USED BY INTEGRATION INITIALIZATION,LAT-LONG SUBROUTINES, P30'S)

 40343                            E4,1425  E4,1432    RLS      ERASE          +5      I(6) PL  LUNAR LANDING SIGHT VECTOR
A40345

R4035   CONISEX (LUNAR AND SOLAR EPHEM)STORAGE. -PAD LOADED-                          (77D)

 4037                             E4,1433  E4,1547    TIMEMO   ERASE          +76D
 4038   REF  1                    E4,1436             VECOEM   EQUALS TIMEMO +3
 4039   REF   1                  E4,1532               RESO       EQUALS VECOEM +60D
 4040   REF   1                  E4,1540               VESO       EQUALS RESO +6
 4041   REF   1                  E4,1546               OMEGAES    EQUALS VESO +6


R4043              FULL INTEGRATION STORAGE.                                           (88D)

 4045                            E4,1550  E4,1550      PBODY      ERASE                    I(1)
 4046   REF   1                  E4,1551               ALPHAV     EQUALS PBODY      +1     I(6)TMP
 4047   REF   1                  E4,1557               BETAV      EQUALS ALPHAV     +6     I(6)TMP
 4048   REF   1                  E4,1565               PHIV       EQUALS BETAV      +6     I(6)TMP
 4049   REF   1                  E4,1573               PSIV       EQUALS PHIV       +6     I(6)TMP
 4050   REF   1                  E4,1601               FV         EQUALS PSIV       +6     I(6)TMP
 4051   REF   1                  E4,1607               BETAM      EQUALS FV         +6     I(6)TMP
 4052   REF   1                  E4,1611               H          EQUALS BETAM      +2     I(2)TMP
 4054   REF   1                  E4,1613               IRETURN    EQUALS H          +2     I(1) TMP
 4055   REF   1                  E4,1614               NORMGAM    EQUALS IRETURN    +1     I(1)TMP
 4056   REF   1                  E4,1615               VECTAB     EQUALS NORMGAM    +1     I(36)TMP
 4057   REF   1                  E4,1661               RPQV       EQUALS VECTAB     +36D    (6)TMP VECTOR PRIMARY TO SECONDARY BODY
 4058   REF   1                  E4,1667               ORIGEX     EQUALS RPQV       +6     B(1)TMP QSAVE FOR COORD. SWITCH. ROUTINE
 4059   REF   1                  E4,1667               KEPRTN     EQUALS ORIGEX                    QSAVE FOR KEPLER
 4061   REF   2  LAST    93      E4,1670               RPSV       EQUALS ORIGEX    +1      I(6) TMP  SUN TO PRIMARY BODY VECTOR
 4062   REF   1                  E4,1676               XKEPNEW    EQUALS RPSV       +6      (2)TMP ROOT OF KEPLERS EQU FOR TIME TAU


R4064              THESE PROBABLY CAN SHARE INTEGRATION VARIABLES.                     (3D)

R4066              LAT-LONG STORAGE

 4069   REF   2  LAST    93      E4,1637               ERADM      EQUALS VECTAB     +18D   I(2)TMP
 4070   REF   1                  E4,1641               INCORPEX   EQUALS ERADM      +2     I(1)TMP


R4071              R31(V83) STORAGE. -SHARES WITH INTEGRATION STORAGE-                 (24D)
A4074

 4075   REF   3  LAST    93      E4,1623               BASEOTP    EQUALS VECTAB     +6     I(6)      BASE POS VECTOR OTHER VEH
 4076   REF   4  LAST    93      E4,1637               BASEOTV    EQUALS VECTAB     +18D   I(6)      BASE VEL VECTOR OTHER VEH
 4077   REF   5  LAST    93      E4,1653               BASETHP    EQUALS VECTAB     +30D   I(6)      BASE POS VECTOR THIS VEH
 4078   REF   2  LAST    93      E4,1661               BASETHV    EQUALS RPQV              I(6)      BASE VEL VECTOR THIS VEH
R4081

R4082              CONIC INTEGRATION STORAGE.       -MAY NOT SHARE WITH SERVICER-    (6D)

 4085   REF   1                  E4,1700               ALPHAM     EQUALS XKEPNEW    +2     I(2)TMP
 4086   REF   1                  E4,1702               TAU.       EQUALS ALPHAM     +2     I(2)TMP
 4088   REF   1                  E4,1704               DT/2       EQUALS TAU.       +2     I(2)TMP


R4089              R61 STORAGE                                                         (2D)
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L       ERASABLE ASSIGNMENTS                                                   USER'S PAGE NO.  57      EU S?

  4091  REF   1                E4,1706          R63TIME  EQUALS DT/2 +2          I(2)TMP
A4092

R4093                INTEGRATION STORAGE                                         (1D)
  4095  REF   1                E4,1710          EGRESS   EQUALS R63TIME +2

R4096                VERB 83(N54)AND VERB 90 (N96) DISPLAYS                      (6D)
  4098  REF   1                E4,1711          RANGE    EQUALS EGRESS   +1      I(2)DSP NOUN 54 DISTANCE TO OPTICAL SUBJ
  4099  REF   1                E4,1713          RRATE    EQUALS RANGE    +2      I(2)DSP NOUN 54 RATE OF APPROACH
  4100  REF   1                E4,1715          RTHETA   EQUALS RRATE    +2      I(2)DSP NOUN 54
  41001 REF   1                E4,1715          RRATE2   EQUALS RTHETA           I(2) N96 LM OUT-OF-PLANE RATE

R41002  VERB 83  STORAGE                                                         (14D)

  4101  REF   2  LAST   94     E4,1717          RONE     EQUALS RTHETA   +2      I(6)TMP VECTOR STORAGE. (SCRATCH)
  4102  REF   1                E4,1725          VONE     EQUALS RONE     +6      I(6)TMP VECTOR STORAGE (SCRATCH)
  4103  REF   1                E4,1733          BASETIME EQUALS VONE     +6      I(2)    BASE TIME  ASSOC WITH BASE VECS
A4104

R4108                V 67 STORAGE                                                (6D)

  4110  REF   2  LAST   94     E4,1711          WWPOS    EQUALS RANGE            I(2)TMP
  4111  REF   2  LAST   94     E4,1713          WWVEL    EQUALS RRATE            I(2)TMP
  4112  REF   3  LAST   94     E4,1715          WWOPT    EQUALS RTHETA           I(2)TMP

R4117                S-BAND ANTENNA GIMBAL ANGLES.  DISPLAYED BY R05 (EXT.VB.64)   (4D)
R4119                       OPERATION DURING P00 ONLY.

  4120  REF   3  LAST   94     E4,1711          RHOSB    EQUALS RANGE            B(2)DSP NOUN 51.  PITCH ANGLE
  4121  REF   1                E4,1713          GAMMASB  EQUALS RHOSB    +2      B(2)DSP NOUN 51.  YAW ANGLE

R4122                R 36 SCRATCHPAD STORAGE                                     (18D)

  4124  REF   2  LAST   94     E4,1717          VPASS36  EQUALS RONE             I (6)S-S
  4125  REF   1                E4,1725          UNP36    EQUALS VPASS36 +6       I (6)S-S
  41251 REF   1                E4,1733          UNA36    EQUALS UNP36 +6         I (6)S-S
A4126

R4127                EXTENDED VERB 82 STORAGE.                                   (6D)

  4130  REF   4  LAST   94     E4,1711          HPERMIN  EQUALS RANGE            I(2) SET TO 300KFT OR 35KFT FOR SR30.1
  4131  REF   1                E4,1713          RPADTEM  EQUALS HPERMIN  +2      I(2) PAD OR LANDING RADIUS FOR SR30.1
  4132  REF   1                E4,1715          TSTART82 EQUALS RPADTEM  +2      I(2) TEMP TIME STORAGE FOR V82.
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A4133

R4134          MORE VERB 82 NOT SHARING WITH VERB 83                  (7D)

  4136  REF  2 LAST   94   E4,1733       V82FLAGS EQUALS VONE     +6    (1) FOR V 82 BITS
  4137  REF  1             E4,1734       TFF      EQUALS V82FLAGS +1   I(2)  DSP NOUN 50,44
  4138  REF  1             E4,1736       -TPER    EQUALS TFF      +2   I(2)DSP NOUN 32
  4139  REF  1             E4,1740       THETA(1) EQUALS -TPER    +2   I(2) TMP SET AT END OF V82
  4140  REF  1             E4,1746       RSP-RREC EQUALS ADPTIME       DSP NOUN 50 FOR V82 DURING P00 AND P11
A41405

R4141          REENTRY CONICS                                         (6D)

  4143  REF  2 LAST   95   E4,1733       URONE    EQUALS V82FLAGS      I(6) SAVE ACTUAL FOR CALCULATIONS
A4144

R4145          V 82 DISPLAY                                           (4D)

  4147  REF  1             E4,1742       HAPOX    EQUALS THETA(1) +2   I(2) DSP NOUN 44
  4148  REF  1             E4,1744       HPERX    EQUALS HAPOX    +2   I(2) DSP NOUN 44
A4149

R4150          MINKEY RENDEZVOUS STORAGE                              (2D)

  4152  REF  1             E4,1750       TCSI2    EQUALS RSP-RREC +2   I(2) TIME OF NEXT CSI

R4154          P22 DISPLAY REGISTERS                                  (06D)

  4156  REF  1             E4,1746       ADPTIME  EQUALS HPERX    +2   I(2)TMP FOR SR52.1,ADVTRACK
  4157  REF  2 LAST   95   E4,1750       LANDLONG EQUALS ADPTIME  +2   I(2) DSP NOUN 89 FOR P22
  4158  REF  1             E4,1752       LANDALT  EQUALS LANDLONG +2   I(2)DSP NOUN 89 FOR P22.
R4159

R4160          S34/35.5,P34-P35 STORAGE.                              (5D)

  4162  REF  1             E4,1754       KT       EQUALS LANDALT  +2   B(2)
  4164  REF  1             E4,1756       QSAVED   EQUALS KT     +2     B(1)TMP HOLDS RETURN
  4165  REF  1             E4,1757       RTRN     EQUALS QSAVED   +1   B(1) RETURN
  4166  REF  1             E4,1760       SUBEXIT  EQUALS RTRN     +1   B(1) TMP
  41665 REF  2 LAST   95   E4,1756       ANEXIT   EQUALS QSAVED        I(1)

R4169          P 30 DISPLAY                                           (4D)
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 4171   REF   2  LAST   95   E4,1754            HAPO     EQUALS KT                  I(2) DSP NOUN 42, FOR P30.
 4172   REF   1              E4,1756            HPER     EQUALS HAPO     +2         I(2) DSP NOUN 42, FOR P30.
A4173

R4174              SOME P34 STORAGE.       (OVERLAYS P35.1 STORAGE)                 (2D)

 4176   REF   3  LAST   96   E4,1754            NOMTPI   EQUALS KT                  I(2)TMP NOMINAL TPI TIME FOR RECYCLE

R41761             P15 PAD LOADS                                                    (3D)

 41763  REF   4  LAST   96   E4,1754            DTF      EQUALS KT                  I(1)
 41764  REF   1              E4,1755            VC/O     EQUALS DTF +1              I(2)

R4177   THE FOLLOWING ARE ERASABLES USED BY THE SYSTEM TESTS. 205 USES TRANSM1  GS ARE NOT USED IN 205 NOR ARE THEY
R4179   WHILE 504 USES TRANSM1 AND ALFDK .

 4180                        E4,1400            TRANSM1  EQUALS 2000                 (18) INITIALIZATION FOR IMU TESTS
 4181   REF   1              E4,1422            ALFDK    =       TRANSM1 +18D        (144) ERASABLE LOAD IN 504
 41815  REF   1              E4,1641            ENDSYS-4 EQUALS ALFDK +143D         LAST SYS.TEST STORAGE IN E-4

R4182   END OF PERF. TEST ERASABLE IN BANK 4

R4183       *-*-* V82 *-*-*                                                         (6D)

 4185   REF   1              E4,1761            VONE'    EQUALS SUBEXIT +1          I(6)TMP NORMAL VELOCITY VONE/ SQRT MU
A4186

R41865     MINKEY PAD LOADS                                                         (8D)

 41867  REF   1              E4,1767            HAMDELH  EQUALS VONE' +6            I(2)PL
 418673 REF   1              E4,1771            WRDTIME  EQUALS HAMDELH +2          I(1)PL
 418675 REF   1              E4,1772            MINBLKTM EQUALS WRDTIME +1          I(1)PL
 418677 REF   1              E4,1773            TBEFCOMP EQUALS MINBLKTM +1         I(1)PL
 418679 REF   1              E4,1774            BRNBLKTM EQUALS TBEFCOMP +1         I(1)PL
 418681 REF   1              E4,1775            MAXWTIME EQUALS BRNBLKTM +1         I(1)PL
 418683 REF   1              E4,1776            FINCMPTM EQUALS MAXWTIME +1         I(1)PL

R4187              PAD LOAD INTEGRATION ERROR INCLUDED IN VARIANCE BY P20           (1D)

 4188   REF   1              E4,1777            INTVAR   EQUALS FINCMPTM +1         I(1)PL  SQUARE OF EXPECTED INTEGRATION
A4189                                                                                       POSITION EXTRAPOLATION ERROR.
A4190                                                                                       SCALED  METERS(2) 2(15)
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L        ERASABLE ASSIGNMENTS                                                        USER'S PAGE NO.  60       E0 S?

P5000    EBANK-5 ASSIGNMENTS
 5001                        E5,1400                  SETLOC 2400

R5002                *-*-*-*-  OVERLAY 1 IN EBANK 5 -*-*-*-*

R5003                W-MATRIX STORAGE.                                          (162D)

 5005                        E5,1400          W        EQUALS 2400              B(162)

 50051                       E5,1444          9X9LOC1  EQUALS 2444
 50052                       E5,1532          9X9LOC2  EQUALS 2532

R50053               P22 TEMP STORAGE          (6D)

 50054  REF    1             E5,1554          S22RL    EQUALS W +108D           TMP RL IN UNKNOWN LMK W INIT

 5006   REF    2 LAST   97   E5,1570          EMATRIX  =      W        +120D    B(42E     USED TO CONVERT W TO  6X6
 5007   REF    3 LAST   97   E5,1642          END-W    EQUALS W        +162D    **NEXT AVAILABLE LOC AFTER W MATRIX**

R5008                AUTO-OPTICS STORAGE -R52-

R5009   DO NOT MOVE FROM E5,1554. A DELICATE BALANCE EXISTS BETWEEN THIS AND P03
 5010   REF    4 LAST   97   E5,1554          XNB1     EQUALS W        +108D    B(6D) TMP
 5011   REF    1             E5,1562          YNB1     EQUALS XNB1     +6       B(6)TMP
 5012   REF    1             E5,1570          ZNB1     EQUALS YNB1     +6       B(6)TMP
 5013   REF    1             E5,1576          SAVQR52  EQUALS ZNB1     +6       I(2)TMP

 50131  REF    1             E5,1577          R52BNKSV EQUALS SAVQR52  +1       USED TO SAVE EBANK IN R52
 5014   REF    2 LAST   97   E5,1600          PLANVEC  EQUALS SAVQR52  +2       B(6) S-S SIGHTING VECTOR IN REF. COOR.
 5015   REF    1             E5,1606          TSIGHT   EQUALS PLANVEC  +6       B(2) S-S TIME OF SIGHTING
A5016

R50161               RENDEZVOUS TARGETTING STORAGE                              (6D)

 501612 REF    2 LAST   97   E5,1600          AUTOY    EQUALS PLANVEC           I(2)
 501613 REF    1             E5,1602          CMYDOT   EQUALS AUTOY +2          I(2)
 501614 REF    1             E5,1604          LMYDOT   EQUALS CMYDOT +2         I(2)

R50165               RENDEZVOUS  -P34-35                                        (26D)

 5018   REF    1             E5,1610          DVLOS    EQUALS TSIGHT   +2       I(6) S-S DELTA VELOCITY,LOS COORD-DISPLI
 5022   REF    1             E5,1616          UNRM     EQUALS DVLOS    +6       I(6) S-S
 5023   REF    1             E5,1624          ULOS     EQUALS UNRM     +6       I(6) S-S UNIT LINE OF SIGHT VECTOR
 5024   REF    1             E5,1632          ACTCENT  EQUALS ULOS     +6       I(2) S-S CENTRAL ANGLE BETWEEN ACTIVE
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A5025                                                                              VEH AT TPI IGNITION TIME AND
A5026                                                                              TARGET VECTOR.
 5027   REF   1                E5,1634          DELVTPI  EQUALS ACTCENT  +2    I(2)   NOUN 58 FOR P34.
 5028   REF   1                E5,1636          DELVTPF  EQUALS DELVTPI  +2    I(2)   NOUN 58,59 FOR P34,35.
 5029   REF   1                E5,1640          POSTTPI  EQUALS DELVTPF  +2    I(2)   NOUN 58 FOR P34.
 5030   REF   2  LAST    98    E5,1634          TDEC2    EQUALS DELVTPI         (2)


 50302  REF   1                E5,1640          T3TOT4   EQUALS POSTTPI        I(2) DSP NOUN 39 FOR P34,P35. TPI TO TIN
A50303                                                                         T (CAN NOT SHARE WITH RETURN TO EARTH)
R5031            ALIGNMENT                                                     (12D)

 5033   REF   2  LAST    97    E5,1610          STARSAV1 EQUALS DVLOS          I(6)TMP RESTART STAR SAVE.
 5034   REF   1                E5,1616          STARSAV2 EQUALS STARSAV1 +6    I(6)TMP RESTART STAR SAVE.
 5035   REF   1                E5,1616          US       =      STARSAV2                 (CISLUNAR TAG FOR STARSAV2).
A5036


R5037            P24-RATE AIDED OPTICS                                         (2)


 5039   REF   1                E5,1656          TRTEMP   EQUALS RIVEC          B(1)TMP
 5040   REF   1                E5,1657          SRTEMP   EQUALS TRTEMP   +1    B(1)TMP  ALSO USED AS RETURN SAVE BY R51
A5041                                                                                   AND P23.
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P5050             ALIGNMENT/SYSTEST/CALCSMSC/CRS61.1 COMMON STORAGE.                     (36D)
R5052             (CALCSMSC IS A SUBSET OF S41.1 AT LEAST)
R5053             (CRS61.1  IS A SUBSET OF P20)

  5054   REF   1                E5,1671          XSM      EQUALS END-W    +23D    B(6)
  5055   REF   1                E5,1677          YSM      EQUALS XSM       +6     B(6)TMP
  5056   REF   1                E5,1705          ZSM      EQUALS YSM       +6     B(6)TMP

  5057   REF   1                E5,1713          XDC      EQUALS ZSM       +6     B(6)TMP
  5058   REF   1                E5,1721          YDC      EQUALS XDC       +6     B(6)TMP
  5059   REF   1                E5,1727          ZDC      EQUALS YDC       +6     B(6)TMP

  5060   REF   2  LAST    99    E5,1713          XNB      =      XDC
  5061   REF   2  LAST    99    E5,1721          YNB      =      YDC
  5062   REF   1                E5,1727          ZNB      =      ZDC


R5066             ALIGNMENT/SYSTEST COMMON STORAGE.                                      (18D)

  5068   REF   2  LAST    99    E5,1735          STARAD   EQUALS ZDC       +6     I(18D)TMP

R5069             ALIGNMENT/SYSTEST/AUTO OPTICS COMMON STORAGE.                          (17D)

  5071   REF   1                E5,1757          OGC      EQUALS STARAD   +18D    I(2)TMP
  5072   REF   1                E5,1761          IGC      EQUALS OGC       +2     I(2)TMP
  5073   REF   1                E5,1763          MGC      EQUALS IGC       +2     I(2)TMP
  5074   REF   1                E5,1765          STAR     EQUALS MGC       +2     I(6)TMP
  5075   REF   1                E5,1773          SAC      EQUALS STAR      +6     I(2)TMP
  5076   REF   1                E5,1775          PAC      EQUALS SAC       +2     I(2)TMP
  5077   REF   1                E5,1777          QMIN     EQUALS PAC       +2     B(1)TMP
R5078

R5079          **** COLP50S ****                                                         (1D)

  5081   REF   1                E5,1735          CULTRIX  EQUALS VEARTH           VEARTH, VSUN, VMOON

R5082             OVERLAYS WITHIN ALIGNMENT/SYSTEST COMMON STORAGE.                      (24D)

  5084   REF   2  LAST    99    E5,1735          VEARTH   EQUALS STARAD           (6)TMP
  5085   REF   2  LAST    99    E5,1743          VSUN     EQUALS VEARTH    +6      (6)TMP
  5086   REF   1                E5,1751          VMOON    EQUALS VSUN      +6      (6)TMP
  5087   REF   1                E5,1757          SAX      EQUALS VMOON     +6      (6)TMP
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L         ERASABLE ASSIGNMENTS                                                              USER'S PAGE NO.  63       E0 S7

P5088                *-*-*-*-  OVERLAY 2 IN EBANK 5 -*-*-*-*

R5089                CONIC ROUTINES STORAGE.                                                (87D)

  5091    REF    2  LAST    99   E5,1642            DELX      EQUALS END-W              I(2)TMP
  5092    REF    1               E5,1644            DELT      EQUALS DELX       +2      I(2)TMP
  5093    REF    1               E5,1646            URRECT    EQUALS DELT       +2      I(6)TMP
  5094    REF    1               E5,1654            RCNORM    EQUALS URRECT     +6      I(2)TMP
  5096    REF    1               E5,1656            R1VEC     EQUALS RCNORM     +2      I(6)TMP
  5097    REF    2  LAST    98   E5,1664            R2VEC     EQUALS R1VEC      +6      I(6)TMP
  5098    REF    1               E5,1672            TDESIRED  EQUALS R2VEC      +6      I(2)TMP
  5099    REF    1               E5,1674            GEOMSGN   EQUALS TDESIRED   +2      I(1)TMP
  5100    REF    1               E5,1675            UN        EQUALS GEOMSGN    +1      I(6)TMP
  5101    REF    1               E5,1703            VTARGTAG  EQUALS UN         +6      I(1)TMP
  5102    REF    1               E5,1704            VTARGET   EQUALS VTARGTAG   +1      I(6)TMP
  5103    REF    1               E5,1712            RTNLAMB   EQUALS VTARGET    +6      I(1)TMP
  5104    REF    1               E5,1713            U2        EQUALS RTNLAMB    +1      I(6)TMP
  5105    REF    1               E5,1721            MAGVEC2   EQUALS U2         +6      I(2)TMP
  5106    REF    1               E5,1723            UR1       EQUALS MAGVEC2    +2      I(6)TMP
  5107    REF    1               E5,1731            SNTH      EQUALS UR1        +6      I(2)TMP
  5108    REF    1               E5,1733            CSTH      EQUALS SNTH       +2      I(2)TMP
  5109    REF    1               E5,1735            1-CSTH    EQUALS CSTH       +2      I(2)TMP
  5110    REF    1               E5,1737            CSTH-RHO  EQUALS 1-CSTH     +2      I(2)TMP
  5111    REF    1               E5,1741            P         EQUALS CSTH-RHO   +2      I(2)TMP
  5112    REF    1               E5,1743            R1A       EQUALS P          +2      I(2)TMP
  5113    REF    3  LAST   100   E5,1656            RVEC      EQUALS R1VEC              I(6)TMP
  5114    REF    1               E5,1745            VVEC      EQUALS R1A        +2      I(6)TMP
  5115    REF    2  LAST   100   E5,1712            RTNTT     EQUALS RTNLAMB            I(1)TMP
  5116    REF    1               E5,1753            ECC       EQUALS VVEC       +6      I(2)TMP
  5117    REF    3  LAST   100   E5,1712            RTNTR     EQUALS RTNLAMB            I(1)TMP
  5118    REF    4  LAST   100   E5,1712            RTNAPSE   EQUALS RTNLAMB            I(1)TMP
  5119    REF    2  LAST   100   E5,1721            R2        EQUALS MAGVEC2            I(2)TMP
  5120    REF    1               E5,1755            RTNPRM    EQUALS ECC        +2      I(1)TMP
  5121    REF    1               E5,1756            SGNRDOT   EQUALS RTNPRM     +1      I(1)TMP
  5122    REF    1               E5,1757            RDESIRED  EQUALS SGNRDOT    +1      I(2)TMP
  5123    REF    1               E5,1761            DELDEP    EQUALS RDESIRED   +2      I(2)TMP
  5124    REF    1               E5,1763            DEPREV    EQUALS DELDEP     +2      I(2)TMP
  5125    REF    2  LAST   100   E5,1761            TERRLAMB  EQUALS DELDEP               I(2)TMP
  5126    REF    1               E5,1763            TPREV     EQUALS DEPREV             I(2)TMP
A5127
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L       ERASABLE ASSIGNMENTS                                                        USER'S PAGE NO. 64      ED 5?

P5128            *-*-*-*-  OVERLAY 3 IN EBANK 5 -*-*-*-*

R5129            MEASUREMENT INCORPORATION STORAGE.                               (540)
R5131            (CALLED BY P20, P22, P23)

 5132   REF   3  LAST  100   E5,1642           OMEGAM1  EQUALS END-W               I(6)TMP
 5133   REF   1              E5,1650           OMEGAM2  EQUALS OMEGAM1   +6        I(6)TMP
 5134   REF   1              E5,1656           OMEGAM3  EQUALS OMEGAM2   +6        I(6)TMP
 5135   REF   1              E5,1664           HOLDW    EQUALS OMEGAM3   +6        I(18)TMP
 5136   REF   1              E5,1706           ZI       EQUALS HOLDW +18D          I(18)
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L         ERASABLE ASSIGNMENTS                                                                       USER'S PAGE NO.  65      E  57

P5157                 *-*-*-*-  OVERLAY 0  IN EBANK 5 -*-*-*-*

R5158                 SYSTEM TEST STORAGE.                                                           (174)

 5160                                E5,1400  E5,1401   AZIMUTH  ERASE  +1
 5161                                E5,1402  E5,1403   LATITUDE ERASE  +1

 5164                                E5,1404  E5,1411   ERVECTOR ERASE  +5
 5165                                E5,1412  E5,1412   LENGTHOT ERASE
 5166                                E5,1413  E5,1420   LOSVEC   ERASE  +5

 5167   REF   1                      E5,1413            SXTOPTN  =      LOSVEC
 5168                                E5,1421  E5,1421   NDXCTR   ERASE

 5169                                E5,1422  E5,1422   SYSTSPR1 ERASE                               UNUSED

 5170                                E5,1423  E5,1423   POSITON  ERASE
 5171                                E5,1424  E5,1424   QPLAC    ERASE
 5172                                E5,1425  E5,1425   QPLACE   ERASE
 5173                                E5,1426  E5,1426   QPLACES  ERASE
 5174                                E5,1427  E5,1427   RUN      ERASE

 5175                                E5,1430  E5,1430   SYSTSPR2 ERASE                               UNUSED

 5176                                E5,1431  E5,1431   SOUTHDR  ERASE
 5177   REF   1                      E5,1431            TARG1/2  =      SOUTHDR
 5178                                E5,1432  E5,1437   TAZEL1   ERASE  +5
 5179                                E5,1440  E5,1441   TEMPTIME ERASE  +1
 5180                                E5,1442  E5,1443   TMARK    ERASE  +1
 5181                                E5,1444  E5,1657   AINLA    ERASE  +139D                        OPTIMUM CALIB. AND ALIGNMENT
 5182   REF   1                      E5,1444            GENPL    =      AINLA
 5183   REF   2  LAST   102          E5,1453            COULIMIT =      AINLA +7
 5184   REF   3  LAST   102          E5,1552            COUNTPL  =      AINLA +70D
 5209   REF   4  LAST   102          E5,1444            WANGO    EQUALS AINLA
 5210   REF   5  LAST   102          E5,1446            WANGI    EQUALS AINLA +2D
 5211   REF   6  LAST   102          E5,1450            WANGT    EQUALS AINLA +4D
 5212   REF   1                      E5,1450            TORQNDX  =      WANGT
 5213   REF   7  LAST   102          E5,1452            DRIFTT   EQUALS AINLA +6D
 5214   REF   8  LAST   102          E5,1454            ALX1S    EQUALS AINLA +8D
 5215   REF   9  LAST   102          E5,1455            CMPX1    EQUALS AINLA +9D
 5216   REF  10  LAST   102          E5,1456            ALK      EQUALS AINLA +10D
 5217   REF  11  LAST   102          E5,1472            VLAUNS   EQUALS AINLA +22D
 5218   REF   1                      E5,1460            THETAX   =      ALK +2
 5219   REF  12  LAST   102          E5,1474            WPLATO   EQUALS AINLA +24D
 5220   REF  13  LAST   102          E5,1500            INTY     EQUALS AINLA +28D
 5221   REF   1                      E5,1466            THETAN   =      THETAX +6
 5222   REF  14  LAST   102          E5,1502            ANGZ     EQUALS AINLA +30D
 5223   REF  15  LAST   102          E5,1504            INTZ     EQUALS AINLA +32D
 5224   REF  16  LAST   102          E5,1506            ANGY     EQUALS AINLA +34D
 5225   REF  17  LAST   102          E5,1510            ANGX     EQUALS AINLA +36D
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L        ERASABLE ASSIGNMENTS                                                          USER'S PAGE NO. 66        L- 52

  5226   REF  18  LAST  102   E5,1512             DRIFTO    EQUALS AINLA +38D
  5227   REF  19  LAST  103   E5,1514             DRIFTI    EQUALS AINLA +40D
  5228   REF  20  LAST  103   E5,1520             VLAUN     EQUALS AINLA +44D
  5229   REF   1              E5,1474             FILDELV   =      THETAN +6
  5230   REF  21  LAST  103   E5,1522             ACCWD     EQUALS AINLA +46D
  5231   REF   1              E5,1476             INTVEC    =      FILDELV +2
  5232   REF  22  LAST  103   E5,1530             POSNV     EQUALS AINLA +52D
  5233   REF  23  LAST  103   E5,1532             DPIPAY    EQUALS AINLA +54D
  5234   REF  24  LAST  103   E5,1536             DPIPAZ    EQUALS AINLA +58D
  5235   REF  25  LAST  103   E5,1540             ALTIM     EQUALS AINLA +60D
  5236   REF  26  LAST  103   E5,1541             ALTIMS    EQUALS AINLA +61D
  5237   REF  27  LAST  103   E5,1542             ALDK      EQUALS AINLA +62D
  5238   REF  28  LAST  103   E5,1560             DELM      EQUALS AINLA +76D
  5239   REF  29  LAST  103   E5,1570             WPLATI    EQUALS AINLA +84D
  5240   REF  30  LAST  103   E5,1577             RESTARPT =       AINLA + 91D
  5241   REF  31  LAST  103   E5,1631             GEOSAVED =       AINLA +117D
  5242   REF  32  LAST  103   E5,1632             PREMTRXC =       AINLA +118D
  5243   REF  33  LAST  103   E5,1633             LAUNCHAZ =       AINLA +119D
  5244   REF  34  LAST  103   E5,1635             NEWAZMTH =       AINLA +121D
  5245   REF  35  LAST  103   E5,1637             OLDAZMTH =       AINLA +123D
  5246   REF  36  LAST  103   E5,1641             TOLDAZMT =       AINLA +125D
  5247   REF  37  LAST  103   E5,1643             GEOCOMPS =       AINLA +127D
  5248   REF  38  LAST  103   E5,1644             1SECXT   =       AINLA +128D
  5249   REF  39  LAST  103   E5,1645             GTSWTLST =       AINLA +129D
  5250   REF  40  LAST  103   E5,1646             ERECTIME =       AINLA +130D
  5251   REF  41  LAST  103   E5,1647             ERCOMP   =       AINLA +131D
  5252   REF  42  LAST  103   E5,1655             ZERONDX  =       AINLA +137D
  5253   REF   1              E5,1655             GTSOPNDZ =       ZERONDX

 R5254   THE FOLLOWING TAGS ARE USED BY THE 504 IMU CALIBRATION AND ALIGNMENT PROGRAM ONLY.

  5256   REF   2  LAST  102   E5,1460             THETAX1  EQUALS ALK      +2
  5257   REF   1              E5,1466             THETAN1  EQUALS THETAX1  +6
  5258   REF   1              E5,1474             FILDELV1 EQUALS THETAN1  +6
  5259   REF   1              E5,1476             INTVEC1  EQUALS FILDELV1 +2
  5260   REF  43  LAST  103   E5,1631             GEOSAVE1 EQUALS AINLA    +117D
  5261   REF  44  LAST  103   E5,1632             PREMTRX1 EQUALS AINLA    +118D
  5262   REF  45  LAST  103   E5,1633             LUNCHAZ1 EQUALS AINLA    +119D
  5263   REF   1              E5,1635             NEWAZ1   EQUALS LUNCHAZ1 +2
  5264   REF   2  LAST  103   E5,1637             OLDAZ1   EQUALS LUNCHAZ1 +4
  5265   REF   3  LAST  103   E5,1641             TOLDAZ1  EQUALS LUNCHAZ1 +6
  5266   REF  46  LAST  103   E5,1643             GEOCOMP1 EQUALS AINLA    +127D
  5267   REF  47  LAST  103   E5,1644             1SECXT1  EQUALS AINLA    +128D
  5268   REF  48  LAST  103   E5,1645             GTSWTLT1 EQUALS AINLA    +129D
  5269   REF  49  LAST  103   E5,1646             ERECTIM1 EQUALS AINLA    +130D
  5270   REF  50  LAST  103   E5,1647             ERCOMP1  EQUALS AINLA    +131D   I(6)
  5271   REF  51  LAST  103   E5,1655             ZERONDX1 EQUALS AINLA    +137D
  52715  REF  52  LAST  103   E5,1656             PERFDLAY EQUALS AINLA    +138D   B(2).........
  52719  REF  53  LAST  103   E5,1657             ENDSYS-5 EQUALS AINLA +139D      LAST SYS.TEST STORAGE IN E-5
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L       ERASABLE ASSIGNMENTS                                               USER'S PAGE NO.  67       E0 S?
R5272   END OF 504 CAL + ALIGN ERASE.
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P5273            *-*-*-*-  OVERLAY 4 IN EBANK 5  -*-*-*-*

R5274            P32 -- P33                                                      (20D)

 5276   REF   3  LAST   98   E5,1610          UP1      EQUALS DVLOS              I(6)
 5277   REF   1              E5,1616          VPASS2   EQUALS UP1       +6       I(6)
 5278   REF   1              E5,1624          RPASS2   EQUALS VPASS2    +6       I(6)
 5279   REF   1              E5,1632          DIFFALT  EQUALS RPASS2    +6       I(2)
A5283

R5284   P32,P33 STORAGE OVERLAYING 9X9 W-MATRIX LOCATIONS                        (32D)

 5286   REF   1              E5,1444          DELVEET1 EQUALS 9X9LOC1            I(6) DELV FOR CSI
 5287   REF   1              E5,1452          RACT2    EQUALS DELVEET1 +6        I(6) POS. ACTIVE VEH. AT CDH TIME
 52871  REF   1              E5,1460          TCDH     EQUALS RACT2 +6           I(2)
 52872  REF   1              E5,1462          TCSI     EQUALS TCDH +2            I(2)
 52873  REF   1              E5,1464          TTPI0    EQUALS TCSI      +2       I(2)
 5288   REF   1              E5,1532          VACT2    EQUALS 9X9LOC2            I(6) VEL. ACTIVE VEH. AT CDH TIME
 5289   REF   1              E5,1540          RACT1    EQUALS VACT2     +6       I(6) POS. ACTIVE VEH. AT CSI TIME
 5290   REF   1              E5,1546          TITDT2   EQUALS RACT1     +6       I(2) TCDH - TCSI
A52915

R52916           MARK COUNT FOR MINKEY R22, Q RETURN FOR N90/N81 DSP  P31,P36.  (2D)

 52918  REF   1              E5,1550          COUNT3MK EQUALS TITDT2 +2          I(1)
 52919  REF   1              E5,1551          N90RET   EQUALS COUNT3MK +1        I(1)

R5292        MINKEY AFTERBURN TEMPORARIES FOR RESTART                            (24D)

 5294   REF   1              E5,1552          BURNTMP1 EQUALS N90RET +1          I(6)
 5295   REF   1              E5,1560          BURNTMP2 EQUALS BURNTMP1 +6        I(6)
 5296   REF   1              E5,1566          BURNTMP3 EQUALS BURNTMP2 +6        I(6)
 5297   REF   1              E5,1574          BURNTMP4 EQUALS BURNTMP3 +6        I(6)
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P6000                     EBANK-6 ASSIGNMENTS
 6001                          E6,1400                  SETLOC 300

R6002             P23   PAD LOADS***                                                 (20).

 6004                          E6,1400  E6,1400   WMIDPOS  ERASE                     I(1) PL  INITIAL VALUES FOR W-MATRIX IN
 6005                          E6,1401  E6,1401   WMIDVEL  ERASE                     I(1) PL  CISLUNAR (P23) NAVIGATION
A6006

R6007             R22 PAD LOADS                                                      ( 50 ).

 6009                          E6,1402  E6,1403   RVAR     ERASE              +1     I(2) PL  VHF RADAR
 6010                          E6,1404  E6,1406   RVARMIN  ERASE              +2     I(3) PL  VHF RADAR
A6011

R6012    ******** PAD LOADED ENTRY DAP STEERING VARIABLES ********                   (30)

 6014                          E6,1407  E6,1407   LADPAD   ERASE                     I(1) PL  FOR ENTRY.HOLDS CM  NOMINAL L/D
 6015                          E6,1410  E6,1410   LODPAD   ERASE                     I(1) PL  FOR ENTRY.HOLDS CM  NOMINAL LOD
 6016                          E6,1411  E6,1411   ALFAPAD  ERASE                     B(1) PL  ALFA TRIM / 180
A6017

R60175            P37  PAD LOAD

 60177                         E6,1412  E6,1412   P37RANGE ERASE                     I(1)PL

R6018    ******** PAD LOADED TVC DAP VARIABLES.************************************(250)

 6020                          E6,1413  E6,1413   ETDECAY  ERASE                     I(1)PL
 6022                          E6,1414  E6,1415   EKPRIME  ERASE              +1     B(2)PL
 6023                          E6,1416  E6,1420   EKTLX/I  ERASE  +2                 B(3)PL
 6024                          E6,1421  E6,1422   EREPFRAC ERASE  +1                 B(2)PL

 6025                          E6,1423  E6,1423   PACTOFF  ERASE                     B(1)PL, DSP N48 R01 = PTRIM, R02 = YTRIM
 6026                          E6,1424  E6,1424   YACTOFF  ERASE                     B(1)PL, CONSECUTIVE WITH PACTOFF

 6027                          E6,1425  E6,1425   HBN10    ERASE                     B(1)
 6028                          E6,1426  E6,1426   HBN11/2  ERASE                     B(1)
 6029                          E6,1427  E6,1427   HBN12    ERASE                     B(1)
 6030                          E6,1430  E6,1430   HBD11/2  ERASE                     B(1)
 6031                          E6,1431  E6,1431   HBD12    ERASE                     B(1)

 6032                          E6,1432  E6,1432   HBN20    ERASE                     B(1)
 6033                          E6,1433  E6,1433   HBN21/2  ERASE                     B(1)
 6034                          E6,1434  E6,1434   HBN22    ERASE                     B(1)
 6035                          E6,1435  E6,1435   HBD21/2  ERASE                     B(1)
 6036                          E6,1436  E6,1436   HBD22    ERASE                     B(1)
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  6037                      E6,1437  E6,1437   HBN30     ERASE                        B(1)
  6038                      E6,1440  E6,1440   HBN31/2   ERASE                        B(1)
  6039                      E6,1441  E6,1441   HBN32     ERASE                        B(1)
  6040                      E6,1442  E6,1442   HBD31/2   ERASE                        B(1)
  6041                      E6,1443  E6,1443   HBD32     ERASE                        B(1)

R6042     ******** EXCLUSIVE TVC DAP VARIABLES. ********************************(4D)

  6045                      E6,1444  E6,1445   TEMPDAP   ERASE  +1                    B(2)
  6046   REF    1           E6,1444            MRKRTMP   =      TEMPDAP                  ((B(1)))
  6047                      E6,1446  E6,1446   CNTR      ERASE                        B(1)
  6048                      E6,1447  E6,1447   CGAD      ERASE                        B(1)
A6049


R6050     ******** EXCLUSIVE RCS DAP VARIABLES.  ********************************(13D)

  6052                      E6,1450  E6,1464   RWORD1    ERASE              +12D   B(1)
  6053   REF    1           E6,1451            RWORD2    EQUALS RWORD1      +1     B(1)
  6054   REF    1           E6,1452            PWORD1    EQUALS RWORD2      +1     B(1)
  6055   REF    1           E6,1453            PWORD2    EQUALS PWORD1      +1     B(1)
  6056   REF    1           E6,1454            YWORD1    EQUALS PWORD2      +1     B(1)
  6057   REF    1           E6,1455            YWORD2    EQUALS YWORD1      +1     B(1)
  6058   REF    1           E6,1456            BLAST     EQUALS YWORD2      +1     B(2)
  6059   REF    1           E6,1460            BLAST1    EQUALS BLAST       +2     B(2)
  6060   REF    1           E6,1462            BLAST2    EQUALS BLAST1      +2     B(2)
  6061   REF    1           E6,1464            T5PHASE   EQUALS BLAST2      +2     B(1)
A6062


R6063     ******** RCS/TVC DAP COMMON STORAGE.**********************************(17D)

  6065                      E6,1465  E6,1465   DAPDATR1  ERASE                        B(1)DSP NOUN 46(R1)
  6066                      E6,1466  E6,1466   DAPDATR2  ERASE                        B(1)DSP NOUN 46(R2)

  60665  REF    1             4076             DPCONFIG  =      OCT60000              DAP CONFIG BITS

  6067                      E6,1467  E6,1467   IXX       ERASE                        B(1) CONSECUTIVE WITH IAVG, IAVG/TLX FOR
  6068                      E6,1470  E6,1470   IAVG      ERASE                        B(1)                           MAS PROP
  6069                      E6,1471  E6,1471   IAVG/TLX  ERASE                        B(1)

  6070                      E6,1472  E6,1472   LEMMASS   ERASE                        B(1)DSP NOUN 47(R2)
  6071                      E6,1473  E6,1474   CSMMASS   ERASE  +1                    B(2)
  6072                      E6,1475  E6,1475   WEIGHT/G  ERASE
  6074                      E6,1476  E6,1476   AK        ERASE
  6075                      E6,1477  E6,1477   AK1       ERASE
  6076                      E6,1500  E6,1500   AK2       ERASE

  6077                      E6,1501  E6,1501   RCSFLAGS  ERASE                        B(1) CONSECUTIVE WITHAK2 DOWNLINK
  6078                      E6,1502  E6,1502   T5TEMP    ERASE                        B(1)
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 6079                        E6,1503  E6,1503   EDRIVEX  ERASE
 6080                        E6,1504  E6,1504   EDRIVEY  ERASE
 6081                        E6,1505  E6,1505   EDRIVEZ  ERASE

R6082             INTEMP THRU INTEMP+14D  ARE RESERVED FOR OVERLAYED TVC/RCS INTERUP TRUE TEMPORIES
 6084                        E6,1506  E6,1524   INTTEMP  ERASE            +14D    (15)

R6085             TVC/RCS THRU TVCRCS +11D RESERVED FOR DOWNLINKED VARIABLES

 6086                        E6,1525  E6,1540   TVCRCS   ERASE            +11D    (12)
A6087                                                                             RCS (WBODYS,ADOTS)
A6088                                                                             TVC(OMEGACS,OMEGABS)

R6089             TVC DAP TEMPORARY VARIABLES************************************

R6090             TVC DAP INTERUPT TRUE TEMPORARIES*****************************

 6091  REF  1                E6,1506            PHI333   EQUALS INTTEMP          B(1)     COUNTING REGISTER
 6092  REF  1                E6,1507            PSI333   EQUALS PHI333   +1      B(1)     COUNTING REGISTER
 6093  REF  1                E6,1510            TEMP333  EQUALS PSI333   +1      B(1)     MASS TEMPORARY
 6094  REF  1                E6,1511            VARST0   EQUALS TEMP333  +1      B(8)     BREAKPOINTS AND SLOPES
 6095  REF  1                E6,1516            VARST5   =      VARST0   +5
 6096  REF  2  LAST  108     E6,1522            LASTMASP EQUALS VARST0 +9D       LAST VARST0 WORD

A6098

R6099             *******REGULAR TVC TEMPORARIES*************

R6100             TVC ZEROING LOOP STARTS HERE

 6101  REF  1                E6,1525            OMEGAC   EQUALS TVCRCS           I(6)
 6102  REF  1                E6,1525            OMEGAXC  =      OMEGAC
 6103  REF  2  LAST  108     E6,1527            OMEGAYC  =      OMEGAC   +2
 6104  REF  3  LAST  108     E6,1531            OMEGAZC  =      OMEGAC   +4

 6105  REF  2  LAST  108     E6,1533            OMEGAB   EQUALS TVCRCS   +6      B(6)
 6106  REF  1                E6,1533            OMEGAXB  =      OMEGAB
 6107  REF  2  LAST  108     E6,1535            OMEGAYB  =      OMEGAB +2
 6108  REF  3  LAST  108     E6,1537            OMEGAZB  =      OMEGAB +4

 6109  REF  4  LAST  108     E6,1541            PTMP1    EQUALS OMEGAC +12D      B(2)
 6110  REF  1                E6,1543            PTMP2    EQUALS PTMP1 +2         B(2)
 6111  REF  1                E6,1545            PTMP3    EQUALS PTMP2 +2         B(2)
 6112  REF  1                E6,1547            PTMP4    EQUALS PTMP3 +2         B(2)
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  6113   REF    1                  E6,1551           PTMP5     EQUALS PTMP4 +2        B(2)
  6114   REF    1                  E6,1553           PTMP6     EQUALS PTMP5 +2        B(2)

  6115   REF    1                  E6,1555           YTMP1     EQUALS PTMP6 +2        B(2)
  6116   REF    1                  E6,1557           YTMP2     EQUALS YTMP1 +2        B(2)
  6117   REF    1                  E6,1561           YTMP3     EQUALS YTMP2 +2        B(2)
  6118   REF    1                  E6,1563           YTMP4     EQUALS YTMP3 +2        B(2)
  6119   REF    1                  E6,1565           YTMP5     EQUALS YTMP4 +2        B(2)
  6120   REF    1                  E6,1567           YTMP6     EQUALS YTMP5 +2        B(2)

  6121   REF    1                  E6,1571           ROLLFIRE EQUALS YTMP6 +2         B(1)
  6122   REF    1                  E6,1572           ROLLWORD EQUALS ROLLFIRE +1      B(1)
  6123   REF    1                  E6,1573           TEMREG    EQUALS ROLLWORD +1     B(1)

  6124   REF    1                  E6,1574           TVCDUMMY EQUALS TEMREG    +1     DUMMY (NEED EVEN NUMBER OF LOCATIONS)
  6125   REF    1                  E6,1575           PERRB     EQUALS TVCDUMMY +1     B(2)
  6126   REF    1                  E6,1577           YERRB     EQUALS PERRB     +2    B(2)

  6127   REF    1                  E6,1601           DELPBAR   EQUALS YERRB     +2    B(2)
  6128   REF    1                  E6,1603           DELYBAR   EQUALS DELPBAR +2      B(2)

  6129   REF    1                  E6,1605           PDELOFF   EQUALS DELYBAR  +2     B(2)
  6130   REF    1                  E6,1607           YDELOFF   EQUALS PDELOFF  +2     B(2)

R6131               TVC ZEROING LOOP ENDS HERE


  6132   REF    1                  E6,1611           TTMP1     EQUALS YDELOFF +2      B(2)
  6133   REF    1                  E6,1613           TTMP2     EQUALS TTMP1 +2        B(2)

  6134   REF    1                  E6,1615           DAP1      EQUALS TTMP2 +2        B(2)
  6135   REF    1                  E6,1617           DAP2      EQUALS DAP1 +2         B(2)
  6136   REF    1                  E6,1621           DAP3      EQUALS DAP2 +2         B(2)

  6137   REF    1                  E6,1623           PCMD      EQUALS DAP3 +2         B(1)
  6138   REF    1                  E6,1624           YCMD      EQUALS PCMD       +1   B(1),  CONSECUTIVE WITH PCMD
  6139   REF    1                  E6,1625           T5TVCDT   EQUALS YCMD       +1   B(1)
  6141   REF    1                  E6,1626           KPRIMEDT EQUALS T5TVCDT   +1     I(2)
  6142   REF    1                  E6,1630           KTLX/I    EQUALS KPRIMEDT +2     B(1)
  6144   REF    1                  E6,1631           1/CONACC EQUALS KTLX/I    +1     B(1)
  6145   REF    1                  E6,1632           VARK      EQUALS 1/CONACC +1     B(1)
  6146   REF    1                  E6,1633           REPFRAC   EQUALS VARK      +1    B(1)
  6147   REF    1                  E6,1634           VCNTR     EQUALS REPFRAC   +1    B(1)
  6148   REF    1                  E6,1635           TVCPHASE EQUALS VCNTR +1         B(1)
  6149   REF    1                  E6,1636           PCDUYPST EQUALS TVCPHASE +1      B(1)
  6150   REF    1                  E6,1637           PCDUZPST EQUALS PCDUYPST +1      B(1)
  61501  REF    1                  E6,1640           YCDUYPST EQUALS PCDUZPST +1      B(1)
  61502  REF    1                  E6,1641           YCDUZPST EQUALS YCDUYPST +1      B(1)
  6151   REF    1                  E6,1642           MCDUYDOT EQUALS YCDUZPST +1      B(1)
  6152   REF    1                  E6,1643           MCDUZDOT EQUALS MCDUYDOT +1      B(1)
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 6153   REF   1                E6,1644          TVCEXPHS EQUALS MCDUZDOT +1    B(1)
R6164               TVC ROLL DAP VARIABLES

R6165   (8D)
 6166   REF   1                E6,1645          OGANOW   EQUALS TVCEXPHS +1
 6167   REF   1                E6,1646          OGAPAST  EQUALS OGANOW   +1    B(1)
 6168   REF   1                E6,1647          OGA      EQUALS OGAPAST  +1    B(1)TMP
 6169   REF   1                E6,1647          OGAERR   =      OGA            (ROLL DAP USES OGA, MEANS OGAERROR)
 6170   REF   2  LAST  110     E6,1650          DELOGART EQUALS OGA      +1    B(1)TMP
 6171   REF   1                E6,1651          SGNRT    EQUALS DELOGART +1    SIGN OF OGA RATE
 6172   REF   1                E6,1652          DELOGA   EQUALS SGNRT    +1    USED IN ROLL LOGIC
 6173   REF   1                E6,1653          I        EQUALS DELOGA   +1    USED IN ROLL LOGIC
 6174   REF   1                E6,1654          IOGARATE EQUALS I        +1    USED IN ROLL LOGIC

R6175               TVC DAP RESTART TEMPORARIES.

 6176   REF   1                E6,1655          PACTTMP  EQUALS IOGARATE +1    B(2)
 6177   REF   1                E6,1657          YACTTMP  EQUALS PACTTMP  +2    B(2)
 6178   REF   1                E6,1661          CNTRTMP  EQUALS YACTTMP  +2    B(1)
 6180   REF   1                E6,1662          DELBRTMP EQUALS CNTRTMP  +1    B(2)
 6181   REF   1                E6,1664          ERRBTMP  EQUALS DELBRTMP +2    B(2)
 6182   REF   1                E6,1666          CMDTMP   EQUALS ERRBTMP  +2    B(2)

 6183   REF   1                E6,1670          TMP1     EQUALS CMDTMP   +2    B(2)
 6184   REF   1                E6,1672          TMP2     EQUALS TMP1     +2    B(2)
 6185   REF   1                E6,1674          TMP3     EQUALS TMP2     +2    B(2)
 6186   REF   1                E6,1676          TMP4     EQUALS TMP3     +2    B(2)
 6187   REF   1                E6,1700          TMP5     EQUALS TMP4     +2    B(2)
 6188   REF   1                E6,1702          TMP6     EQUALS TMP5     +2    B(2)

R6189               TVC DAP FILTER COEFFICIENTS TEMPORARIES

 6190   REF   1                E6,1704          COEFFADR EQUALS TMP6 +2        B(1)
 6191   REF   1                E6,1705          N10      EQUALS COEFFADR +1    I(15)

R6192               OVERLAYS WITHIN TVC DAP

 6193   REF   4  LAST  108     E6,1533          OGARATE  =      OMEGAB         B(2)

 6194   REF   2  LAST  109     E6,1611          PHASETMP =      TTMP1          B(1) RESTART FOR CSM/LM V46 SWITCH-OVER
 6195   REF   2  LAST  109     E6,1613          RTRNLOC  =      TTMP2          B(1) RESTART FOR CSM/LM V46 SWITCH-OVER
R6200

R6201               S40.9 STORAGE..........

 6202   REF   1                E6,1724          NBRCYCLS EQUALS N10      +150  B(1) COUNTER FOR P40,41 STEERING
 6203   REF   1                E6,1725          NBRCYCLP EQUALS NBRCYCLS +1    B(1) MAINTAIN ORDER
 6204   REF   1                E6,1726          DELVSUM  EQUALS NBRCYCLP +1    I(6)  P40,P41
 6205   REF   1                E6,1734          DELVSUMP EQUALS DELVSUM +6     I(6) P40,P41
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L        ERASABLE ASSIGNMENTS                                                      USER'S PAGE NO.  74       E  S?
R620501            S40.8 TEMPORARY
 620502 REF   1              E6,1734             MASSTMP  EQUALS DELVSUMP         1(2)
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P6206    ******** RCS DAP TEMPORARY VARIABLES.************************************(55D)

R6208             **RCS INTERUPT TRUE TEMPS************************           15D

 6210    REF   2  LAST  108   E6,1506          SPNDX     EQUALS INTTEMP           B(1)
 6211    REF   1              E6,1507          DPNDX     EQUALS SPNDX      +1     B(1)TMP
 6212    REF   1              E6,1510          KMPAC     EQUALS DPNDX      +1     B(2)TMP
 6213    REF   1              E6,1512          KMPTEMP   EQUALS KMPAC      +2     B(1)TMP

 6214    REF   1              E6,1513          XNDX1     EQUALS KMPTEMP    +1     B(1)TMP  XNDX1 THRU NYJETS ARE OVERLAYED
 6215    REF   1              E6,1514          XNDX2     EQUALS XNDX1      +1     B(1)TMP  BY OTHER DAP ERASABLES SO
 6216    REF   1              E6,1515          YNDX      EQUALS XNDX2      +1     B(1)TMP  SHOULD ALWAYS BE DEFINED IN
 6217    REF   1              E6,1516          ZNDX      EQUALS YNDX       +1     B(1)TMP  A BLOCK
 6218    REF   1              E6,1517          RINDEX    EQUALS ZNDX       +1     B(1)TMP
 6219    REF   1              E6,1520          PINDEX    EQUALS RINDEX     +1     B(1)TMP
 6220    REF   1              E6,1521          YINDEX    EQUALS PINDEX     +1     B(1)TMP
 6221    REF   1              E6,1522          NRJETS    EQUALS YINDEX     +1     B(1)TMP
 6222    REF   1              E6,1523          NPJETS    EQUALS NRJETS     +1     B(1)TMP
 6223    REF   1              E6,1524          NYJETS    EQUALS NPJETS     +1     B(1)TMP

 6224    REF   2  LAST  112   E6,1513          WTEMP     EQUALS XNDX1             B(2)TMP  WTEMP THRU DELTEMPZ OVERLAY
 6225    REF   1              E6,1515          DELTEMPX  EQUALS WTEMP      +2     B(2)TMP  XNDX1 THRU NRJETS AND EDOT THRU
 6226    REF   1              E6,1517          DELTEMPY  EQUALS DELTEMPX   +2     B(2)TMP  ADBVEL
 6227    REF   1              E6,1521          DELTEMPZ  EQUALS DELTEMPY   +2     B(2)TMP

 6228    REF   2  LAST  112   E6,1515          EDOT      EQUALS YNDX              B(2)TMP  EDOT THRU ADBVEL OVERLAY
 6229    REF   1              E6,1517          AERR      EQUALS EDOT       +2     B(1)TMP  YNDX THRU NPJETS AND DELTEMPX
 6230    REF   1              E6,1520          EDOTVEL   EQUALS AERR       +1     B(2)TMP   THRU DELTEMPZ
 6231    REF   1              E6,1522          AERRVEL   EQUALS EDOTVEL    +2     B(1)TMP
 6232    REF   1              E6,1523          ADBVEL    EQUALS AERRVEL    +1     B(1)TMP

R6233             *** REGULAR RCS TEMPS****************************            (   ).

R6235              RCS ZEROING LOOP STARTS HERE****  ** **   **   ***    *** * *    (37)

 6237    REF   3  LAST  108   E6,1525          WBODY     EQUALS TVCRCS            B(2)TMP
 6238    REF   1              E6,1527          WBODY1    EQUALS WBODY      +2     B(2)TMP
 6239    REF   2  LAST  112   E6,1531          WBODY2    EQUALS WBODY      +4     B(2)TMP
 6240    REF   1              E6,1533          ADOT      EQUALS WBODY2     +2     B(2)TMP
 6241    REF   1              E6,1535          ADOT1     EQUALS ADOT       +2     B(2)TMP
 6242    REF   1              E6,1537          ADOT2     EQUALS ADOT1      +2     B(2)TMP

 6243    REF   1              E6,1541          MERRORX   EQUALS ADOT2      +2      (2)
 6244    REF   1              E6,1543          MERRORY   EQUALS MERRORX    +2      (2)
 6245    REF   1              E6,1545          MERRORZ   EQUALS MERRORY    +2      (2)
 6246    REF   1              E6,1547          DFT       EQUALS MERRORZ +2               B(1)TMP
 6247    REF   1              E6,1550          DFT1      EQUALS DFT        +1     B(1)TMP
 6248    REF   1              E6,1551          DFT2      EQUALS DFT1       +1     B(1)TMP
 6249    REF   1              E6,1552          DRHO      EQUALS DFT2      +1      B(2)TMP
 6250    REF   1              E6,1554          DRHO1     EQUALS DRHO       +2     B(2)TMP
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L         ERASABLE ASSIGNMENTS                                                                          USER'S PAGE NO.  76      E0 S?

  6251   REF    1                 E6,1556            DRHO2     EQUALS DRHO1     +2     B(2)TMP
  6252   REF    1                 E6,1560            ATTSEC    EQUALS DRHO2     +2     B(1)TMP
  6253   REF    1                 E6,1561            TAU       EQUALS ATTSEC    +1     B(1)TMP
  6254   REF    1                 E6,1562            TAU1      EQUALS TAU       +1     B(1)TMP
  6255   REF    1                 E6,1563            TAU2      EQUALS TAU1      +1     B(1)TMP
  6256   REF    1                 E6,1564            BIAS      EQUALS TAU2      +1     B(1)TMP
  6257   REF    1                 E6,1565            BIAS1     EQUALS BIAS      +1     B(1)TMP
  6258   REF    1                 E6,1566            BIAS2     EQUALS BIAS1     +1     B(1)TMP
  6259   REF    1                 E6,1567            ERRORX    EQUALS BIAS2     +1     B(1)TMP
  6260   REF    1                 E6,1570            ERRORY    EQUALS ERRORX    +1     B(1)TMP
  6261   REF    1                 E6,1571            ERRORZ    EQUALS ERRORY    +1     B(1)TMP
A6262

R6263                 RCS ZERO LOOP ENDS HERE

R6264                      MORE RCS                                                    (69D)

  6266   REF    1                 E6,1572            THETADX   EQUALS ERRORZ    +1     B(1)TMP  MUST BE CONSECUTIVE WITH ERRORZ
  6267   REF    1                 E6,1573            THETADY   EQUALS THETADX   +1     B(1)TMP
  6268   REF    1                 E6,1574            THETADZ   EQUALS THETADY   +1     B(1)TMP

  6269   REF    1                 E6,1575            DELCDUX   EQUALS THETADZ   +1     B(2)TMP
  6270   REF    1                 E6,1577            DELCDUY   EQUALS DELCDUX   +2     B(2)TMP
  6271   REF    1                 E6,1601            DELCDUZ   EQUALS DELCDUY   +2     B(2)TMP

  6272   REF    1                 E6,1603            DCDU      EQUALS DELCDUZ   +2     B(6)TMP USED DURING P20
  6273   REF    1                 E6,1611            DTHETASM  EQUALS DCDU      +6     B(6)TMP STEER LOW OUTPUT.

  6274   REF    1                 E6,1617            ATTKALMN  EQUALS DTHETASM  +6     B(1)TMP
  6275   REF    1                 E6,1620            KMJ       EQUALS ATTKALMN  +1     B(1)TMP
  6276   REF    1                 E6,1621            KMJ1      EQUALS KMJ       +1     B(1)TMP
  6277   REF    1                 E6,1622            KMJ2      EQUALS KMJ1      +1     B(1)TMP
  6278   REF    1                 E6,1623            J/M       EQUALS KMJ2      +1     B(1)TMP
  6279   REF    1                 E6,1624            J/M1      EQUALS J/M       +1     B(1)TMP
  6280   REF    1                 E6,1625            J/M2      EQUALS J/M1      +1     B(1)TMP
  6281   REF    1                 E6,1626            RACFAIL   EQUALS J/M2      +1     B(1)TMP
  6282   REF    1                 E6,1627            RBDFAIL   EQUALS RACFAIL   +1     B(1)TMP
  6283   REF    1                 E6,1630            ACORBD    EQUALS RBDFAIL   +1     B(1)TMP
  6284   REF    1                 E6,1631            XTRANS    EQUALS ACORBD    +1     B(1)TMP
  6285   REF    1                 E6,1632            CH31TEMP  EQUALS XTRANS    +1     B(1)TMP
  6286   REF    1                 E6,1633            CHANTEMP  EQUALS CH31TEMP  +1     B(1)TMP
  6287   REF    1                 E6,1634            T5TIME    EQUALS CHANTEMP  +1     B(1)TMP
  6288   REF    1                 E6,1635            RHO       EQUALS T5TIME    +1     B(1)TMP
  6289   REF    1                 E6,1636            RHO1      EQUALS RHO       +1     B(1)TMP
  6290   REF    1                 E6,1637            RHO2      EQUALS RHO1      +1     B(1)TMP
  6291   REF    1                 E6,1640            AMGB1     EQUALS RHO2      +1     B(1)TMP
  6292   REF    1                 E6,1641            AMGB4     EQUALS AMGB1     +1     B(1)TMP
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 6293   REF   1              E6,1642            AMGB5     EQUALS  AMGB4     +1     B(1)TMP
 6294   REF   1              E6,1643            AMGB7     EQUALS  AMGB5     +1     B(1)TMP
 6295   REF   1              E6,1644            AMGB8     EQUALS  AMGB7     +1     B(1)TMP
 6296   REF   1              E6,1645            CAPSI     EQUALS  AMGB8     +1     B(1)TMP
 6297   REF   1              E6,1646            CDUXD     EQUALS  CAPSI     +1     B(2)TMP
 6298   REF   1              E6,1650            CDUYD     EQUALS  CDUXD     +2     B(2)TMP
 6299   REF   1              E6,1652            CDUZD     EQUALS  CDUYD     +2     B(2)TMP
 6300   REF   1              E6,1654            SLOPE     EQUALS  CDUZD     +2     B(1)TMP
 6301   REF   1              E6,1655            ADB       EQUALS  SLOPE     +1     B(1)TMP
 6302   REF   1              E6,1656            RMANNDX   EQUALS  ADB       +1     B(1)TMP
 6303   REF   1              E6,1657            PMANNDX   EQUALS  RMANNDX   +1     B(1)TMP
 6304   REF   1              E6,1660            YMANNDX   EQUALS  PMANNDX   +1     B(1)TMP  MUST BE LAST VARIABLE IN RCS
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L       ERASABLE ASSIGNMENTS                                                                  USER'S PAGE NO.  78       E0 S?

P6305   ******** ENTRY DAP TEMPORARY VARIABLES.**********************************(69D)

R6307    ANGLE REGISTERS FOR ENTRY DAPS

 6308   REF   1                      E6,1661             AOG       EQUALS BCDU             1P
 6309   REF   1                      E6,1662             AIG       EQUALS AOG +1           1P
 6310   REF   1                      E6,1663             AMG       EQUALS AIG +1           1P
 6311   REF   1                      E6,1664             ROLL/180 EQUALS AMG       +1     1P
 6312   REF   1                      E6,1665             ALFA/180 EQUALS ROLL/180 +1      1P
 6313   REF   1                      E6,1666             BETA/180 EQUALS ALFA/180 +1      1P
 6314   REF   1                      E6,1667             AOG/PIP   EQUALS BETA/180 +1      1P
 6315   REF   1                      E6,1670             AIG/PIP   EQUALS AOG/PIP  +1      1P
 6316   REF   1                      E6,1671             AMG/PIP   EQUALS AIG/PIP  +1      1P
 6317   REF   1                      E6,1672             ROLL/PIP EQUALS AMG/PIP  +1      1P
 6318   REF   1                      E6,1673             ALFA/PIP EQUALS ROLL/PIP +1      1P
 6319   REF   1                      E6,1674             BETA/PIP EQUALS ALFA/PIP +1      1P

R6320   GYMBAL DIFFERENCES OVER INTERVAL TCDU = .1 SEC.

 6321   REF   1                      E6,1675             -DELAOG  EQUALS BETA/PIP +1      1P
 6322   REF   1                      E6,1676             -DELAIG  EQUALS -DELAOG +1       1P
 6323   REF   1                      E6,1677             -DELAMG  EQUALS -DELAIG +1       1P

R6324   ESTIMATED BODY RATES

 6325   REF   1                      E6,1700             CMDAPMOD EQUALS -DELAMG +1       1P  GOES BEFORE PREL FOR TM.

 6326   REF   1                      E6,1701             PREL      EQUALS CMDAPMOD +1      1P   P TCDU/180        (ROLLDOT)
 6327   REF   1                      E6,1702             QREL      EQUALS PREL +1          1P   Q TCDU/180       (PITCHDOT)
 6328   REF   1                      E6,1703             RREL      EQUALS QREL +1          1P   R TCDU/180       (YAWDOT)

 6329   REF   1                      E6,1704             BETADOT   EQUALS RREL     +1      1P  MUST FOLLOW RREL. BETADOT TCDU/180
 6330   REF   1                      E6,1705             PHIDOT    EQUALS BETADOT  +1      1P

R6331   OLD (UNAVERAGED) BODY RATE MEASURE

 6332   REF   1                      E6,1706             OLDELP    EQUALS PHIDOT   +1      1P
 6333   REF   1                      E6,1707             OLDELQ    EQUALS OLDELP +1        1P
 6334   REF   1                      E6,1710             OLDELR    EQUALS OLDELQ +1        1P

 6335   REF   1                      E6,1711             JETAG     EQUALS OLDELR  +1       1P
 6336   REF   1                      E6,1712             TUSED     EQUALS JETAG +1         1P   ELAPSED TIME SINCE NOMINAL UPDATE.
A6337

R6338             FOLLOWING 3 SP WORDS IN DOWNLINK.  ROLLTM SENT EACH 1 SEC.

 6339   REF   1                      E6,1713             PAXERR1   EQUALS TUSED     +1     1P   INTEGRATED ROLL ERROR/360.
 6340   REF   1                      E6,1714             ROLLTM    EQUALS PAXERR1  +1      1P   ROLL/180 FOR TM.
 6341   REF   1                      E6,1715             ROLLC     EQUALS ROLLTM   +1      2P   ROLLCOM/360 FROM ENTRY (FOR TM)
A6342                                                                                     >> KEEP ROLLC & ROLLHOLD ADJACENT FOR TP
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 6343   REF   1              E6,1717           ROLLHOLD EQUALS ROLLC     +2      1P FOR ATTITUDE HOLD IN CMDAPMOD = +1
A6344

R6345              ENTRY DAP QUANTITIES THAT SHARE WITH RCS DAP.

 6346   REF   2  LAST  113   E6,1603           ALFACOM  EQUALS DCDU              1P  KEEP ADJACENT TO BETACOM.  <<
 6347   REF   1              E6,1604           BETACOM  EQUALS ALFACOM +1        1P

R6348   JET LIST:    DT, JETBITS  IN THIS ORDER.

 6349   REF   1              E6,1605           TOFF     EQUALS BETACOM +1        1P   DP PAIR
 6350   REF   1              E6,1606           TBITS    EQUALS TOFF +1           1P
 6351   REF   1              E6,1607           TON2     EQUALS TBITS +1          1P   DP PAIR
 6352   REF   1              E6,1610           T2BITS   EQUALS TON2 +1           1P

R6353     MISCELLANEOUS PERMANENT ERASEABLE.

 6354   REF   1              E6,1611           OUTTAG   EQUALS T2BITS  +1        1P
 6355   REF   1              E6,1612           NUJET    EQUALS OUTTAG +1         1P
R6356       MORE  ENTRY DAP QUANTITIES THAT  DO NOT SHARE WITH RCS DAP.

 6357   REF   1              E6,1720           JETEM    EQUALS ROLLHOLD +1       2P  THIS DP USED IN RATEAVG.
 6358   REF   1              E6,1722           GAMA     EQUALS JETEM   +2        1P
 6359   REF   1              E6,1723           GAMDOT   EQUALS GAMA      +1      1P
 6360   REF   1              E6,1724           POSEXIT  EQUALS GAMDOT    +1      1P
 6361   REF   1              E6,1725           CM/GYMDT EQUALS POSEXIT   +1      1P
 6362   REF   1              E6,1726           HEADSUP  EQUALS CM/GYMDT +1       1P  DSP NOUN 61 FOR P62,63,64,67.
 6363   REF   1              E6,1727           P63FLAG  EQUALS HEADSUP   +1      1P  INTERLOCK FOR WAKEP62
A6364

A6365                                                                 >> SHARE BELOW WITH RCS RUPT TEMPS (< 150) <<<
 6366   REF   2  LAST  112   E6,1506           CALFA    EQUALS SPNDX             1P
 6367   REF   1              E6,1507           SALFA    EQUALS CALFA +1          1P

 6368   REF   1              E6,1510           SINM     EQUALS SALFA +1          1P
 6369   REF   1              E6,1511           COSM     EQUALS SINM +1           1P
 6370   REF   1              E6,1512           SINO     EQUALS COSM +1           1P
 6371   REF   1              E6,1513           COSO     EQUALS SINO +1           1P
 6372   REF   1              E6,1514           SINOCOSM EQUALS COSO +1           1P
 6373   REF   1              E6,1515           COSOCOSM EQUALS SINOCOSM +1       1P
A6374                                                                 >> SHARE ABOVE WITH RCS RUPT TEMPS          <<<
A6375
R6376              THE FOLLOWING FEW REGISTERS USED ONCE EACH 2 SEC.

 6377   REF   1              E6,1613           -VT/180  EQUALS NUJET    +1       1P
 6378   REF   1              E6,1614           LCX/360  EQUALS -VT/180 +1        1P
 6379   REF   1              E6,1615           XD/360   EQUALS LCX/360 +1        1P
 6380   REF   1              E6,1616           VSQ/4API EQUALS XD/360 +1         1P
 6381   REF   1              E6,1617           JNDX     EQUALS VSQ/4API +1       1P
 6382   REF   1              E6,1620           JNDX1    EQUALS JNDX +1           1P
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L        ERASABLE ASSIGNMENTS                                                              USER'S PAGE NO.  80        EQ 57

  6383   REF   1                E6,1621            TON1      EQUALS JNDX1 +1          1P   DP PAIR
  6384   REF   1                E6,1622            T1BITS    EQUALS TON1      +1      1P

R6385              MISCELLANEOUS REGISTERS USED EACH UPDATE.

  6386   REF   1                E6,1623            CM/SAVE   EQUALS T1BITS    +1      1P
  6387   REF   1                E6,1624            JETEM2    EQUALS CM/SAVE +1        1P   TEMPORARY STORAGE
A6388
R6389              DAP   QUANTITIES SHARED WITH RCS DAP FOR TM & FLIGHT RECORDER.

  6390   REF   2  LAST  113     E6,1567            VDT/180    =        ERRORX         1P   (EDIT)
  6391   REF   2  LAST  113     E6,1570            -VT/180E =          ERRORY         1P   (EDIT)

  6392   REF   1                E6,1476            PAXERR    EQUALS AK                1P   ROLL ERROR FOR NEEDLES
  6393   REF   2  LAST  113     E6,1572            QAXERR     =        THETADX        1P   SINCE AK1 IS ZEROED IN ATM DAP.
  6394   REF   1                E6,1573            RAXERR     =        QAXERR    +1   1P   SINCE AK2 IS ZEROED IN TM DAP.
A6395


R6396           **** COLMANU (R60,R62) ****

  6397   REF   1                E6,1710            VECQTEMP EQUALS COFSKEW
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P6398    ******** KALCMANU VARIABLES. (71D) *************************************
 6399    REF   1              E6,1661         BCDU     EQUALS YMANNDX  +1       B(3) TMP
 6400    REF   2  LAST  115   E6,1664         KSPNDX   EQUALS BCDU +3           B(1)TMP
 6401    REF   1              E6,1665         KDPNDX   EQUALS KSPNDX   +1       B(1)TMP

 6402    REF   1              E6,1666         TMIS     EQUALS KDPNDX   +1       I(18) MUST BE IN SAME BANK AS RCS DAP
 6403    REF   1              E6,1710         COFSKEW  EQUALS TMIS     +18D     I(6)  MUST BE IN SAME BANK AS RCS DAP
 6404    REF   2  LAST  117   E6,1716         CAM      EQUALS COFSKEW  +6       I(2)  MUST BE IN SAME BANK AS RCS DAP

 6405    REF   1              E6,1720         MIS      EQUALS CAM      +2       I(18)  (THE REST MAY GO ANYWHERE)
 6406    REF   1              E6,1742         COF      EQUALS MIS      +18D     I(6)TMP
 6407    REF   1              E6,1750         SCAXIS   EQUALS COF      +6       I(6)TMP
 6408    REF   1              E6,1756         POINTVSM EQUALS SCAXIS   +6       I(6)TMP
 6409    REF   1              E6,1764         AM       EQUALS POINTVSM +6       I(2)TMP
 6410    REF   1              E6,1766         RAD      EQUALS AM       +2       I(2)TMP


R6411    FIRST-ORDER OVERLAYS IN KALCMANU                                           (12D+8D)

 6413    REF   2  LAST  118   E6,1666         MFISYM   EQUALS TMIS              I    TMP
 6414    REF   3  LAST  118   E6,1666         TMFI     EQUALS TMIS              I    TMP
 6415    REF   4  LAST  118   E6,1666         NCDU     EQUALS TMIS              B    TMP
 6416    REF   5  LAST  118   E6,1671         NEXTIME  EQUALS TMIS     +3       B    TMP
 6417    REF   6  LAST  118   E6,1672         TTEMP    EQUALS TMIS     +4       B    TMP
 6419    REF   7  LAST  118   E6,1674         BIASTEMP EQUALS TMIS     +6       B    TMP
 6422    REF   3  LAST  118   E6,1710         BRATE    EQUALS COFSKEW           B    TMP
 6423    REF   2  LAST  118   E6,1716         TM       EQUALS CAM               B    TMP

R64281            UT TEMPS

 64285   REF   2  LAST  118   E6,1750         UTX      EQUALS SCAXIS            I(6)
 64286   REF   2  LAST  118   E6,1756         UTY      EQUALS POINTVSM          I(6)


R6429             SATURN BOOST STORAGE. SAVE TILL RCS DAP OPERATION.                (17D)

 6431    REF   3  LAST  118   E6,1661         POLYNUM  EQUALS BCDU              B(15) PAD LOADED
 6432    REF   1              E6,1673         POLYLOC  =      POLYNUM  +10D
 6433    REF   2  LAST  118   E6,1700         SATRLRT  EQUALS POLYNUM  +15D     B(2)  PAD LOADED
A6434


R6435             MORE P11 STORAGE -PAD LOADED-                                     (2D)

R6437             (NOTE: THIS PAD LOAD WILL NOT BE PRESERVED THROUGHOUT THE MISSION AS IT SHARES STORAGE WITH KALCMANU,
R6439              ENTRY DAP AND TVC DAP)

 6440    REF   1              E6,1702         RPSTART  EQUALS SATRLRT  +2       B(1) PITCH ROLL START TIME
 6441    REF   1              E6,1703         POLYSTOP EQUALS RPSTART  +1       B(1) POLY CUTOFF MINUS RPSTART SEC
A6442
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L       ERASABLE ASSIGNMENTS                                                      USER'S PAGE NO.  82      E0 57

R6443             P11 STORAGE                                                     (4D)

  6444   REF   1               E6,1704          SPOLYARG EQUALS POLYSTOP +1       B(1)TMP ARG FOR POLY
  6445   REF   1               E6,1705          BOOSTEMP EQUALS SPOLYARG +1       B(3)TEMP


R64551  P11 SATURN I/F                                                            (9D)

  64553  REF   1               E6,1710          SATRATE  EQUALS BOOSTEMP +3       B(4)PL MANEUVER RATES FOR SATURN STICK
  64554  REF   1               E6,1714          SATSW    EQUALS SATRATE  +4       B(1)TEM STATUS SW FOR BOOST TAKEOVER
  64555  REF   1               E6,1715          BIASAK   EQUALS SATSW    +1       B(3)TEM STORE AK BIAS FOR BOOST TAKEOVER
  64556  REF   1               E6,1720          SATSCALE EQUALS BIASAK   +3       B(1) SCALE FACTOR FOR SATURN STEERING
A64557


R6456             P21 STORAGE.                                                    (1D)

  6458   REF   1               E6,1770          GENRET   EQUALS RAD      +2       B(1)TMP

R6459             R61CSM STORAGE.                                                 (1D)

  6461   REF   1               E6,1771          SAVBNK   EQUALS GENRET   +1       B(1) S-S SAVE EBANK FOR R61 SUBROUTINE

R6462   R67 STORAGE                                                               (1D)
A64631
  6464   REF   1               E6,1772          RATEPTC  EQUALS SAVBNK  +1        B(1)
A64641

R64642            PERMANENT STORAGE FOR P20 DEADBAND                              (1D)

  6465   REF   1               E6,1773          DBPTC    EQUALS RATEPTC +1        B(1)
A64651

R6466   R61,R67 STORAGE                                                           (1D)

  6468   REF   1               E6,1774          R61CNTR  EQUALS DBPTC  +1         B(1)
R6469             ENTRY RESTART PROTECTION STORAGE. -KEEP TEMPS IN ORDER-         (12D)

  6471   REF   2 LAST  119     E6,1770          TEMPROLL EQUALS GENRET            B(1)TMP COPY CYCLE REGISTER
  6472   REF   1               E6,1771          TEMPALFA EQUALS TEMPROLL +1       B(1)TMP COPY CYCLE REGISTER
  6473   REF   1               E6,1772          TEMPBETA EQUALS TEMPALFA +1       B(1)TMP COPY CYCLE REGISTER
  6474   REF   1               E6,1773          60GENRET EQUALS TEMPBETA +1       B(1)TMP QSAVE FOR S61.1 AND ENTRY.
  6475   REF   1               E6,1774          S61DT    EQUALS 60GENRET +1       B(1)TMP VARIABLE DT FOR S61.1 RESTART.
A6476


R6477             ENTRY TM SHARING FOR ACCELERATION PROFILE.
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L       ERASABLE ASSIGNMENTS                                                    USER'S PAGE NO.  83      E0 52

 6478   REF   2  LAST  112   E6,1533          XPIPBUF   EQUALS ADOT                B(1) PIPA BUFFER FOR TM DURING ENTRY.
 6479   REF   1              E6,1534          YPIPBUF   EQUALS XPIPBUF   +1        B(1) PIPS FILED HERE EACH .5 SEC APPEAR
 6480   REF   1              E6,1535          ZPIPBUF   EQUALS YPIPBUF   +1        B(1) ON DOWNLIST ONCE PER SECOND DURING
 6481   REF   1              E6,1536          XOLDBUF   EQUALS ZPIPBUF   +1        B(1) ENTRY AFTER RCS DAP HAS BEEN DIS-
 6482   REF   1              E6,1537          YOLDBUF   EQUALS XOLDBUF   +1        B(1) ABLED. NEWEST PIP VALUE REPLACES
 6483   REF   1              E6,1540          ZOLDBUF   EQUALS YOLDBUF   +1        B(1) PIPBUF,WHICH IS MOVED INTO OLDBUF.
R6484

R6485                REENTRY VARIABLES SHARED WITH RCS DAP FOR TM & FLIGHT RECORDER.

 6486   REF   2  LAST  113   E6,1574          Q7          =       THETADZ          I(2)   HI-WORD ONLY ON DNLIST.

 6487   REF   3  LAST  112   E6,1525          ASPS(TM) =          WBODY            I(6) DWN
A6488                                                                                     ASKEP,ASP1,ASPUP,ASPDN,ASP3,ASP3+1

R64885               P23 PAD LOAD (2D)                                             (1)

 64887  REF   1              E6,1775          HORISLP   EQUALS R61CNTR   +1        I(2)PL
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L        ERASABLE ASSIGNMENTS                                                                   USER'S PAGE NO.  84        57

P7000                        EBANK-7 ASSIGNMENTS

 7001                              E7,1400                      SETLOC 3400


R7002                *-*-*-*-  OVERLAY 0 IN EBANK 7 -*-*-*-*

R7003                EXTERNAL DELTA-V UPDATE.                                               (21D)

R7005                (MUST BE IN ORDER FOR UPDATE PROGRAM. ALSO ENTRY PROGRAMS PICK UP 'LAT(SPL)' WITH A VLOAD.)

 7007                              E7,1400  E7,1424    LAT(SPL) ERASE             +20D    I(2)       DSP NOUN 61 FOR P62,63,64,67
 7008     REF    2  LAST    36     E7,1402             LNG(SPL) EQUALS LAT(SPL) +2       I(2)DSP NOUN 61 FOR P62,63,64,67

 7009     REF    1                 E7,1404             DELVSLV   EQUALS LNG(SPL) +2      I(6)TMP DELTA VEL VECT, LOC VER COORDS
 7010     REF    2  LAST    36     E7,1412             TIG       EQUALS DELVSLV  +6      B(2)DSP NOUN 33 FOR X-V94(R32),P30,40.
 7011     REF    2  LAST    36     E7,1414             RTARG     EQUALS TIG      +2      I(6)IN  DESIRED VEHICHE RADIUS VECTOR
 7012     REF    1                 E7,1422             DELLT4    EQUALS RTARG    +6      I(2)IN  TIME DIFFERENCE FOR INITVEL
 7013     REF    1                 E7,1424             ECSTEER   EQUALS DELLT4   +2      I(1)PL   FOR P40 S
 7014     REF    3  LAST   121     E7,1404             DELVLVC   =       DELVSLV
 7015                              E7,1425  E7,1425    END-DELV ERASE                     *NEXT AVAIL LOC AFTER UNSHARED E7*
A70155


R7016                SERVICER STORAGE.                                                      (12D)

 7018     REF    1                 E7,1425             DVTOTAL   EQUALS END-DELV         B(2) DSP NOUN 40,99 FOR P30,34,35,40
 7019     REF    1                 E7,1427             TGO       EQUALS DVTOTAL  +2      B(2)
 7021     REF    1                 E7,1431             DELVREF   EQUALS TGO      +2      I(6)TMP
 7022     REF    1                 E7,1447             NOMTIG    EQUALS END-KALC         I(2) (CAN NOT SHARE WITH KALCMANU
A7023                                                                                     OR DELVREF)
 7024     REF    1                 E7,1451             END-SVCR EQUALS NOMTIG   +2       ***NEXT AVAILABLE AFTER SERVICER
A7025


R7026                ALIGNMENT STORAGE.                                                     (7D)

 7031     REF    1                 E7,1451             VEL/C     EQUALS END-SVCR         I(6)TMP
 7032     REF    1                 E7,1457             R53EXIT   EQUALS VEL/C    +6      I(1)TMP


R7033                ALIGNMENT  MARKDATA  (DOWNLNK)******                                   (7D)
 7035     REF    1                 E7,1460             MARK2DWN EQUALS R53EXIT  +1       (7)  USED BY ALLIGNMENT P50S
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L        ERASABLE ASSIGNMENTS                                                      USER'S PAGE NO.  85      E  S?

P7036              *-*-*-*-  OVERLAY 1 IN EBANK 7 -*-*-*-*

R7037    REENTRY ERASABLES                                               (1810+40)

  7039   REF   2  LAST  121   E7,1451          RTINIT    EQUALS END-SVCR        6P
  7040   REF   1              E7,1457          RTEAST    EQUALS RTINIT +6       6P
  7041   REF   1              E7,1465          RTNORM    EQUALS RTEAST +6       6P
  7042   REF   1              E7,1473          RT        EQUALS RTNORM +6       6P
  7043   REF   1              E7,1501          UNI       EQUALS RT +6           6P
  7044   REF   1              E7,1507          UNITV     EQUALS UNI +6          6P
  7045   REF   1              E7,1515          VEL       EQUALS UNITV +6        6P

  7046   REF   1              E7,1523          TIME/RTO  EQUALS VEL       +6    2P   TIME OF INITIAL TARGET, RTO.
  7047   REF   1              E7,1525          -VREL     EQUALS TIME/RTO +2     6P
  7048   REF   1              E7,1533          OLDUYA    EQUALS -VREL +6        6P   USED BY CM/POSE    (ENTRY DAP)
  7049   REF   1              E7,1541          UXA/2     EQUALS OLDUYA +6       6P   USED BY CM/POSE  (ENTRY DAP)   -UVA
  7050   REF   1              E7,1541          URH       =      UXA/2                       P61 DISPLAY NOUN
  7051   REF   2  LAST  122   E7,1547          UYA/2     EQUALS UXA/2 +6        6P   USED BY CM/POSE  (ENTRY DAP)    UYA
  7052   REF   1              E7,1555          UZA/2     EQUALS UYA/2 +6        6P   USED BY CM/POSE  (ENTRY DAP)    UNA
  7053   REF   1              E7,1563          UBX/2     EQUALS UZA/2 +6        6P   USED BY CM/POSE  (ENTRY DAP)
  7054   REF   1              E7,1571          UBY/2     EQUALS UBX/2 +6        6P   USED BY CM/POSE  (ENTRY DAP)
  7055   REF   1              E7,1577          UBZ/2     EQUALS UBY/2 +6        6P   USED BY CM/POSE  (ENTRY DAP)

  7056   REF   1              E7,1605          DTEAROT   EQUALS UBZ/2 +6        2P
  7057   REF   1              E7,1607          DIFF      EQUALS DTEAROT +2      2P
  7058   REF   1              E7,1611          DIFFOLD   EQUALS DIFF +2         2P
  7059   REF   1              E7,1613          FACTOR    EQUALS DIFFOLD +2      2P
  7060   REF   1              E7,1615          FACT1     EQUALS FACTOR  +2      2P
  7061   REF   1              E7,1617          FACT2     EQUALS FACT1   +2      2P
 A7062                                         Q7        =      THETADZ         2P   SHARED FOR TM.   P64-P66
  7063   REF   1              E7,1621          VSQUARE   EQUALS FACT2 +2        2P
  7064   REF   1              E7,1623          LAD       EQUALS VSQUARE +2      2P
  7065   REF   1              E7,1625          LOD       EQUALS LAD     +2      2P
  7066   REF   1              E7,1627          L/DCMINR  EQUALS LOD     +2      2P
  7067   REF   1              E7,1631          KLAT      EQUALS L/DCMINR +2     2P
  7068   REF   1              E7,1633          L/D       EQUALS KLAT +2         2P
  7069   REF   1              E7,1635          L/D1      EQUALS L/D +2          2P
  7070   REF   1              E7,1724          LEWD      =      V1O             2P   SHARED FOR TM.  P64-P65
  7071   REF   1              E7,1637          D         EQUALS L/D1     +2     2P   DSP NOUN 64,66,68 FOR P63,64,67
 A7072                                         V1        =      ENDBUF +1       2P   SHARED FOR TM.  P64-P65
  7073   REF   1              E7,1641          DLEWD     EQUALS D        +2     2P
  7074   REF   1              E7,1643          K2ROLL    EQUALS DLEWD    +2     2 P
  7075   REF   1              E7,1645          GOTOADDR  EQUALS K2ROLL +2       1P
  7076   REF   1              E7,1646          TEM1B     EQUALS GOTOADDR +1     2 P
  7077   REF   1              E7,1650          MM        EQUALS TEM1B    +2     2 P
  7078   REF   1              E7,1651          GRAD      EQUALS MM +1           1P
  7079   REF   1              E7,1652          FX        EQUALS GRAD     +1     1P   OVERWRITES NEXT 5 LOCS IN P67
  7080   REF   1              E7,1653          LEQ       EQUALS FX +1           2P
  7081   REF   1              E7,1655          DHOOK     EQUALS LEQ +2          2P
  7082   REF   1              E7,1657          AHOOKDV   EQUALS DHOOK +2        2P
  7083   REF   1                 E7,1661          DVL       EQUALS AHOOKDV +2     2P
A7084                                             A0        =      ENDBUF +3      2P    SHARED FOR TM.(HI-WD ) P64-P65
  7085   REF   1                 E7,1663          A1        EQUALS DVL      +2    2P
  7086   REF   1                 E7,1665          VBARS     EQUALS A1 +2          2P
  7087   REF   1                 E7,1667          COSG/2    EQUALS VBARS +2       2P
  7089                             0026           GAMMAL1   =      22D            2P
  7090   REF   1                 E7,1671          VS1       EQUALS COSG/2  +2     2P
  7092   REF   1                 E7,1673          V         EQUALS VS1      +2    2P
A7093                                             VREF      =      THETAD   +2    2P   SHARED FOR TM     P65
  7094   REF   1                 E7,1675          LATANG    EQUALS V        +2    2P   ADJACENT FOR TM.
  7095   REF   1                 E7,1677          RDOT      EQUALS LATANG  +2     2P   ADJACENT FOR TM.
  7096   REF   1                 E7,1701          THETAH    EQUALS RDOT     +2    2P   DSP NOUN 64,67 FOR P63,64,67
A7097                                             RDOTREF   =      THETAD         2P   SHARED FOR TM      P65
  7098   REF   1                 E7,1703          ALP       EQUALS THETAH  +2     2P

  7099   REF   1                 E7,1730          ASKEP     =      ASPS           2P)                   THESE ARE STORED IN
  7100   REF   2  LAST  123      E7,1731          ASP1      =      ASPS     +1    2P)                   SEQUENCE,OVERLAPPING
  7101   REF   3  LAST  123      E7,1732          ASPUP     =      ASPS     +2    2P)>HI-WD OF EACH<    HI-WORD ONLY APPEARS
  7102   REF   4  LAST  123      E7,1733          ASPDWN    =      ASPS     +3    2P)                   ON DOWNLIST, EXCEPT
  7103   REF   5  LAST  123      E7,1734          ASP3      =      ASPS     +4    2P)                   ASP3 IS COMPLETE.

  7104   REF   1                 E7,1705          C/D0      EQUALS ALP      +2    2P   -1/D0
  7105   REF   1                 E7,1707          D0        EQUALS C/D0      +2   I(2)    CONSTANT DRAG
  7106   REF   1                 E7,1711          Q2        EQUALS D0        +2   2P
A7107
R7108               ROLLC IS LOCATED IN EBANK= A0G TO AID ENTRY DAP.
  7109   REF   1                 E7,1713          RTGO      EQUALS Q2        +2   2P   DSP NOUN 66 FOR P64,P67.
  7110   REF   1                 E7,1715          DNRNGERR EQUALS RTGO       +2   2P DSP NOUN 66 FOR P64,67.
  7111   REF   2  LAST  123      E7,1675          XRNGERR   =      LATANG               FOR DISKY DISPLAY
  7112   REF   1                 E7,1717          KAT       EQUALS DNRNGERR +2    2P
  7113   REF   1                 E7,1721          GMAX      EQUALS KAT       +2   1P  DSP NOUN 60 FOR P61,62,63.
A7114                                                                             GMAX IS LOADED IN  DOUBLE PRECISION
  7115   REF   1                 E7,1726          L/DCALC   =      TTE            2P  CALCULATED L/D FOR TM:  P64 - P67.
A71155

  71159  REF   1                 E7,1756          VL        =      VPRED          2P  SHARED FOR TM  P64-P65
  7116   REF   1                 E7,1760          GAMMAL    =      GAMMAEI        2P  SHARED FOR TM   P64
  7117   REF   2  LAST  123      E7,1760          PREDANG   =      GAMMAEI              FOR TM IN P67.
  7118   REF   1                 E7,1761          JJ        =      PREDANG  +1          FOR TM IN P67.
A71165

R71186      ENTRY P11  P15

  7119   REF   1                 E7,1722          VMAGI     EQUALS GMAX      +1   2P DSP NOUN 62,64,68 FOR P11,63,64.
R71195
  7120   REF   1                 E7,1724          VIO       EQUALS VMAGI     +2   2P  DSP NOUN 63 FOR P61.
  7121   REF   2  LAST  122      E7,1726          TTE       EQUALS VIO       +2   2P  DSP NOUN 63 FOR P61.


  7122   REF   2  LAST  123      E7,1730          ASPS      EQUALS TTE        +2  I(2)     HI-WORD ONLY ON DNLIST FOR TEMP
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L        ERASABLE ASSIGNMENTS                                                                USER'S PAGE NO.  87       EQ S?

  7123   REF   6  LAST  123   E7,1732            TTE1      EQUALS ASPS      +2      I(2)TMP HOLDS UNDECREMENTED TTE VALUE

 71235   REF   1              E7,1734            TTE2      EQUALS TTE1  +2          I(2) HOLDS COMPENSATED TTE VALUE DURING
A71236                                                                                     P61 THRU P63 FOR  N63 DISPLAY

R7124              **** P60S ****                                                   (2D)

  7125   REF   2  LAST  123   E7,1713            RTGON64   EQUALS RTGO              RANGE ERRORS NEGATIVE IF FALLS SHORT
  7126   REF   3  LAST  124   E7,1713            RTGON67   EQUALS RTGO                 DSP NOUN 67
A7127

R7128              REENTRY, RETURN TO EARTH COMMOM DISPLAY.                         (4D)

  7130   REF   1              E7,1756            VPRED     EQUALS BETA12    +2      DSP NOUN 60 FOR P61,    ,62,63.
  7131   REF   2  LAST  123   E7,1760            GAMMAEI   EQUALS VPRED     +2      DSP NOUN 60 FOR P61,    ,62,63.
A7132

R71323             DISPLAY REGISTER FOR VG                                          (2D)

 71325   REF   3  LAST  123   E7,1762            VGDISP    EQUALS GAMMAEI   +2      B(2)DSP N.40,42,99 FOR P30,34,35,37,40,
A71326                                                                                         41 VG DISPLAY

R7133              SOME P11 DISPLAY REGISTERS.                                      (4D)

  7135   REF   1              E7,1736            ALTI      EQUALS TTE2      +2      2P DSP NOUN 62 FOR P11
  7136   REF   1              E7,1740            HDOT      EQUALS ALTI      +2      2P DSP NOUN 62 FOR P11.
A7137
R71371             P15,S11.1 INTERFACE                                              (4D)

 71373   REF   2  LAST  123   E7,1722            VNOW      =        VMAGI

 71374   REF   3  LAST  124   E7,1724            VGTLI     EQUALS VMAGI +2          I(2)TMP
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L        ERASABLE ASSIGNMENTS                                                               USER'S PAGE NO.  88      EL S?

P7138              *-*-*-*-  OVERLAY 2 IN EBANK 7 -*-*-*-*

R7139              KALCMANU STORAGE.                                                    (18D)

  7141    REF   2  LAST  121   E7,1425               MFS       EQUALS END-DELV            I(18)
  7142    REF   1              E7,1425               MFI       EQUALS MFS                 I   TMP
  7143    REF   2  LAST  125   E7,1425               DEL       EQUALS MFS                 I   TMP
  7144    REF   3  LAST  125   E7,1447               END-KALC  EQUALS MFS       +18D   **NEXT AVAIL LOC AFTER KALCMANU **

R7145              MEASUREMENT INCORPORATION STORAGE(R22) STORAGE.                      (56D)

  7147    REF   2  LAST  121   E7,1447               TX789     EQUALS END-KALC          I(6)TMP
  7148    REF   1              E7,1455               GAMMA     EQUALS TX789     +6      I(2)TMP
  7149    REF   1              E7,1457               OMEGA     EQUALS GAMMA     +2      I(18)TMP
  7150    REF   1              E7,1501               BVECTOR   EQUALS OMEGA     +18D    I(18)TMP
  7151    REF   1              E7,1523               DELTAQ    EQUALS BVECTOR   +18D    I(2)TMP
  7152    REF   1              E7,1525               VARIANCE  EQUALS DELTAQ +2         I(3)TMP
  7153    REF   1              E7,1530               RCLP      EQUALS VARIANCE +3       I(6)TMP
  7154    REF   1              E7,1536               GRP2SVQ   EQUALS RCLP      +6      I(1)TMP QSAVE FOR RESTARTS

R71542             P22 TEMP

 71545    REF   2  LAST  125   E7,1501               S22UMRL   EQUALS BVECTOR           I(18)

R7155              P20, P22, P23 DSP NOUN                                               (5D)

  7157    REF   3  LAST  125   E7,1501               N49DISP   EQUALS BVECTOR           B(5)TMP

R7158              S22.1 STORAGE.                                                       (36D)

  7160    REF   1              E7,1537               SVMRKDAT  EQUALS GRP2SVQ  +1       I(36)TMP 5 SETS OF MARK DATA +PAD OF ONE

R7161           **** CISLUNAR NAV. ERAS. (P20S) ****                                    (42D)

  7165    REF   1              E7,1603               UBAR0     EQUALS SVMRKDAT +36D
  7166    REF   1              E7,1611               UBAR1     EQUALS UBAR0 +6
  7167    REF   1              E7,1617               UBAR2     EQUALS UBAR1 +6
  7168    REF   1              E7,1625               RZC       EQUALS UBAR2 +6
  7169    REF   1              E7,1633               VZC       EQUALS RZC +6
  7170    REF   1              E7,1641               UCLSTAR   EQUALS VZC +6
  7171    REF   1              E7,1647               USSTAR    EQUALS UCLSTAR +6
 A7175
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L          ERASABLE ASSIGNMENTS                                                             USER'S PAGE NO.  89        E  52

P7176                *-*-*-*-  OVERLAY 3 IN EBANK 7 -*-*-*-*

R7177                RENDEZVOUS GUIDANCE STORAGE.  - P32...P35 -                         (8D)

 7179   REF    3  LAST  125   E7,1447            DELTEEDO  EQUALS END-KALC             I(2) S-S BACK VALUES OF DELTA TIME
 7180   REF    1              E7,1451            DELEL     EQUALS DELTEEO   +2         I(2) S-S
 7181   REF    1              E7,1453            SECMAX    EQUALS DELEL     +2         I(2) S-S MAX STOP SIZE FOR ROUTINE
 7182   REF    1              E7,1455            XXXALT    EQUALS SECMAX    +2         I(2)
A7183


R7184                S40.9 STORAGE.                                                      (16D)

 7186   REF    1              E7,1457            VG        EQUALS XXXALT    +2         I(6)TMP
 7187   REF    1              E7,1465            VRPREV    EQUALS VG        +6         I(6)
 7188   REF    1              E7,1473            TNIT      EQUALS VRPREV    +6         I(2)
 7189   REF    1              E7,1475            TNITPREV  EQUALS TNIT      +2         I(2)


R7193                P30'S COMMON STORAGE                                                (24D)

 7195   REF    2  LAST  125   E7,1537            RACT3     EQUALS GRP2SVQ   +1         I(6)TMP POSITION OF ACTIVE AT TPI TIME.
 7196   REF    1              E7,1545            VACT3     EQUALS RACT3     +6         I(6)TMP VELOCITY OF ACTIVE AT  TPI TIME.
 7197   REF    1              E7,1553            RPASS3    EQUALS VACT3     +6         I(6)TMP POSITION OF PASSIVE AT TPI TIME.
 7198   REF    1              E7,1561            VPASS3    EQUALS RPASS3    +6         I(6)TMP VELOCITY OF PASSIVE AT TPI TIME.


R7199                P76  N84 DISPLAY  -  P32  N82 DISPLAY                              (6D)
 7201   REF    2  LAST  126   E7,1537            DELVOV    EQUALS RACT3                I(6)DSP NOUN 84 FOR X-V84, P34-35
A7202

R72025               P76 - P77           STORAGE                                         (1D)

 72027  REF    1              E7,1545            OPTFLAG   EQUALS DELVOV    +6         B(1)TMP FLAG FOR P76 OR P77 BRANCHING
R7203                INITVEL/MIDGIM STORAGE.                                             (34D)
R7205                         (CALLED BY S34.1,2,  S35.1,2, AND S40.9)
R7206                         (CALLS LAMBERT, CONIC SUBROUTINES)

 7207   REF    1              E7,1567            RINIT     EQUALS VPASS3    +6         I(6)IN  ACTIVE VEHICLE RADIUS VECTOR
 7208   REF    1              E7,1575            VINIT     EQUALS RINIT     +6         I(6)IN  ACTIVE VEHICLE VELOCITY VECTOR
 7209   REF    1              E7,1603            RTARG1    EQUALS VINIT     +6         I(6)TMP SHIFTED RTARG
 7210   REF    1              E7,1611            VIPRIME   EQUALS RTARG1    +6         I(6)OUT   NEW VEL REQ AT INITIAL RADIUS
 7211   REF    1              E7,1617            VTPRIME   EQUALS VIPRIME   +6         I(6)OUT TOTAL VELOCITY AT DESIRED RADIUS
 7212   REF    1              E7,1625            +MGA      EQUALS VTPRIME   +6         I(2)DSP NOUN 45 FOR P30,34,35. +MID GIM.
 7213   REF    1              E7,1627            COZY4     EQUALS +MGA      +2         I(2)TMP COSINE OF ANGLE WHEN ROT STARTS

R7214    (THE FOLLOWING OVERLAYS MEASUREMENT INCORP AND CAN NOT SHARE WITH TPI

 7215   REF    1              E7,1502            INTIME    EQUALS TNITPREV +5
 7216   REF    1              E7,1504            ITCTR     EQUALS INTIME    +2         I(1) TMP ITERATION COUNTER
 7217   REF  1                E7,1631         END-IN/M EQUALS COZY4    +2    **NEXT AVAIL LOC AFTER INITVEL/MIDGIM**

R7218            P34 AND P33 STORAGE.   (OVERLAYS INITVEL/MIDGIM)                (240)

 7220   REF  2  LAST  126    E7,1567         VAPREC   EQUALS RINIT              I(6) S-S PREC VEC FOR NOM TPI TIME(ACT V
 7221   REF  2  LAST  126    E7,1575         RAPREC   EQUALS VINIT              I(6) S-S PREC VEC FOR NOM TPI TIME(ACT V
 7222   REF  2  LAST  126    E7,1611         VPPREC   EQUALS VIPRIME            I(6) S-S PREC VEC FOR NOM TPI TIME(PASS
 7223   REF  2  LAST  126    E7,1617         RPPREC   EQUALS VTPRIME            I(6) S-S PREC VEC FOR NOM TPI TIME(PASS
R7224


R7225            P30, P40 INTERFACE.                                             (20D)

 7227   REF  1               E7,1631         RTIG     EQUALS END-IN/M           I(6)TMP
 7228   REF  1               E7,1637         VTIG     EQUALS RTIG       +6      I(6)TMP
 7229   REF  1               E7,1645         DELVSIN  EQUALS VTIG       +6      I(6)TMP
 7230   REF  1               E7,1645         DELVEET3 EQUALS DELVSIN                  TMP DELTA VEL VECT INERTIAL COORDS.
 7231   REF  1               E7,1645         VGTEMP   EQUALS DELVEET3
 7232   REF  2  LAST  127    E7,1653         DELVSAB  EQUALS DELVSIN    +6      I(2)TMP
A7233


R7234            P35-P40 INTERFACE STORAGE. (OVERLAYS P30-P40 I/F STORAGE)       (6D)

 7237   REF  2  LAST  127    E7,1637         VPASS4   EQUALS VTIG               I(6)TMP VELOCITY OF PASSIVE AT INTERCEPT
R7242            P30-P40 COMMON STORAGE.                                         (3D)

 7244   REF  1               E7,1655         TPASS4   EQUALS DELVSAB    +2      I(2)TMP
 7246   REF  1               E7,1657         QTEMP    EQUALS TPASS4     +2      I(1) TMP
A7247


R7248            P30-P40 STORAGE.                                                (4D)

 7250   REF  1               E7,1660         TTOGO    EQUALS QTEMP      +1      B(2)DSP NOUN 35,40,45,59,99
A7251                                                                                    FOR P30,34,35,40,41,47,  R3
 7252   REF  1               E7,1662         TTPI     EQUALS TTOGO      +2      B(2)DSP NOUN 37 FOR P34 TPI TIME, CSECS.

 7253   REF  1               E7,1664         END-P30S EQUALS TTPI       +2      **NEXT AVAIL LOC AFTER P30-40 STORAGE.**


R7254            P40 STORAGE.                                                    (8D)

 7256   REF  1               E7,1664         VGBODY   EQUALS END-P30S           B(6)DSP NOUN 85 FOR P40,41,42 VG-LC COOR
 7257   REF  1               E7,1664         CELVCTL  =      VGBODY
 7258   REF  2  LAST  127    E7,1672         P40TMP   EQUALS VGBODY     +6      B(2)TMP


R7259            P47 STORAGE.
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L       ERASABLE ASSIGNMENTS                                                      USER'S PAGE NO. 91      1- 57

  7260  REF   2  LAST  126   E7,1457           DV47TEMP EQUALS VG                  B(6)TMP
  7261  REF   1              E7,1674           DELVIMU  EQUALS P40TMP    +2        I(6)  DSP  NOUN 83 FOR P47 DELTAV(IMU)
A 7262

R 7263             S40.1 STORAGE.                                                  (230)

  7265  REF   1              E7,1702           CSTEER   EQUALS DELVIMU  +6         I(2)IN
  7266  REF   1              E7,1704           BDT      EQUALS CSTEER   +2         I(6)IN
  7267  REF   1              E7,1712           UT       EQUALS BDT      +6         I(6)OUT THRUST DIRECTION
  7268  REF   1              E7,1720           VGTIG    EQUALS UT       +6         I(6)OUT
  7269  REF   1              E7,1720           VGPREV   =      VGTIG
  7270  REF   2  LAST  128   E7,1726           F        EQUALS VGTIG    +6         I(2)OUT S40.3 NEEDS THIS

  7271  REF   1              E7,1730           QTEMP1   EQUALS F        +2         I(1)TMP HOLDS RETURN

R 7272             P15 TEMPORARY STORAGE                                           (6D)

 72722  REF   1              E7,1457           AVEGDT   EQUALS DV47TEMP            B(2)
 72723  REF   1              E7,1461           VPAST    EQUALS AVEGDT +2           I(2)
 72724  REF   1              E7,1463           TLITMP   EQUALS VPAST  +2           B(2)

R 7273             R41                                                             (2D)

  7275  REF   2  LAST  128   E7,1465           T-TO-ADD EQUALS DV47TEMP +6         I(2) FOR MIDTOAVE
A 7276
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P7277            *-*-*-*-  OVERLAY 4 IN EBANK 7 -*-*-*-*

R7278            S35.1 STORAGE.                                                      (2D)

 7280   REF   2  LAST  127   E7,1664          TSTRT    EQUALS END-P30S               I(2)IN  MIDCOURSE START TIME


R7281            S34.1 STORAGE.           (OVERLAYS S35.1 STORAGE)                   (1D)

 7283   REF   1              E7,1664          TITER    EQUALS TSTRT                  I(1)TMP ITERATION COUNTER


R7288            P22 STORAGE.                                                        (5D)
 7291   REF   1              E7,1667          S22TOFF  EQUALS DELVEET2 +1            2    T SUB OFF
A72911                                                                               *USED IN SUBROUTINE COMMON TO P22 & P23.
 7292   REF   1              E7,1671          S22TPRIM EQUALS S22TOFF +2             2        SAVE TF
 7293   REF   1              E7,1673          S22EORM  EQUALS S22TPRIM +2            0 = EARTH -- NON-ZERO = MOON
A7294


R7295            DOWNLINK ERASABLES FOR P22,P20 MARK DATA.                           (8D)

 7297   REF   1              E7,1674          MARKDOWN EQUALS S22EORM  +1            B(7)
 7298   REF   1              E7,1703          RM       EQUALS S22RTNEX               DOWNLINK OF VHF RANGE
A7299


R7300            S22.1                                                               (1D)

 7302   REF   1              E7,1703          S22RTNEX EQUALS MARKDOWN +7            B(1)
A7303


R73031           P22 STORAGE                                                         (6D)

 73033  REF   2  LAST  129   E7,1704          STARSAV3 EQUALS S22RTNEX +1            I(6)TMP

R7304            CRS61.1 STORAGE.         -A SUBSET OF P20-                          (14D)

 7306   REF   1              E7,1704          Q611     EQUALS RM       +1            I(1) TMP QSAVE
 7307   REF   1              E7,1705          Q6111    EQUALS Q611     +1            I(1)TMP QSAVE
 7308   REF   1              E7,1706          SAVEPOS  EQUALS Q6111    +1            I(6)TMP LEM POSITION VECTOR-
 7309   REF   1              E7,1714          SAVEVEL  EQUALS SAVEPOS  +6            I(6)TMP LEM VELOCITY VECTOR-

R7313            MARK STORAGE AND W MATRIX INIT STORAGE (UNSHARED)                   (13D)

 7315   REF   1              E7,1722          MRKBUF1  EQUALS SAVEVEL +6             B(7)
 73151  REF   1              E7,1731          CNT3TEMP EQUALS MRKBUF1  +7            I(2)
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L         ERASABLE ASSIGNMENTS                                                               USER'S PAGE NO.  93       EU 57

 73152  REF   1                   E7,1733             OLDMKTME EQUALS CNT3TEMP +2       I(2)
 73153  REF   1                   E7,1735             AGEOFW   EQUALS OLDMKTME +2       I(2)
A73155


R7317                 MORE CONICS STORAGE.                                              (4)
 7319   REF   1                   E7,1767             COGA     EQUALS NN +2             I(2) COTAN OF INITIAL FLT PATH ANGLE
 7320   REF   1                   E7,1767             INDEP    EQUALS COGA              I(1) USED BY SUBROUTINE:ITERATOR:
 7321   REF   2  LAST  130        E7,1771             EPSILONL EQUALS COGA      +2      I(2) TMP
A7322

R732205               UNIVERSAL TRACKING STORAGE                                        (10D)

 73221  REF   2  LAST  130        E7,1731             PLANVCUT EQUALS CNT3TEMP          I(6) PLANET VECTOR UT
 73222  REF   1                   E7,1737             UTPIT    EQUALS PLANVCUT +6       I(2)  N78 PITCH
 73223  REF   1                   E7,1741             UTYAW    EQUALS UTPIT +2             I(2)  N78 YAW
R73224


R7323                 RENDEZVOUS GUIDANCE STORAGE.  - P32...P35 -                       (10D)

 7325   REF   1                   E7,1743             ELEV     EQUALS UTYAW +2          I(2)TMP
 7326   REF   1                   E7,1745             RTX1     EQUALS ELEV      +2       (1)
 7327   REF   1                   E7,1746             RTX2     EQUALS RTX1      +1       (1)
 7328   REF   1                   E7,1747             RTMU     EQUALS RTX2      +1       (2)
 7329   REF   1                   E7,1751             RTSR1/MU EQUALS RTMU      +2       (2)
 7330   REF   1                   E7,1753             CENTANG  EQUALS RTSR1/MU +2       I(2) S-S CENTRAL ANGLE COVERED(TPI-TPF)
A7331
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P7339            *-*-*-*-  OVERLAY 5 IN EBANK 7 -*-*-*-*

R7340            P34                                                        (2D)

 7342  REF   2  LAST  130   E7,1765          NN1       =       NN           I(2) DSP NOUN 55, R1

R7343    *********** THE FOLLOWING ARE FOR FLIGHT 504 ONLY *******************

R7344            RETURN-TO-EARTH STORAGE.                                   (93D)

 7346  REF   2  LAST  127   E7,1631          RTEDVD    EQUALS END-IN/M      I(2)IN  DELTA VELOCITY DESIRED  M/CS B7
 7347  REF   1              E7,1633          RTEGAM2D  EQUALS RTEDVD   +2   I(2)IN  REENTRY ANGLE DESIRED   REVS B0
 7348  REF   1              E7,1635          RCON      EQUALS RTEGAM2D +2   I(2)TMP CONIC R2 RADIUS             M B29
 7349  REF   1              E7,1637          R(T1)/    EQUALS RCON     +2   I(6)TMP POSITION VECTOR AT TIG M B29/B27
 7350  REF   1              E7,1645          R(T1)     EQUALS R(T1)/   +6   I(2)TMP MAGNITUDE OF R(T1)/    M B29/B27
 7351  REF   1              E7,1647          DT21PR    EQUALS R(T1)    +2   I(2) TMP PREVOUS DT21            CS B30
 7352  REF   1              E7,1651          MAMAX1    EQUALS DT21PR   +2   I(2) TMP MAJ AXIS LOW BOUND LMT   M B30
 7353  REF   1              E7,1653          MAMAX2    EQUALS MAMAX1   +2   I(2) TMP MAJ AXIS UP BOUND LMT    M B30
 7354  REF   1              E7,1655          R(T2)/    EQUALS MAMAX2   +2   I(6)TMP FINAL POSITION VECTOR  M B29/B27
 7355  REF   1              E7,1663          RD        EQUALS R(T2)/   +6   I(2)TMP FINAL R DESIRED        M B29/B27
 7356  REF   1              E7,1665          DRCON     EQUALS RD       +2   I(2)TMP RCON SLOPE ITERATOR    M B29/B27
 7357  REF   1              E7,1667          RPRE,     EQUALS DRCON    +2   I(2)TMP PREVISOUS RPRE         M B29/B27
 7358  REF   1              E7,1671          V(T1)/    EQUALS RPRE,    +2   I(6)TMP VEL VECTOR AT TIG     M/CS B7/B5
 7359  REF   1              E7,1677          V2(T1)/   EQUALS V(T1)/   +6   I(6)TMP POST IMP VEL AT TIG   M/CS B7/B5
 7360  REF   1              E7,1705          DV        EQUALS V2(T1)/  +6   I(2)TMP DELTA VELOCITY AT TIG M/CS B7/B5
 7361  REF   1              E7,1707          V(T2)/    EQUALS DV       +2   I(6)TMP FINAL VELOCITY VECTOR M/CS B7/B5
 7362  REF   1              E7,1715          T1        EQUALS V(T2)/   +6   I(2)TMP INITIAL VECTOR TIME        CS B28
 7363  REF   1              E7,1717          PCON      EQUALS T1       +2   I(2)TMP SEMI-LATUS RECTUM           M B29
 7364  REF   1              E7,1721          X(T1)     EQUALS PCON     +2   I(2)TMP COTANGENT GAMMA1               B5
 7365  REF   1              E7,1723          T12       EQUALS X(T1)    +2   I(2)TMP INIT TO FINL POSIT TIME    CS B28
 7366  REF   1              E7,1725          DELTAT    EQUALS T12      +2   I(2) TMP DELTA T IN SAFE PERILUNE CS B28
 7367  REF   1              E7,1727          NN1A      EQUALS DELTAT   +2   I(2) TMP ITERATION COUNTER 1
A73675

 7368  REF   2  LAST  126   E7,1545          NN2       EQUALS DELVOV +6     I(2) TMP ITERATION COUNTER
 7369  REF   1              E7,1547          RTENCKEX  EQUALS NN2      +2   I(1)TMP RTENCK RETURN ADDRESS
 7370  REF   1              E7,1550          CONICX1   EQUALS RTENCKEX +1   I(1) TMP CONICS MU TABLE INDEX
 7371  REF   1              E7,1551          T2        EQUALS CONICX1  +1   I(2)TMP FINAL TIME                 CS B28
 7372  REF   1              E7,1553          UR1/      EQUALS T2       +2   I(6)TMP UNIT R(T1)/                    B1
 7373  REF   1              E7,1561          UV1/      EQUALS UR1/     +6   I(6)TMP UNIT V(T1)/                    B1
A73735

 7374  REF   2  LAST  130   E7,1743          BETA1     EQUALS UTYAW +2      I(2) TEMP 1+X(T2)**2                   B1
 7375  REF   1              E7,1745          P(T1)     EQUALS BETA1    +2   I(1)TMP PRIMARY BODY STATE TIME 1    B14
 7376  REF   1              E7,1746          CFPA      EQUALS P(T1)    +1   I(2) TMP COSINE FLIGHT PATH ANGLE  B1
 7377  REF   1              E7,1750          PHI2      EQUALS CFPA     +2   I(2) TMP PERI OR APO INDICATOR      B2
 7378  REF   1              E7,1752          SPRTEX    EQUALS PHI2     +2   I(1)TMP ROUTINE RETURN ADDRESS
 7379   REF   1               E7,1753          VNSTORE  EQUALS SPRTEX   +1    I(1)TMP VERBNOUN STORAGE
 7380   REF   1               E7,1754          BETA12   EQUALS VNSTORE  +1    I(2)TMP SIGN FOR TIMERAD
R7381                 OVERLAYS WITHIN RETURN-TO-EARTH STORAGE.

R73815          TEMPS WITHIN VAC

 7382                            0030          RPRE     EQUALS 24D            I(2)TMP COMPUTED PREC RADIUS   M B29/B27
 7383                            0032          P/RPRE   EQUALS 26D            I(2)TMP P/R                          B4
 7384                            0034          R/APRE   EQUALS 28D            I(2)TMP R/A                          B6
A73845

 7385   REF   2  LAST  131    E7,1723          X(T2)PRE EQUALS T12            I(2)TMP PREC COTAN GAMMA2            B0
 7386   REF   2  LAST  131    E7,1725          X(T2)    EQUALS DELTAT         I(2)TMP COTAN GAMMA2                 B0
 7387   REF   1               E7,1561          UH/      EQUALS UV1/           I(2)TMP UNIT HORIZONTAL VECTOR.      B1
 7388   REF   3  LAST  121    E7,1412          SPRTETIG EQUALS TIG            I(2)IN  TIME OF IGNITION          CS B28
R7389
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L        ERASABLE ASSIGNMENTS                                                            USER'S PAGE NO.  96      E  S?

P7390              *-*-*-*- OVERLAY 6 IN EBANK 7 -*-*-*-*

R7391              P32,P33

R7392                  THE FOLLOWING OVERLAY MEAS. INCORP. AND ARE IN USE ONLY WHEN(32D)

  7394   REF   3  LAST  128   E7,1457              POSTCSI  EQUALS VG                   I(2)
  7395   REF   1              E7,1461              DELVCSI  EQUALS POSTCSI   +2         I(2)
  7396   REF   1              E7,1463              DELDV    EQUALS DELVCSI   +2         I(2)
  7397   REF   1              E7,1465              GAMPREV  EQUALS DELDV     +2         I(2)
  7398   REF   1              E7,1467              DVPREV   EQUALS GAMPREV   +2         I(2)
  7399   REF   1              E7,1471              POSTCDH  EQUALS DVPREV    +2         I(2)
  7400   REF   1              E7,1471              HAFPA1   EQUALS POSTCDH
  7401   REF   2  LAST  133   E7,1473              VACT4    EQUALS POSTCDH   +2         I(6)
  7402   REF   1              E7,1501              RDOTV    EQUALS VACT4     +6         I(2)
  7403   REF   1              E7,1503              VACT1    EQUALS RDOTV     +2         I(6)
  7405   REF   1              E7,1511              VPASS1   EQUALS VACT1     +6         I(6) VEL. PASSIVE VEH, AT CSI TIME


  7406   REF   2  LAST  126   E7,1545              UNVEC    EQUALS VACT3                I(6)
  7407   REF   2  LAST  127   E7,1655              T2TOT3   EQUALS TPASS4               I(2) TPI - TCDH

  7408   REF   1              E7,1664              CSIALRM  EQUALS TITER                I(2) ALARM INDEX

  74085  REF   1              E7,1666              DELVEET2 EQUALS CSIALRM   +2         I(6) VACT3-VACT2 = DVCDH REF.COORD.
R74086               P21 STORAGE                                                        (2D)

  74088  REF   3  LAST  126   E7,1537              P21TIME  EQUALS RACT3                I(2)


R7409                ADDITIONAL CSI - CDH STORAGE.                                      (10D)

  7411   REF   1              E7,1755              RPASS1   EQUALS CENTANG   +2         I(6) POS. PASSIVE VEH. AT CSI TIME.
  7412   REF   1              E7,1763              LOOPCT   EQUALS RPASS1    +6         I(2) ITERATION COUNTER
  7413   REF   1              E7,1765              NN       EQUALS LOOPCT    +2         I(2)

R7414                P21 STORAGE                                                        (19D)

  7416   REF   2  LAST  125   E7,1603              P21ORIG  EQUALS UBAR0                I(1)
  7417   REF   1              E7,1604              P21BASER EQUALS P21ORIG   +1         I(6)
  7418   REF   1              E7,1612              P21BASEV EQUALS P21BASER +6          I(6)
  74181  REF   1              E7,1620              P21ALT   EQUALS P21BASEV +6          I(2) NOUN 73 R1 ALTITUDE
  74182  REF   1              E7,1622              P21VEL   EQUALS P21ALT    +2         I(2) NOUN 73 R2 VELOCITY
  74183  REF   1              E7,1624              P21GAM   EQUALS P21VEL    +2         I(2) NOUN 73 R3 FLIGHT PATH ANGLE
A7419


R74191               P29 ERASABLES                                                      (32D)
```

```
L       ERASABLE ASSIGNMENTS                                                             USER'S PAGE NO. 97     E. 57

 74193  REF   1                E7,1541          PASSTIME EQUALS P21TIME  +2      B(2)TMP
 74203  REF   1                E7,1543          LONGFOR  EQUALS PASSTIME +2      B(2)TMP
 74213  REF   1                E7,1545          DELTLONG EQUALS LONGFOR  +2      I(2)TMP
 74223  REF   1                E7,1547          FUDGE    EQUALS DELTLONG +2      I(2)TMP
 74233  REF   1                E7,1551          MUSUBE   EQUALS FUDGE    +2      I(6)TMP
 74243  REF   1                E7,1557          MUSUBC   EQUALS MUSUBE   +6      I(6)TMP
 74253  REF   1                E7,1565          MUSUBS   EQUALS MUSUBC   +6      I(6)TMP
 74263  REF   1                E7,1573          MUSUBN   EQUALS MUSUBS   +6      I(6)TMP

 74273  REF   2  LAST  134     E7,1537          P29BASET =      P21TIME
 74283  REF   2  LAST  133     E7,1604          P29BASER =      P21BASER
 74293  REF   2  LAST  133     E7,1612          P29BASEV =      P21BASEV

R74303  P22-P23 STORAGE.                                                         (90)

 74323  REF   2  LAST  130     E7,1743          22SUBSCL EQUALS ELEV             B(1) DE OF ABCDE LANDMARK ID NO
 74333  REF   1                E7,1744          CXOFF    EQUALS 22SUBSCL +1      B OF ABCDE OFFSET INDICATOR.
 74343  REF   1                E7,1745          8KK      EQUALS CXOFF    +1      B (2)  TMP   INDEX OF PRESENT MARK.
 74353  REF   1                E7,1747          8NN      EQUALS 8KK      +2      B(1) TMP NO OF MARKS TAKEN IN SXTMARK
 74363  REF   1                E7,1750          S22LOC   EQUALS 8NN      +1      I(1)TMP MARK DATA LOC
 74373  REF   1                E7,1751          LANDMARK EQUALS S22LOC   +1      B(1)DSP NOUN 70 FOR P22,51,R52,53.
 74383  REF   1                E7,1752          HORIZON  EQUALS LANDMARK +1      B(1)DSP NOUN 70 FOR P22,51,R52,53
 74393  REF   1                E7,1753          P22DEX   EQUALS HORIZON  +1      B(1) INDEX FOR SXTMARK IN P22
R74403             P23 TRUNION BIAS STORAGE.

R74413  S(1D)
 74423  REF   1                E7,1754          TRUNION  EQUALS P22DEX   +1      B(1)
 74433                         E7,1777          WHOCARES =      3777             A DUMMY FOR E-BANK INSENSITIVE 2CADRS.

 74434  REF   1                E7,1777          END-E7   =      WHOCARES         TAG NEEDED FOR EDITS
```

```
L       CHECK EQUALS LIST                                                           USER'S PAGE NO.  1      E 57

P0001   ********** CHECK EQUALS LIST **********

R0002   THIS LIST IS MAINTAINED TO ENSURE THAT CERTAIN ERASABLE LOCATIONS
R0003   ARE LOCATED AT A SPECIFIED DISTANCE FROM ANOTHER ERASABLE LOCATION
R0004   AS REQUIRED BY THE STRUCTURE OF THE DOWNLINK LISTS:
R0005           1. IF A LOCATION IS THE SECOND PART OF A DOWNLINK WORD, IT MUST
R0006              BE CONTIGUOUS TO THE LOCATION THAT IS THE FIRST PART.
R0007           2. IF A LOCATION IS NOT THE FIRST WORD OF AN NONADR IT
R0008              MUST BE AT A SPECIFIC NUMBER OF LOCATIONS FROM THE FIRST
R0009              LOCATION IN THE INSTRUCTION.
R0010           3. OTHER NAMES MAY BE GIVEN TO LOCATIONS IN THE DOWNLINK LISTS
R0011              THAT ARE NOT REFERENCED IN THE LISTS.THESE MUST NOT BE MOVED.
R0012   THIS IS ACCOMPLISHED USING THE INSTRUCTION     CHECK=    .
R0013   THIS INSTRUCTION GIVES A CUSS IN THE ASSEMBLY IF THE LOCATION OF THE
R0014   FIRST TAG FIELD IS NOT EQUAL TO THE LOCATION OF THE SECOND TAG FIELD.
R0015   THE INSTRUCTION HAS NO OTHER EFFECT ON THE ASSEMBLY OR CODE.

R0016   THIS LIST SHOULD BE UPDATED FOR ANY CHANGES TO THE DOWNLINK LISTS.

R0017   THIS LIST IS MAINTAINED BY  SUMNER ROSENBERG


  0018  REF   1                  0025            TIME1    CHECK= TIME2 +1
  0019  REF   1                  0033            CDUY     CHECK= CDUX +1
  0020  REF   1                  0035            CDUT     CHECK= CDUZ +1
  0021  REF   1                  0037            PIPAX    CHECK= CDUS +1
  0022  REF   1                  0040            PIPAY    CHECK= PIPAX +1
  0023  REF   1                  0041            PIPAZ    CHECK= PIPAY +1
  0024  REF   3  LAST    73      0301            UPOLDMOD CHECK= COMPNUMB +1
  0025  REF   2  LAST    73      0302            UPVERB   CHECK= UPOLDMOD +1
  0026  REF   2  LAST    73      0303            UPCOUNT  CHECK= UPVERB +1
  0027  REF   2  LAST    73      0303            BESTJ    CHECK= BESTI +1
  0028  REF   1                  0375            FAILREG  CHECK= C31FLWRD +1
  0029  REF   2  LAST    77      0772            TRKMKCNT CHECK= VHFCNT +1
  0030  REF   1                  0776            OPTION2  CHECK= OPTION1 +1
  0031  REF   1                  1307            THETAD   CHECK= REDOCTR +1
  0032  REF   1                  1334            IMODES33 CHECK= IMODES30 +1
  0033  REF   1                  1340            HOLDFLAG CHECK= OPTMODES +1
  0034  REF   5  LAST    94   E4,1713            RRATE    CHECK= RANGE +2
  0035  REF   2  LAST    95   E4,1744            HPERX    CHECK= HAPOX +2
  0036  REF   2  LAST   105   E5,1462            TCSI     CHECK= TCDH +2
  0037  REF   2  LAST    99   E5,1761            IGC      CHECK= OGC +2
  0038  REF   2  LAST    99   E5,1763            MGC      CHECK= IGC +2
  0039  REF   1               E6,1424            YACTOFF  CHECK= PACTOFF +1
  0040  REF   1               E6,1466            DAPDATR2 CHECK= DAPDATR1 +1
  0041  REF   1               E6,1473            CSMMASS  CHECK= LEMMASS +1
  0042  REF   2  LAST   117   E6,1477            AK1      CHECK= AK +1
  0043  REF   1               E6,1500            AK2      CHECK= AK1 +1
  0044  REF   1               E6,1501            RCSFLAGS CHECK= AK2 +1
```

```
L        CHECK EQUALS LIST                                                                       USER'S PAGE NO.  2      E  S?

 0045    REF   5  LAST  108   E6,1525           WBODY     CHECK= OMEGAC
 0046    REF   1              E6,1533           ADOT      CHECK= OGARATE
 0047    REF   3  LAST  120   E6,1535           ADOT1     CHECK= ADOT +2
 0048    REF   2  LAST  112   E6,1537           ADOT2     CHECK= ADOT1 +2
 0049    REF   3  LAST  117   E6,1570           ERRORY    CHECK= ERRORX +1
 0050    REF   3  LAST  117   E6,1571           ERRORZ    CHECK= ERRORY +1
 0051    REF   2  LAST  113   E6,1572           THETADX   CHECK= ERRORZ +1
 0052    REF   3  LAST  117   E6,1573           THETADY   CHECK= THETADX +1
 0053    REF   2  LAST  113   E6,1574           THETADZ   CHECK= THETADY +1
 0054    REF   2  LAST  109   E6,1624           YCMD      CHECK= PCMD +1
 0055    REF   2  LAST  115   E6,1666           BETA/180  CHECK= ALFA/180 +1
 0056    REF   2  LAST  115   E6,1701           PREL      CHECK= CMDAPMOD +1
 0057    REF   2  LAST  115   E6,1702           QREL      CHECK= PREL +1
 0058    REF   2  LAST  115   E6,1703           RREL      CHECK= QREL +1
 0059    REF   2  LAST  115   E6,1714           ROLLTM    CHECK= PAXERR1 +1
 0060    REF   2  LAST  115   E6,1715           ROLLC     CHECK= ROLLTM +1
 0061    REF   3  LAST  121   E7,1402           LNG(SPL)  CHECK= LAT(SPL) +2
 0062    REF   2  LAST  129   E7,1703           RM        CHECK= MARKDOWN +7
 0063    REF   3  LAST  123   E7,1677           RDOT      CHECK= LATANG +2
 0064    REF   2  LAST  123   E7,1701           THETAH    CHECK= RDOT +2
 0065    REF   3  LAST  124   E7,1760           GAMMAEI   CHECK= VPRED +2
 0066    REF   1                 0074           STATE     CHECK= FLAGWRD0
 0067    REF   3  LAST   74      0304           CMTMTIME  CHECK= UPBUFF
 0068    REF   4  LAST  136      0305           SW/NDX    CHECK= UPBUFF +1
 0069    REF   5  LAST  136      0324           ENDBUF    CHECK= UPBUFF +16D
 0070    REF   6  LAST  136      0325           V1        CHECK= UPBUFF +17D
 0071    REF   7  LAST  136      0327           A0        CHECK= UPBUFF +19D
 0072    REF   2  LAST   74      0332           DNLSTADR  CHECK= DNLSTCOD
 0073    REF   3  LAST  136      0333           CTLIST    CHECK= DNLSTCOD +1
 0074    REF   1                 0373           TEMPFLSH  CHECK= CADRFLSH +2
 0075    REF   3  LAST   77      0746           LANDLAT   CHECK= LAT
 0077    REF   2  LAST   78      1021           TLIFTOFF  CHECK= TEVENT
 0078    REF   5  LAST   84      1307           CPHI      CHECK= THETAD
 0079    REF   6  LAST  136      1307           RDOTREF   CHECK= THETAD
 0080    REF   7  LAST  136      1310           CTHETA    CHECK= THETAD +1
 0081    REF   8  LAST  136      1311           CPSI      CHECK= THETAD +2
 0082    REF   9  LAST  136      1311           VREF      CHECK= THETAD +2
 0083    REF   4  LAST   84      1314           DELVX     CHECK= DELV
 0084    REF   5  LAST  136      1316           DELVY     CHECK= DELV +2
 0085    REF   6  LAST  136      1320           DELVZ     CHECK= DELV +4
 0086    REF   1              E3,1642           TETLEM    CHECK= T-OTHER
 0087    REF   2  LAST  136   E3,1642           TETOTHER  CHECK= T-OTHER
 0088    REF   4  LAST   94   E4,1715           RRATE2    CHECK= RTHETA
 0089    REF   3  LAST  135   E6,1476           PAXERR    CHECK= AK
 0090    REF   6  LAST  136   E6,1525           OMEGAXC   CHECK= OMEGAC
 0091    REF   7  LAST  136   E6,1525           TVCRCS    CHECK= OMEGAC
 0092    REF   4  LAST  120   E6,1525           ASPS(TM)  CHECK= WBODY
 0093    REF   8  LAST  136   E6,1527           OMEGAYC   CHECK= OMEGAC +2
 0094    REF   5  LAST  136   E6,1527           WBODY1    CHECK= WBODY +2
 0095    REF   1              E6,1531           WBODY2    CHECK= WBODY1 +2
```

```
L        CHECK EQUALS LIST                                                          USER'S PAGE NO.   3      E  57

  0096    REF   9  LAST  136   E6,1531          OMEGAZC  CHECK= OMEGAC +4
  0097    REF   5  LAST  110   E6,1533          OGARATE  CHECK= OMEGAB
  0098    REF   6  LAST  137   E6,1533          OMEGAXB  CHECK= OMEGAB
  0099    REF   4  LAST  136   E6,1533          XPIPBUF  CHECK= ADOT
  0100    REF   2  LAST  120   E6,1534          YPIPBUF  CHECK= XPIPBUF +1
  0101    REF   2  LAST  120   E6,1535          ZPIPBUF  CHECK= YPIPBUF +1
  0102    REF   2  LAST  120   E6,1536          XOLDBUF  CHECK= ZPIPBUF +1
  0103    REF   2  LAST  120   E6,1537          YOLDBUF  CHECK= XOLDBUF +1
  0104    REF   2  LAST  120   E6,1540          ZOLDBUF  CHECK= YOLDBUF +1
  0105    REF   7  LAST  137   E6,1535          OMEGAYB  CHECK= OMEGAB +2
  0107    REF   8  LAST  137   E6,1537          OMEGAZB  CHECK= OMEGAB +4
  0108    REF   4  LAST  136   E6,1567          VDT/180  CHECK= ERRORX
  0109    REF   4  LAST  136   E6,1570          -VT/180E CHECK= ERRORY
  0110    REF   4  LAST  136   E6,1572          QAXERR   CHECK= THETADX
  0111    REF   3  LAST  136   E6,1573          RAXERR   CHECK= THETADY
  0112    REF   3  LAST  120   E6,1574          Q7       CHECK= THETADZ
  0113    REF   4  LAST  121   E7,1404          DELVLVC  CHECK= DELVSLV
  0114    REF   4  LAST  132   E7,1412          SPRTETIG CHECK= TIG
  0115    REF   2  LAST  127   E7,1645          DELVSIN  CHECK= DELVEET3
  0116    REF   3  LAST  137   E7,1645          VGTEMP   CHECK= DELVEET3
  0118    REF   3  LAST  128   E7,1720          VGPREV   CHECK= VGTIG
  0119    REF   3  LAST  123   E7,1724          LEWD     CHECK= VIO
  0120    REF   3  LAST  123   E7,1726          L/DCALC  CHECK= TTE
  0121    REF   4  LAST  136   E7,1756          VL       CHECK= VPRED
  0122    REF   4  LAST  124   E7,1760          GAMMAL   CHECK= GAMMAEI
  0123    REF   5  LAST  137   E7,1760          PREDANG  CHECK= GAMMAEI
  0124    REF   6  LAST  137   E7,1761          JJ       CHECK= GAMMAEI +1
  0125    REF   2  LAST   79      1063          VTEMP    CHECK= MARKTIME +2
  0126    REF   4  LAST  137   E7,1722          VMAGI    CHECK= VGTIG +2
  0127    REF   4  LAST  124   E7,1724          VGTLI    CHECK= VMAGI +2
```

```
L        CHECK EQUALS LIST                                                              USER'S PAGE NO.  4      EU 52

P0200    THE FOLLCWING LOCATICNS ARE PUT CHECK= DUE TO THE REQUIREMENTS OF
R0201    COPYCYCLE:

  0210   REF   7  LAST  124   E7,1730              ASKEP     CHECK= ASPS
  0211   REF   8  LAST  138   E7,1731              ASP1      CHECK= ASPS +1
  0212   REF   9  LAST  138   E7,1732              ASPUP     CHECK= ASPS +2
  0213   REF  10  LAST  138   E7,1733              ASPDWN    CHECK= ASPS +3
  0214   REF  11  LAST  138   E7,1734              ASP3      CHECK= ASPS +4
  0215   REF   1              04,2171              DUMMYAD   CHECK= RUU +3

*** END OF ERASTOTL.041 ***
```

```
L       INTERRUPT LEAD INS                                                                          USER'S PAGE NO.   1      E0 S?

 0001                          4000                 SETLOC 4000

 0002   REF    1                                    COUNT* $$/RUPTS
 0003                          4000  0 0004 0       INHINT               GO
 0004   REF    1               4001  3 4051 1       CAF     GOBB
 0005   REF    1               4002  56 006 1       XCH     BBANK
 0006   REF    1               4003  1 2563 1       TCF     GOPROG

 0007   REF    1               4004  52 011 0       DXCH    ARUPT        T6RUPT
 0008                          4005  0 0006 1       EXTEND
 0009   REF    1               4006  3 0111 0       DCA     T6LOC
 0010                          4007  52 006 0       DTCB

 0011   REF    2  LAST  139    4010  52 011 0       DXCH    ARUPT        T5RUPT
 0012   REF    1               4011  4 0030 0       CS      TIME5
 0013   REF    1               4012  6 5011 1       AD      .5SEC
 0014   REF    1               4013  1 4056 1       TCF     T5RUPT

 0015   REF    3  LAST  139    4014  52 011 0       DXCH    ARUPT        T3RUPT
 0016   REF    1               4015  3 5254 1       CAF     T3RPTBB
 0017   REF    2  LAST  139    4016  56 006 1       XCH     BBANK
 0018   REF    1               4017  1 3362 1       TCF     T3RUPT

 0019   REF    4  LAST  139    4020  52 011 0       DXCH    ARUPT        T4RUPT
 0020   REF    1               4021  3 4054 1       CAF     T4RPTBB
 0021   REF    3  LAST  139    4022  56 006 1       XCH     BBANK
 0022   REF    1               4023  1 2000 1       TCF     T4RUPT

 0023   REF    5  LAST  139    4024  52 011 0       DXCH    ARUPT        KEYRUPT1
 0024   REF    1               4025  3 4052 1       CAF     KEYRPTBB
 0025   REF    4  LAST  139    4026  56 006 1       XCH     BBANK
 0026   REF    1               4027  1 3666 0       TCF     KEYRUPT1

 0027   REF    6  LAST  139    4030  52 011 0       DXCH    ARUPT        KEYRUPT2
 0028   REF    1               4031  3 4052 1       CAF     MKRUPTBB
 0029   REF    5  LAST  139    4032  56 006 1       XCH     BBANK
 0030   REF    1               4033  1 2105 0       TCF     MARKRUPT

 0031   REF    7  LAST  139    4034  52 011 0       DXCH    ARUPT        UPRUPT
 0032   REF    1               4035  3 4052 1       CAF     UPRPTBB
 0033   REF    6  LAST  139    4036  56 006 1       XCH     BBANK
 0034   REF    1               4037  1 3710 0       TCF     UPRUPT

 0035   REF    8  LAST  139    4040  52 011 0       DXCH    ARUPT        DOWNRUPT
 0036   REF    1               4041  3 4051 1       CAF     DWNRPTBB
 0037   REF    7  LAST  139    4042  56 006 1       XCH     BBANK
 0038   REF    1               4043  1 4621 1       TCF     DODOWNTM

 0039   REF    9  LAST  139    4044  52 011 0       DXCH    ARUPT        RADAR RUPT
 0040   REF    1               4045  3 4053 0       CAF     RDRPTBB
```

```
L       INTERRUPT LEAD INS                                                               USER'S PAGE NO.  2      E0 S3

 0041   REF   8  LAST  139        4046  56 006 1             XCH     BBANK
 0042   REF   1                   4047  1 2536 1             TCF     VHFREAD

 0043                             4050  5 0017 1             RESUME

 0047   REF   1              E3,1400                         EBANK=  LST1              RESTART USES E0, E3
 0048   REF   2  LAST  139        4051    12063 1  GOBB      BBCON   GOPROG

 0049   REF   2  LAST  140   E3,1400                         EBANK=  LST1
 0050   REF   1                   5254             T3RPTBB   EQUALS  WAITBB
 0052   REF   2  LAST  139        4052             KEYRPTBB =        MKRUPTBB

 0053   REF   2  LAST  129   E7,1722                         EBANK=  MRKBUF1
 0054   REF   2  LAST  139        4052    16067 1  MKRUPTBB BBCON    MARKRUPT

 0055   REF   2  LAST  139        4052             UPRPTBB  =        KEYRPTBB

 0057   REF   2  LAST  139        4051             DWNRPTBB =        GOBB

 0058   REF   2  LAST  129   E7,1703                         EBANK=  RM
 0059   REF   2  LAST  140        4053    56067 0  RDRPTBB   BBCON   VHFREAD
 0062   REF   1                   1322                       EBANK=  DSRUPTSW
 0063   REF   2  LAST  139        4054    14062 0  T4RPTBB   BBCON   T4RUPT
 0064   REF   1                   0025                       EBANK=  TIME1
 0065   REF   2  LAST  139        4055    04060 0  T5RPTBB   BBCON   T5RUPT

 0066                             4056  0 0006 1   T5RUPT    EXTEND
 0067   REF   1                   4057  6 5327 1             BZMF    NOQBRSM
 0068                             4060  0 0006 1             EXTEND
 0069   REF   1                   4061  3 0113 1             DCA     T5LOC
 0070                             4062  52 006 0             DTCB
```

```
  L     T4RUPT PROGRAM                                                USER'S PAGE NO.   1     E0 S3

   0002 REF  1          06,2000                    SETLOC T4RUP
   0003                 06,2000                    BANK

   0004 REF  1                                     COUNT* $$/T4RPT
   0005 REF  1          06,2000 54 016 1  T4RUPT   TS     BANKRUPT
   0006                 06,2001 0 0006 1           EXTEND
   0007 REF  1          06,2002 22 012 1           QXCH   QRUPT

   0008 REF  2 LAST 140 06,2003 11'322 1           CCS    DSRUPTSW      GOES 3(-1)0 AROUND AND AROUND
   0009 REF  1          06,2004 1 2010 0           TCF    NORMT4 +1
   0010 REF  2 LAST 141 06,2005 1 2007 0           TCF    NORMT4

   0011 REF  1          06,2006 1 2132 1           TCF    QUIKDSP

   0012 REF  2 LAST  35 06,2007 3 6214 0  NORMT4   CAF    THREE
   0013 REF  1          06,2010 54 070 1           TS     RUPTREG1
   0014 REF  3 LAST 141 06,2011 55'322 1           TS     DSRUPTSW

   0016 REF  1            7675            74K      =      HIGH4
  R0017 RELTAB IS A PACKED TABLE. RELAYWORD CODE IN UPPER 4 BITS, RELAY CODE
  R0018 IN LOWER 5 BITS.

   0020 REF  1            4000                     SETLOC FFTAG12
   0021                   4063                     BANK
  00215 REF  1                                     COUNT* $$/PIN
   0022                   4063  04025 1   RELTAB   OCT    04025
   0023                   4064  10003 0            OCT    10003
   0024                   4065  14031 0            OCT    14031
   0025                   4066  20033 0            OCT    20033
   0026                   4067  24017 1            OCT    24017
   0027                   4070  30036 1            OCT    30036
   0028                   4071  34034 1            OCT    34034
   0029                   4072  40023 1            OCT    40023
   0030                   4073  44035 1            OCT    44035
   0031                   4074  50037 0            OCT    50037
   0032                   4075  54000 0            OCT    54000
   0033                   4076  60000 1   RELTAB11 OCT    60000
```

```
L         T4RUPT PROGRAM                                                            USER'S PAGE NO.  2       EC 53

P0034             SWITCHED-BANK PORTION.

 0036    REF   2  LAST  141   06,2000                          SETLOC T4RUP
 0037                         06,2012                          BANK

 0038    REF    2 LAST  141 TO  141:     10     10*            COUNT* $$/T4RPT
 0039    REF    1             06,2012  11'241 0  CDRVE         CCS    DSPTAB +11D
 0040    REF    1             06,2013  0 2063 0                TC     DSPOUT
 0041    REF    2  LAST  142  06,2014  0 2063 0                TC     DSPOUT

 0042    REF    2  LAST  142  06,2015  57'241 1                XCH    DSPTAB +11D
 0043    REF    1             06,2016  7 4347 1                MASK   LOW11
 0044    REF    3  LAST  142  06,2017  55'241 0                TS     DSPTAB +11D
 0045    REF    1             06,2020  6 4076 1                AD     RELTAB11
 0046                         06,2021  0 0006 1                EXTEND
 0047    REF    1             06,2022  01 010 1                WRITE  OUT0
 0048    REF    1             06,2023  0 2072 0                TC     HANG20
```

```
P0049   DSPOUT PROGRAM. PUTS OUT DISPLAYS.

 0050   REF   1                06,2024  55'221 0  DSPOUTSB TS      NOUT
 0051   REF   1                06,2025  4 4772 0           CS      ZERO
 0052   REF   1                06,2026  54 0073 1          TS      DSRUPTEM        SET TO -0 FOR 1ST PASS THRU DSPTAB
 0053   REF   1                06,2027  57'201 0           XCH     DSPCNT
 0054   REF   1                06,2030  6 4771 1           AD      NEG0            TO PREVENT +0
 0055   REF   2  LAST  143     06,2031  55'201 1           TS      DSPCNT
 0056   REF   3  LAST  143     06,2032  51'201 0  DSPSCAN  INDEX   DSPCNT
 0057   REF   4  LAST  142     06,2033  11'226 1           CCS     DSPTAB
 0058   REF   4  LAST  143     06,2034  11'201 1           CCS     DSPCNT          IF DSPTAB ENTRY +, SKIP
 0059   REF   1                06,2035  1 2030 1           TCF     DSPSCAN -2      IF DSPCNT +, AGAIN
 0060   REF   1                06,2036  1 2047 1           TCF     DSPLAY          IF DSPTAB ENTRY -, DISPLAY
 0061                          06,2037   22400 0  11,14,9  OCT     22400           CANNOT GET HERE
 0062   REF   2  LAST  143     06,2040  10 0073 1          CCS     DSRUPTEM        IF DSRUPTEM=+0,2ND PASS THRU DSPTAB
 0063                          06,2041   37764 0  I20MRUPT DEC     16372           (DSPCNT = 0). +0 INTO NOUT.
 0064   REF   2  LAST  143     06,2042  55'221 0           TS      NOUT
 0065   REF   2  LAST   42     06,2043  0 0002 0           TC      Q
 0066   REF   3  LAST  143     06,2044  54 0073 1          TS      DSRUPTEM        IF DSRUPTEM=-0,1ST PASS THRU DSPTAB
 0067   REF   1                06,2045  3 4355 0           CAF     TABLNTH         (DSPCNT=0). +0 INTO DSRUPTEM. PASS AGAIN
 0068   REF   2  LAST  143     06,2046  1 2031 0           TCF     DSPSCAN -1

 0069   REF   1                06,2047  6 4770 0  DSPLAY   AD      ONE
 0070   REF   5  LAST  143     06,2050  51'201 0           INDEX   DSPCNT
 0071   REF   5  LAST  143     06,2051  55'226 1           TS      DSPTAB          REPLACE POSITIVELY
 0072   REF   2  LAST  142     06,2052  7 4347 1           MASK    LOW11           REMOVE BITS 12 TO 15
 0073   REF   4  LAST  143     06,2053  54 0073 1          TS      DSRUPTEM
 0074   REF   1                06,2054  3 4344 0           CAF     HI5
 0075   REF   6  LAST  143     06,2055  51'201 0           INDEX   DSPCNT
 0076   REF   1                06,2056  7 4063 1           MASK    RELTAB          PICK UP BITS 12 TO 15 OF RELTAB ENTRY
 0077   REF   5  LAST  143     06,2057  6 0073 0           AD      DSRUPTEM
 0078                          06,2060  0 0006 1           EXTEND
 0079   REF   2  LAST  142     06,2061  01 010 1           WRITE   OUT0            WRITE CHANNEL 10
 0080   REF   1                06,2062  1 6706 1           TCF     Q+1             ***NORMAL RETURN SKIPS ONE


 00802  REF   1                   5005            OCT54    EQUALS  LTHVACA
 00805  REF   1                   4355            TABLNTH  EQUALS  BINCON          DEC 10  LENGTH OF DSPTAB
 0081   REF   1                06,2063  3 0101 1  DSPOUT   CA      FLAGWRD5
 00815  REF   1                06,2064  7 4752 1           MASK    DSKYBIT
 0082                          06,2065  0 0006 1           EXTEND
 0083   REF   1                06,2066  1 2126 1           BZF     NODSPOUT
 0084   REF   3  LAST  143     06,2067  11'221 0           CCS     NOUT
 0085   REF   1                06,2070  0 2024 0           TC      DSPOUTSB
 0086   REF   2  LAST  143     06,2071  1 2126 1           TCF     NODSPOUT        NO DISPLAY REQUESTS
 0087   REF   1                06,2072  4 2037 0  HANG20   CS      11,14,9
 0088   REF   4  LAST  141     06,2073  27'322 1           ADS     DSRUPTSW

 0089   REF   1                06,2074  3 7663 0           CAF     20MRUPT
 0090   REF   1                06,2075  54 0027 0  SETTIME4 TS      TIME4
```

```
R0091   THE STATUS OF THE PROCEED PUSHBUTTON IS MONITORED EVERY 120 MILLISECONDS VIA THE CHANNEL 32 BIT 14 INBIT.
R0093   THE STATE OF THIS INBIT IS COMPARED WITH ITS STATE DURING THE PREVIOUS T4RUPT AND IS PROCESSED AS FOLLOWS.

R0095       IF PREV ON AND NOW ON     -    BYPASS
R0096       IF PREV ON AND NOW OFF    -    UPDATE IMODES33
R0097       IF PREV OFF AND NOW ON    -    UPDATE IMODES33 AND PROCESS VIA PINBALL
R0098       IF PREV OFF AND NOW OFF   -    BYPASS

R0099   THE LOGIC EMPLOYED REQUIRES ONLY 9 MCT (APPROX. 108 MICROSECONDS) OF COMPUTER TIME WHEN NO CHANGES OCCUR.


 0101   REF   1                 06,2076   3 1334 1   PROCEEDE CA       IMODES33          MONITIOR FOR PROCEED BUTTON
 0102                           06,2077   0 0006 1            EXTEND
 0103   REF   1                 06,2100   06 032 0            RXOR     CHAN32            CHECK IF BIT 14 DIFFERENT
 0104   REF   1                 06,2101   7 4753 0            MASK     PROCDBIT
 0105                           06,2102   0 0006 1            EXTEND
 0106   REF   1                 06,2103   1 2116 1            BZF      T4JUMP            NO CHANGE

 0107   REF   2  LAST  144      06,2104   23'334 1            LXCH     IMODES33
 0108                           06,2105   0 0006 1            EXTEND
 0109   REF   1                 06,2106   06 001 0            RXOR     LCHAN
 0110   REF   3  LAST  144      06,2107   55'334 0            TS       IMODES33          UPDATE IMODES33
 0111   REF   2  LAST  144      06,2110   7 4753 0            MASK     PROCDBIT
 0112   REF   1                 06,2111   10 000 0            CCS      A
 0113   REF   2  LAST  144      06,2112   1 2116 1            TCF      T4JUMP            WAS ON - NOW OFF

 0115   REF   1                 06,2113   0 5120 1            TC       NOVAC30           WAS OFF - NOW ON
 0116   REF   1                   1202                        EBANK=   DSPCOUNT
 0117   REF   1                 06,2114    03311 1            2CADR    PROCKEY
 0117   REF   1                 06,2115    60102 1
```

```
P0118              JUMP TO APPROPRIATE ONCE-PER SECOND (.96 SEC ACTUALLY) ACTIVITY

 0119    REF   2  LAST  141   06,2116  50 070 0  T4JUMP    INDEX   RUPTREG1
 0120                         06,2117  1 2120 1            TCF     +1

 0121    REF   1              06,2120  1 2124 0            TCF     OPTTEST
 0122    REF   1              06,2121  1 3001 1            TCF     OPTMON
 0123    REF   2  LAST  145   06,2122  1 2124 0            TCF     OPTTEST
 0124    REF   1              06,2123  1 2167 1            TCF     IMUMON
 0129    REF   1              06,2124  0 4714 1  OPTTEST   TC      IBNKCALL
 0130    REF   1              06,2125   20000 0            CADR    OPTDRIVE

 0131    REF   1                7663             20MRUPT   =       OCT37776          (DEC 16382)
 0132                         06,2126  0 0006 1  NODSPOUT  EXTEND                    TURN OFF RELAYS
 0133    REF   3  LAST  143   06,2127  01 010 1            WRITE   OUT0

 0134    REF   1              06,2130  3 2041 0            CAF     120MRUPT          SET FOR NEXT CDRVE
 0135    REF   1              06,2131  1 2075 0            TCF     SETTIME4

 0136    REF  15  LAST   85   06,2132  3 4753 1  QUIKDSP   CAF     BIT14
 0137    REF   5  LAST  143   06,2133  7 1322 1            MASK    DSRUPTSW
 0138                         06,2134  0 0006 1            EXTEND
 0139    REF   1              06,2135  1 2163 0            BZF     QUIKOFF           WROTE LAST TIME, NOW TURN OFF RELAYS

 01395   REF   4  LAST  143   06,2136  11'221 0            CCS     NOUT
 0140    REF   2  LAST  143   06,2137  0 2024 0            TC      DSPOUTSB
 0141    REF   1              06,2140  1 2150 0            TCF     NODSPY            NOUT=0 OR BAD RETURN FROM DSPOUTSB
 0142    REF  16  LAST  145   06,2141  4 4753 0            CS      BIT14             GOOD RETURN (WE DISPLAYED SOMETHING)
 0143    REF   6  LAST  145   06,2142  27'322 1  QUIKRUPT  ADS     DSRUPTSW

 0144    REF   2  LAST  143   06,2143  3 7663 0            CAF     20MRUPT
 0145    REF   2  LAST  143   06,2144  54 027 0            TS      TIME4

 0146    REF  13  LAST   84   06,2145  3 4760 1            CAF     BIT9
 0147    REF   7  LAST  145   06,2146  27'322 1            ADS     DSRUPTSW

 0148    REF   1              06,2147  0 5323 0            TC      RESUME

 0149                         06,2150  0 0006 1  NODSPY    EXTEND
 0150    REF   4  LAST  145   06,2151  01 010 1            WRITE   OUT0

 0151    REF   3  LAST  145   06,2152  3 7663 0  SYNCT4    CAF     20MRUPT
 0152    REF   3  LAST  145   06,2153  26 027 0            ADS     TIME4

 0153    REF  14  LAST  145   06,2154  3 4760 1            CAF     BIT9
 0154    REF   8  LAST  145   06,2155  27'322 1            ADS     DSRUPTSW
 0155    REF   9  LAST  145   06,2156  11'322 1            CCS     DSRUPTSW
 0156    REF   2  LAST  145   06,2157  0 5323 0            TC      RESUME
 0157                         06,2160   37737 0  OCT37737  OCT     37737
 0158    REF   1              06,2161  0 2152 0            TC      SYNCT4
```

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L        T4RUPT PROGRAM                                                        USER'S PAGE NO.  6       E0 S3

 0159    REF   3  LAST  145   06,2162  0 5323 0            TC      RESUME

 0160                         06,2163  0 0006 1  QUIKOFF   EXTEND
 0161    REF   5  LAST  145   06,2164  01 010 1            WRITE   OUT0
 0162    REF  17  LAST  145   06,2165  3 4753 1            CAF     BIT14            RESET DSRUPTSW TO SEND DISPLAY NEXT PASS
 0163    REF   1              06,2166  1 2142 0            TCF     QUIKRUPT
```

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L        T4RUPT PROGRAM                                                                    USER'S PAGE NO.   7      E0 S3

P0165    PROGRAM NAME:  IMUMON

R0166    FUNCTIONAL DESCRIPTION:  THIS PROGRAM IS ENTERED EVERY 480 MS.  IT DETECTS CHANGES OF THE IMU STATUS BITS IN
R0168    CHANNEL 30 AND CALLS THE APPROPRIATE SUBROUTINES.  THE BITS PROCESSED AND THEIR RELEVANT SUBROUTINES ARE:

R0170             FUNCTION                  BIT    SUBROUTINE CALLED
R0171             --------                  ---    -----------------
R0172             TEMP IN LIMITS             15    TLIM
R0173             ISS TURN-ON REQUEST        14    ITURNON
R0174             IMU FAIL                   13    IMUFAIL (SETISSW)
R0175             IMU CDU FAIL               12    ICDUFAIL (SETISSW)
R0176             IMU CAGE                   11    IMUCAGE
R0177             IMU OPERATE                 9    IMUOP

R0178             THE LAST SAMPLED STATE OF THESE BITS IS LEFT IN IMODES30.  ALSO, EACH SUBROUTINE CALLED FINDS THE NEW
R0180    VALUE OF THE BIT IN A, WITH Q SET TO THE PROPER RETURN LOCATION, NXTIFAIL.

R0182    CALLING SEQUENCE:  T4RUPT EVERY 480 MILLISECONDS.

R0183    JOBS OR TASKS INITIATED:  NONE.

R0184    SUBROUTINES CALLED:  TLIM, ITURNON, SETISSW, IMUCAGE, IMUOP.

R0185    ERASABLE INITIALIZATION:
R0186             FRESH START OR RESTART WITH NO GROUPS ACTIVE: C(IMODES30) = OCT 37411.
R0188             RESTART WITH ACTIVE GROUPS: C(IMODES30) = (B(IMODES30)AND(OCT 00035)) PLUS OCT 37400.
R0190                                         THIS LEAVES IMU FAIL BITS INTACT.

R0191    ALARMS:  NONE.

R0192    EXIT:  TNONTEST.

R0193    OUTPUT:  UPDATED IMODES30 WITH CHANGES PROCESSED BY APPROPRIATE SUBROUTINE.

 0195    REF   2  LAST  135   06,2167  3 1333 0  IMUMON    CA      IMODES30       SEE IF THERE HAS BEEN A CHANGE IN THE
 0196                         06,2170  0 0006 1            EXTEND                 RELEVANT BITS OF CHAN 30.
 0197    REF   1              06,2171  06 030 1            RXOR    CHAN30         CHECK IF BITS 9,11-15 CHANGED
 0198    REF   1              06,2172  7 2764 1            MASK    30RDMSK
 0199                         06,2173  0 0006 1            EXTEND
 0200    REF   1              06,2174  1 2224 0            BZF     TNONTEST       NO CHANGE IN STATUS.

 0201    REF   3  LAST  145   06,2175  54 070 1            TS      RUPTREG1       SAVE BITS WHICH HAVE CHANGED.
 0202    REF   3  LAST  147   06,2176  23'333 0            LXCH    IMODES30       UPDATE IMODES30.
 0203                         06,2177  0 0006 1            EXTEND
 0204    REF   2  LAST  144   06,2200  06 001 0            RXOR    LCHAN
 0205    REF   4  LAST  147   06,2201  55'333 1            TS      IMODES30

 0206    REF   2  LAST  143   06,2202  4 4770 1            CS      ONE
 0207    REF   4  LAST  147   06,2203  56 070 0            XCH     RUPTREG1
 0208                         06,2204  0 0006 1            EXTEND
```

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L        T4RUPT PROGRAM                                                                 USER'S PAGE NO.  8      E0 S3

 0209    REF   1                 06,2205  6 2517 0             BZMF    TLIM            CHANGE IN IMU TEMP.
 0210    REF   1                 06,2206  1 2210 1             TCF     NXTIFBIT        BEGIN BIT SCAN.

 0211    REF   3  LAST  147      06,2207  6 4770 0   -1        AD      ONE             (RE-ENTERS HERE FROM NXTIFAIL.)
 0212    REF   5  LAST  147      06,2210  24 070 0  NXTIFBIT INCR      RUPTREG1        ADVANCE BIT POSITION NUMBER.
 0213                            06,2211  6 0000 1   +1        DOUBLE
 0214    REF   2  LAST  144      06,2212  54 000 0             TS      A               SKIP IF OVERFLOW.
 0215    REF   2  LAST  148      06,2213  1 2210 1             TCF     NXTIFBIT        LOOK FOR BIT.

 0216    REF   1                 06,2214  56 071 1             XCH     RUPTREG2        SAVE OVERFLOW-CORRECTED DATA.
 0217    REF   6  LAST  148      06,2215  50 070 0             INDEX   RUPTREG1        SELECT NEW VALUE OF THIS BIT.
 0218    REF   1                 06,2216  3 4753 1             CAF     TONISSBT
 0219    REF   5  LAST  147      06,2217  7 1333 1             MASK    IMODES30
 0220    REF   7  LAST  148      06,2220  50 070 0             INDEX   RUPTREG1
 0221    REF   1                 06,2221  0 2760 1             TC      IFAILJMP

 0222    REF   2  LAST  148      06,2222  10 071 0  NXTIFAIL CCS       RUPTREG2        PROCESS ANY ADDITIONAL CHANGES.
 0223    REF   3  LAST  148      06,2223  1 2207 1             TCF     NXTIFBIT -1
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L       T4RUPT PROGRAM                                                           USER'S PAGE NO.   9      E0 S3

P0224   PROGRAM NAME:  TNONTEST.

R0225   FUNCTIONAL DESCRIPTION:  THIS PROGRAM HONORS REQUESTS FOR ISS INITIALIZATION.  ISS TURN-ON (CHANNEL 30 BIT 14)
R0227   AND ISS OPERATE (CHANNEL 30 BIT 9) REQUESTS ARE TREATED AS A PAIR AND PROCESSING TAKES PLACE .480 SECONDS
R0229   AFTER EITHER ONE APPEARS.  THIS INITIALIZATION TAKES ON ONE OF THE FOLLOWING THREE FORMS:

R0231               1)  ISS TURN-ON:  IN THIS SITUATION THE COMPUTER IS OPERATING WHEN THE ISS IS TURNED ON.  NOMINALLY,
R0233               BOTH ISS TURN-ON AND ISS OPERATE APPEAR.  THE PLATFORM IS CAGED FOR 90 SECONDS AND THE ICDU'S ZEROED
R0235               SO THAT AT THE END OF THE PROCESS THE GIMBAL LOCK MONITOR WILL FUNCTION PROPERLY.

R0237               2)  ICDU INITIALIZATION:  IN THIS CASE THE COMPUTER WAS PROBABLY TURNED ON WITH THE ISS IN OPERATE OR
R0239               A FRESH START WAS DONE WITH THE ISS IN OPERATE.  IN THIS CASE ONLY ISS OPERATE IS ON.  THE ICDU'S ARE
R0241               ZEROED SO THE GIMBAL LOCK MONITOR WILL FUNCTION.  AN EXCEPTION IS IF THE ISS IS IN GIMBAL LOCK AFTER
R0243               A RESTART, THE ICDU'S WILL NOT BE ZEROED.

R0244               3)  RESTART WITH RESTARTABLE PROGRAM USING THE IMU:  IN THIS CASE, NO INITIALIZATION TAKES PLACE SINCE
R0246               IT IS ASSUMED THAT THE USING PROGRAM DID THE INITIALIZATION AND THEREFORE T4RUPT SHOULD NOT INTERFERE.

R0248   IMODES30 BIT 7 IS SET = 1 BY THE FIRST BIT (CHANNEL 30 BIT 14 OR 9) WHICH ARRIVES.  FOLLOWING THIS. TNONTEST IS
R0250   ENTERED, FINDS BIT 7 = 1 BUT BIT 8 = 0, SO IT SETS BIT 8 = 1 AND EXITS.  THE NEXT TIME IT FINDS BIT 8 = 1 AND
R0252   PROCEEDS, SETTING BITS 8 AND 7 = 0.  AT PROCTNON, IF ISS TURN-ON REQUEST IS PRESENT, THE ISS IS CAGED (ZERO +
R0254   COARSE).  IF ISS OPERATE IS NOT PRESENT PROGRAM ALARM 00213 IS ISSUED.  AT THE END OF A 90 SECOND CAGE, BIT 2
R0256   OF IMODES30 IS TESTED.  IF IT IS = 1, ISS TURN-ON WAS NOT PRESENT FOR THE ENTIRE 90 SECONDS.  IN THAT CASE, IF
R0258   THE ISS TURN-ON REQUEST IS PRESENT THE 90 SECOND WAIT IS REPEATED, OTHERWISE NO ACTION OCCURS UNLESS A PROGRAM
R0260   WAS WAITING FOR THE INITIALIZATION IN WHICH CASE THE PROGRAM IS GIVEN AN IMUSTALL ERROR RETURN.  IF THE DELAY
R0262   WENT PROPERLY, THE ISS DELAY OUTBIT IS SENT AND THE ICDU'S ZEROED.  A TASK IS INITIATED TO REMOVE THE PIPA FAIL
R0264   INHIBIT BIT IN 10.24 SECONDS.  IF A MISSION PROGRAM WAS WAITING IT IS INFORMED VIA ENDIMU.

R0266   AT PROCTNON, IF ONLY ISS OPERATE IS PRESENT (OPONLY), THE CDU'S ARE ZEROED UNLESS THE PLATFORM IS IN COARSE
R0268   ALIGN (= GIMBAL LOCK HERE) OR A MISSION PROGRAM IS USING THE IMU (IMUSEFLG = 1).

R0270   CALLING SEQUENCE:  T4RUPT EVERY 480 MILLISECONDS AFTER IMUMON.

R0271   JOBS OR TASKS INITIATED:  1) ENDTNON, 90 SECONDS AFTER CAGING STARTED.  2) ISSUP, 4 SECONDS AFTER CAGING DONE.
R0273               3) PFAILOK, 10.24 SECONDS AFTER INITIALIZATION COMPLETED.  4) UNZ2, 320 MILLISECONDS AFTER ZEROING
R0275               STARTED.

R0276   SUBROUTINES CALLED:  CAGESUB, CAGESUB2, ZEROICDU, ENDIMU, IMUBAD, NOATTOFF, SETISSW, VARDELAY.

R0278   ERASABLE INITIALIZATION:  SEE IMUMON.

R0279   ALARMS:  PROGRAM ALARM 00213 IF ISS TURN-ON REQUESTED WITHOUT ISS OPERATE.

R0281   EXIT:  ENDTNON EXITS TO C33TEST.  TASKS HAVING TO DO WITH INITIALIZATION EXIT AS FOLLOWS:  MISSION PROGRAM
R0283   WAITING AND INITIALIZATION COMPLETE, EXIT TO ENDIMU, MISSION PROGRAM WAITING AND INITIALIZATION FAILED, EXIT TO
R0285   IMUBAD, IMU NOT IN USE, EXIT TO TASKOVER.

R0286   OUTPUT:  ISS INITIALIZED.

 0287   REF   6  LAST  148   06,2224  4 1333 1  TNONTEST CS      IMODES30        AFTER PROCESSING ALL CHANGES, SEE IF IT
 0288   REF   1                06,2225  7 4762 1              MASK    ITNON1BT        IS TIME TO ACT ON TURN-ON REQUEST
 0289   REF   3  LAST   148    06,2226  10 000 0              CCS     A
 0290   REF   1                06,2227  1 2366 1              TCF     C33TEST         NO - EXAMINE CHANNEL 33.

 0291   REF   1                06,2230  3 4761 0              CAF     ITNON2BT        SEE IF FIRST OR 2ND SAMPLE
 0292   REF   7  LAST   149    06,2231  7 1333 1              MASK    IMODES30
 0293   REF   4  LAST   150    06,2232  10 000 0              CCS     A
 0294   REF   1                06,2233  1 2237 1              TCF     PROCTNON        REACT AFTER SECOND SAMPLE.

 0295   REF   2  LAST   150    06,2234  3 4761 0              CAF     ITNON2BT        IF FIRST SAMPLE, SET BIT TO REACT
 0296   REF   8  LAST   150    06,2235  27'333 1              ADS     IMODES30        TIME.
 0297   REF   2  LAST   150    06,2236  1 2366 1              TCF     C33TEST

R0298                 PROCESS IMU TURN-ON REQUESTS AFTER WAITING 1 SAMPLE FOR ALL SIGNALS TO ARRIVE.

 0300   REF   3  LAST   150    06,2237  3 4761 0  PROCTNON CA      ITNON2BT
 03002  REF   2  LAST   150    06,2240  6 4762 0              AD      ITNON1BT
 03005                         06,2241  4 0000 0              COM
 0301   REF   9  LAST   150    06,2242  7 1333 1              MASK    IMODES30
 0302   REF  10  LAST   150    06,2243  55'333 1              TS      IMODES30
 0303   REF   2  LAST   148    06,2244  7 4753 0              MASK    TONISSBT        SEE IF TURN-ON REQUEST
 0304   REF   5  LAST   150    06,2245  10 000 0              CCS     A
 0305   REF   1                06,2246  1 2342 1              TCF     OPONLY          OPERATE ON ONLY.

 0306   REF  11  LAST   150    06,2247  4 1333 1              CS      IMODES30        IF TURN-ON REQUEST, WE SHOULD HAVE IMU
 0307   REF   1                06,2250  7 4760 0              MASK    IMUOPBIT        OPERATE.
 0308   REF   6  LAST   150    06,2251  10 000 0              CCS     A
 0309                          06,2252  1 2255 0              TCF     +3

 0310   REF   1                06,2253  0 5671 1              TC      ALARM           ALARM IF NOT.
 0311                          06,2254   00213 1              OCT     213

 0312   REF   1                06,2255  0 2740 0   +3         TC      CAGESUB

 0313   REF   1                06,2256  3 3670 0              CAF     90SECS
 0314   REF   1                06,2257  0 5233 0              TC      WAITLIST
 0315   REF   1                E3,1474                        EBANK=  CDUIND
 0316   REF   1                06,2260   02265 1              2CADR   ENDTNON
 0316   REF   1                06,2261   14063 1

 0317   REF   3  LAST   150    06,2262  1 2366 1              TCF     C33TEST

 0318   REF   2  LAST   150    06,2263  3 3670 0  RETNON      CAF     90SECS
 0319   REF   1                06,2264  0 5260 0              TC      VARDELAY

 0320   REF   1                06,2265  4 4767 1  ENDTNON     CS      DLAYFAIL        RESET TURN-ON REQUEST FAILBIT
 0321   REF  12  LAST   150    06,2266  7 1333 1              MASK    IMODES30
 0322   REF  13  LAST   150    06,2267  57'333 0              XCH     IMODES30
 0323   REF   2  LAST   150    06,2270  7 4767 1              MASK    DLAYFAIL        IF IT WAS OFF, SEND ISS DELAY COMPLETE
 0324                          06,2271  0 0006 1              EXTEND
 0325   REF   1               06,2272  1 2305 1             BZF     ENDTNON2

 0326   REF   3  LAST  150    06,2273  3 4753 1             CAF     TONISSBT         IF IT WAS ON AND TURN-ON REQUEST NOW
 0327   REF  14  LAST  150    06,2274  7 1333 1             MASK    IMODES30         PRESENT, RE-ENTER 90 SEC DELAY IN WL.
 0328                         06,2275  0 0006 1             EXTEND
 0329   REF   1               06,2276  1 2263 0             BZF     RETNON

 0330   REF   2  LAST  136    06,2277  4 0074 0             CS      FLAGWRD0         IF IT IS NOT ON NOW, SEE IF A PROG WAS
 0331   REF   1               06,2300  7 4761 1             MASK    IMUSEFLG         WAITING.
 0332   REF   7  LAST  150    06,2301  10 000 0             CCS     A
 0333   REF   1               06,2302  1 5314 0             TCF     TASKOVER
 0334   REF   1               06,2303  0 4655 0             TC      POSTJUMP
 0335   REF   1               06,2304   17625 0             CADR    IMUBAD           UNSUCCESSFUL TURN-ON.

 0336   REF  13  LAST   84    06,2305  3 4752 0  ENDTNON2   CAF     BIT15            SEND ISS DELAY COMPLETE.
 0337                         06,2306  0 0006 1             EXTEND
 0338   REF   1               06,2307  05 012 1             WOR     CHAN12           TURN OFF ISS DELAY COUNTER
 0339   REF   2  LAST  145    06,2310  0 4714 1             TC      IBNKCALL         TURN OFF NO ATT LAMP.
 0340   REF   1               06,2311   17207 1             CADR    NOATTOFF

 0341   REF   1               06,2312  0 5511 1  UNZ2       TC      ZEROICDU

 0342   REF   1               06,2313  4 5001 1             CS      BITS4&5          REMOVE ZERO AND COARSE.
 0343                         06,2314  0 0006 1             EXTEND
 0344   REF   2  LAST  151    06,2315  03 012 1             WAND    CHAN12

 0345   REF   1               06,2316  3 5025 0             CAF     7.9SEC           WAIT 7.9 SEC FOR CTRS TO FIND GIMBALS
 0346   REF   2  LAST  150    06,2317  0 5260 0             TC      VARDELAY

 0347   REF   1               06,2320  3 4763 1  ISSUP      CA      IMUNITBT
 03472  REF   1               06,2321  6 4765 1             AD      IMUFINHT
 03474  REF   1               06,2322  6 4766 1             AD      ICDUINHT
 03476                        06,2323  4 0000 0             COM                      REMOVE CAGING, IMUFAIL INHIBIT, AND
 0348   REF  15  LAST  151    06,2324  7 1333 1             MASK    IMODES30         ICDUFAIL INHIBIT FLAGS.
 0349   REF  16  LAST  151    06,2325  55'333 1             TS      IMODES30

 0350   REF   1               06,2326  4 4763 0             CS      NOIMUDAP         ENABLE DAP
 0351   REF   4  LAST  144    06,2327  7 1334 0             MASK    IMODES33
 0352   REF   5  LAST  151    06,2330  55'334 0             TS      IMODES33

 0353   REF   1               06,2331  0 2706 1             TC      SETISSW          ISS WARNING MIGHT HAVE BEEN INHIBITED.

 0354   REF  14  LAST  151    06,2332  4 4752 1             CS      BIT15            REMOVE IMU DELAY COMPLETE DISCRETE.
 0355                         06,2333  0 0006 1             EXTEND
 0356   REF   3  LAST  151    06,2334  03 012 1             WAND    CHAN12

 0357   REF   1               06,2335  3 5020 0             CAF     4SECS            DONT ENABLE PROG ALARM ON PIP FAIL FOR
 0358   REF   2  LAST  150    06,2336  0 5233 0             TC      WAITLIST         ANOTHER 4 SECS.
 0359   REF   2  LAST  150    E3,1474                       EBANK=  CDUIND
 0360   REF   1               06,2337   03175 1             2CADR   PFAILOK
 0360   REF   1               06,2340   16063 0
```

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L         T4RUPT PROGRAM                                                                      USER'S PAGE NO.  12       E  53

 0364   REF   2  LAST  151   06,2341  1 5314 0            TCF     TASKOVER

 0367   REF  13  LAST   85   06,2342  3 4765 1  OPONLY    CAF     BIT4
 0368                        06,2343  0 0006 1            EXTEND                   IF OPERATE ON ONLY AND WE ARE IN COARSE
 0369   REF   4  LAST  151   06,2344  02 012 0            RAND    CHAN12           ALIGN, DONT ZERO THE CDUS BECAUSE WE
 0370   REF   8  LAST  151   06,2345  10 000 0            CCS     A                MIGHT BE IN GIMBAL LOCK. USE V41N20 TO
 0371   REF   4  LAST  150   06,2346  1 2366 1            TCF     C33TEST          RECOVER.

 0372   REF   2  LAST  151   06,2347  3 4761 0            CAF     IMUSEFLG         OTHERWISE, ZERO THE COUNTERS
 0373   REF   3  LAST  151   06,2350  7 0074 0            MASK    FLAGWRD0         UNLESS SOMEONE IS USING THE IMU
 0374   REF   9  LAST  152   06,2351  10 000 0            CCS     A
 0375   REF   5  LAST  152   06,2352  1 2366 1            TCF     C33TEST

 0376   REF   1              06,2353  0 2751 0            TC      CAGESUB2         SET TURNON FLAGS.

 0377   REF   3  LAST  151   06,2354  0 4714 1  ISSZERO   TC      IBNKCALL         TURN OFF NO ATT LAMP
 0378   REF   2  LAST  151   06,2355   17207 1            CADR    NOATTOFF             IMU CAGE OFF ENTRY

 0379   REF  14  LAST   85   06,2356  3 4764 0            CAF     BIT5             ISS CDU ZERO
 0380                        06,2357  0 0006 1            EXTEND
 0381   REF   5  LAST  152   06,2360  05 012 1            WOR     CHAN12

 03811  REF   2  LAST  151   06,2361  0 5511 1            TC      ZEROICDU
 0382   REF  14  LAST   85   06,2362  3 4763 1            CAF     BIT6             WAIT 300 MS FOR AGS TO RECEIVE SIGNAL.
 0383   REF   1              06,2363  0 5223 1            TC      TWIDDLE
 0384   REF   1              06,2364   02312 0            ADRES   UNZ2
 0386   REF   6  LAST  152   06,2365  1 2366 1            TCF     C33TEST
```

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R0387   PROGRAM NAME:  C33TEST

R0388   FUNCTIONAL DESCRIPTION:  THIS PROGRAM MONITORS THREE FLIP-FLOP INBITS OF CHANNEL 33 AND CALLS THE APPROPRIATE
R0390   SUBROUTINE TO PROCESS A CHANGE.  IT IS ANALOGOUS TO IMUMON, WHICH MONITORS CHANNEL 30, EXCEPT THAT IT READS
R0392   CHANNEL 33 WITH A WAND INSTRUCTION BECAUSE A 'WRITE' PULSE IS REQUIRED TO RESET THE FLIP-FLOPS.  THE BITS
R0394   PROCESSED AND THE SUBROUTINES CALLED ARE:

R0395               BIT    FUNCTION                 SUBROUTINE
R0396               ---    --------                 ----------
R0397                13    PIPA FAIL                PIPFAIL
R0398                12    DOWNLINK TOO FAST        DNTMFAST
R0399                11    UPLINK TOO FAST          UPTMFAST

R0400   UPON ENTRY TO THE SUBROUTINE, THE NEW BIT STATE IS IN A.

R0401   CALLING SEQUENCE:  EVERY 480 MILLISECONDS AFTER TNONTEST.

R0402   JOBS OR TASKS INITIATED:  NONE.

R0403   SUBROUTINES CALLED:  PIPFAIL, DNTMFAST AND UPTMFAST ON BIT CHANGES.

R0404   ERASABLE INITIALIZATION:  C(IMODES33) = OCT 16000 ON A FRESH START OR RESTART, THEREFORE, THESE ALARMS WILL
R0406   REAPPEAR IF THE CONDITIONS PERSIST.

R0407   ALARMS:  NONE.

R0408   EXIT:  GLOCKMON.

R0409   OUTPUT:  UPDATED BITS 13, 12 AND 11 OF IMODES33 WITH CHANGES PROCESSED.

 0410   REF   6  LAST  151    06,2366  3 1334 1  C33TEST  CA       IMODES33         SEE IF RELEVANT CHAN 33 BITS HAVE
 0411   REF   1               06,2367  7 5055 0           MASK     33RDMSK
 0412   REF   2  LAST   42    06,2370  54 001 1           TS       L                CHANGED.
 0413   REF   2  LAST  153    06,2371  3 5055 1           CAF      33RDMSK
 0414                         06,2372  0 0006 1           EXTEND
 0415   REF   1               06,2373  03 033 1           WAND     CHAN33           RESETS FLIP-FLOP INPUTS.
 0416                         06,2374  0 0006 1           EXTEND
 0417   REF   3  LAST  147    06,2375  06 001 0           RXOR     LCHAN
 0418                         06,2376  0 0006 1           EXTEND
 0419   REF   1               06,2377  1 2426 1           BZF      GLOCKMON         ON NO CHANGE.

 0420   REF   8  LAST  148    06,2400  54 070 1           TS       RUPTREG1         SAVE BITS WHICH HAVE CHANGED
 0421   REF   7  LAST  153    06,2401  23'334 1           LXCH     IMODES33
 0422                         06,2402  0 0006 1           EXTEND
 0423   REF   4  LAST  153    06,2403  06 001 0           RXOR     LCHAN
 0424   REF   8  LAST  153    06,2404  55'334 0           TS       IMODES33         UPDATED IMODES33.

 0425   REF   2  LAST  143    06,2405  3 4772 1           CAF      ZERO
 0426   REF   9  LAST  153    06,2406  56 070 0           XCH      RUPTREG1
 0427                         06,2407  6 0000 1           DOUBLE
```

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L        T4RUPT PROGRAM                                                               USER'S PAGE NO. 14         53

 0428   REF   1                06,2410  1 2413 1             TCF     NXTIBT +1       SCAN FOR BIT CHANGES.

 0429   REF   4  LAST  148     06,2411  6 4770 0   -1        AD      ONE
 0430   REF  10  LAST  153     06,2412  24 070 0  NXTIBT     INCR    RUPTREG1
 0431                          06,2413  6 0000 1   +1        DOUBLE
 0432   REF  10  LAST  152     06,2414  54 000 0             TS      A               (CODING IDENTICAL TO CHAN 30)
 0433   REF   2  LAST  154     06,2415  1 2412 0             TCF     NXTIBT

 0434   REF   3  LAST  148     06,2416  56 071 1             XCH     RUPTREG2
 0435   REF  11  LAST  154     06,2417  50 070 0             INDEX   RUPTREG1        GET NEW VALUE OF BIT WHICH CHANGED.
 0436   REF   1                06,2420  3 4754 0             CAF     PIP2FLBT
 0437   REF   9  LAST  153     06,2421  7 1334 0             MASK    IMODES33
 0438   REF  12  LAST  154     06,2422  50 070 0             INDEX   RUPTREG1
 0439   REF   1                06,2423  0 2766 1             TC      C33JMP

 0440   REF   4  LAST  154     06,2424  10 071 0  NXTFL33    CCS     RUPTREG2        PROCESS POSSIBLE ADDITIONAL CHANGES.
 0441   REF   3  LAST  154     06,2425  1 2411 0             TCF     NXTIBT -1
```

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L       T4RUPT PROGRAM                                                               USER'S PAGE NO. 15      ED S3

P0442   PROGRAM NAME:  GLOCKMON

R0443   FUNCTIONAL DESCRIPTION:  THIS PROGRAM MONITORS THE CDUZ COUNTER TO DETERMINE WHETHER THE ISS IS IN GIMBAL LOCK
R0445   AND TAKES ACTION IF IT IS.  THREE REGIONS OF MIDDLE GIMBAL ANGLE (MGA) ARE USED:

R0447             1) ABS(MGA) LESS THAN OR EQUAL TO 70 DEGREES - NORMAL MODE.
R0448             2) ABS(MGA) GREATER THAN 70 DEGREES AND LESS THAN OR EQUAL TO 85 DEGREES - GIMBAL LOCK LAMP TURNED ON.
R0450             3) ABS(MGA) GREATER THAN 85 DEGREES - ISS PUT IN COARSE ALIGN AND NO ATT LAMP TURNED ON.

R0452   CALLING SEQUENCE:  EVERY 480 MILLISECONDS AFTER C33TEST.

R0453   JOBS OR TASKS INITIATED:  NONE.

R0454   SUBROUTINES CALLED:  1) SETCOARS WHEN ABS(MGA) GREATER THAN 85 DEGREES AND ISS NOT IN COARSE ALIGN.
R0456                        2) LAMPTEST BEFORE TURNING OFF GIMBAL LOCK LAMP.

R0457   ERASABLE INITIALIZATION:
R0458             1) FRESH START OR RESTART WITH NO GROUPS ACTIVE:  C(CDUZ) = 0, IMODES30 BIT 6 = 0, IMODES33 BIT 1 = 0.
R0460             2) RESTART WITH GROUPS ACTIVE:  SAME AS FRESH START EXCEPT C(CDUZ) NOT CHANGED SO GIMBAL MONITOR
R0462                                             PROCEEDS AS BEFORE.

R0463   ALARMS:  1) MGA REGION (2) CAUSES GIMBAL LOCK LAMP TO BE LIT.
R0464            2) MGA REGION (3) CAUSES THE ISS TO BE PUT IN COARSE ALIGN AND THE NO ATT LAMP TO BE LIT IF EITHER NOT
R0466               SO ALREADY.

 0467   REF  2  LAST  135    06,2426  10 034 1  GLOCKMON CCS     CDUZ
 0468   REF  1               06,2427   1 2433 0           TCF     GLOCKCHK           SEE IF MAGNITUDE OF MGA IS GREATER THAN
 0469   REF  1               06,2430   1 2471 0           TCF     SETGLOCK           70 DEGREES.
 0470   REF  2  LAST  155    06,2431   1 2433 0           TCF     GLOCKCHK
 0471   REF  2  LAST  155    06,2432   1 2471 0           TCF     SETGLOCK

 0472   REF  1               06,2433   6 2516 1  GLOCKCHK AD      -70DEGS
 0473                        06,2434   0 0006 1           EXTEND
 0474   REF  3  LAST  155    06,2435   6 2470 0           BZMF    SETGLOCK -1        NO LOCK.

 0475   REF  1               06,2436   6 3557 0           AD      -15DEGS            SEE IF ABS(MGA) GREATER THAN 85 DEGS.
 0476                        06,2437   0 0006 1           EXTEND
 0477   REF  1               06,2440   6 2466 1           BZMF    NOGIMRUN

 0478   REF 14  LAST  152    06,2441   3 4765 1           CAF     BIT4               IF SO, SYSTEM SHOULD BE IN COARSE ALIGN
 0479                        06,2442   0 0006 1           EXTEND                     TO PREVENT GIMBAL RUN-AWAY.
 0480   REF  6  LAST  152    06,2443  02 012 0            RAND    CHAN12
 0481   REF 11  LAST  154    06,2444  10 000 0            CCS     A
 0482   REF  2  LAST  155    06,2445   1 2466 0           TCF     NOGIMRUN

 04821  REF  2  LAST  135    E6,1465                      EBANK=  DAPDATR1
 04822  REF  1               06,2446   3 5045 0           CAF     EBANK6
 04823  REF  1               06,2447  54 003 0            TS      EBANK
 04824  REF  3  LAST  155    06,2450   4 1465 0           CS      DAPDATR1
 04825  REF  1               06,2451   7 4346 0           MASK    PRIO30
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04826  REF  12  LAST  155   06,2452  10 000 0                CCS      A
04827  REF   1              06,2453  1 2460 0                TCF      CALLCRS            NO

04828  REF   1              06,2454  3 4770 0                CAF      AVEGBIT            YES, IS AVEG ON
048285 REF   1              06,2455  7 0075 1                MASK     FLAGWRD1
04829  REF  13  LAST  156   06,2456  10 000 0                CCS      A
048295 REF   3  LAST  155   06,2457  1 2466 0                TCF      NOGIMRUN           YES, DON'T COARSE ALIGN

0483   REF   4  LAST  152   06,2460  0 4714 1  CALLCRS      TC       IBNKCALL           GO INTO COARSE ALIGN
0484   REF   1              06,2461   17070 0                CADR     SETCOARS

0485   REF   1              06,2462  3 6211 0                CAF      SIX                ENABLE ISS ERROR COUNTERS IN 60 MS
0486   REF   3  LAST  151   06,2463  0 5233 0                TC       WAITLIST
0487   REF   3  LAST  151   E3,1474                          EBANK=   CDUIND
0488   REF   1              06,2464   03064 0                2CADR    CA+ECE
0488   REF   1              06,2465   16063 0
0489   REF  15  LAST  152   06,2466  3 4763 1  NOGIMRUN     CAF      BIT6               TURN ON GIMBAL LOCK LAMP.
0490   REF   4  LAST  155   06,2467  1 2471 0                TCF      SETGLOCK

0491   REF   3  LAST  153   06,2470  3 4772 1   -1          CAF      ZERO
0492   REF   6  LAST  143   06,2471  6 1241 1  SETGLOCK     AD       DSPTAB +11D        SEE IF PRESENT STATE OF GIMBAL LOCK LAMP
0493   REF  16  LAST  156   06,2472  7 4763 0                MASK     BIT6               AGREES WITH DESIRED STATE BY HALF ADDING
0494                        06,2473  0 0006 1                EXTEND                      THE TWO.
0495   REF   1              06,2474  1 5323 1                BZF      GLOCKOK            OK AS IS.

0496   REF   7  LAST  156   06,2475  7 1241 0                MASK     DSPTAB +11D        IF OFF, DONT TURN ON IF IMU BEING CAGED.
0497   REF  14  LAST  156   06,2476  10 000 0                CCS      A
0498   REF   1              06,2477  1 2513 0                TCF      GLAMPTST           TURN OFF UNLESS LAMP TEST IN PROGRESS.

0499   REF   2  LAST  151   06,2500  3 4763 1                CAF      IMUNITBT
0500   REF  17  LAST  151   06,2501  7 1333 1                MASK     IMODES30
0501   REF  15  LAST  156   06,2502  10 000 0                CCS      A
0502   REF   2  LAST  156   06,2503  1 5323 1                TCF      GLOCKOK

0503   REF   8  LAST  156   06,2504  4 1241 0  GLINVERT     CS       DSPTAB +11D        INVERT GIMBAL LOCK LAMP.
0504   REF  17  LAST  156   06,2505  7 4763 0                MASK     BIT6
0505   REF  15  LAST  151   06,2506  6 4752 0                AD       BIT15              TO INDICATE CHANGE IN DSPTAB +11D.
0506   REF   9  LAST  156   06,2507  57'241 1                XCH      DSPTAB +11D
0507   REF   1              06,2510  7 2160 0                MASK     OCT37737
0508   REF  10  LAST  156   06,2511  27'241 0                ADS      DSPTAB +11D
0509   REF   3  LAST  156   06,2512  1 5323 1                TCF      GLOCKOK

0510   REF   1              06,2513  0 2771 1  GLAMPTST     TC       LAMPTEST           TURN OFF UNLESS LAMP TEST IN PROGRESS.
0511   REF   4  LAST  156   06,2514  1 5323 1                TCF      GLOCKOK
0512   REF   1              06,2515  1 2504 0                TCF      GLINVERT

0513                        06,2516   63434 1  -70DEGS      DEC      -.38888            -70 DEGREES SCALED IN HALF-REVOLUTIONS.
0514   REF   1              06,3557            -15DEGS      EQUALS   OCT75252           SAME AS -.08333 DEC
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R0515    PROGRAM NAME:  TLIM.

R0516    FUNCTIONAL DESCRIPTION:  THIS PROGRAM MAINTAINS THE TEMP LAMP (BIT 4 OF CHANNEL 11) ON THE DSKY TO AGREE WITH
R0518    THE TEMP SIGNAL FROM THE ISS (BIT 15 OF CHANNEL 30).  HOWEVER, THE LIGHT WILL NOT BE TURNED OFF IF A LAMP TEST
R0520    IS IN PROGRESS.

R0521    CALLING SEQUENCE:  CALLED BY IMUMON ON A CHANGE OF BIT 15 OF CHANNEL 30.

R0522    JOBS OR TASKS INITIATED:  NONE.

R0523    SUBROUTINES CALLED:  LAMPTEST.

R0524    ERASABLE INITIALIZATION:  FRESH START AND RESTART TURN THE TEMP LAMP OFF.

R0526    ALARMS:  TEMP LAMP TURNED ON WHEN IMU TEMP GOES OUT OF LIMITS.

R0527    EXIT:  NXTIFAIL.

R0528    OUTPUT:  SERVICE OF TEMP LAMP.                                                 IN A, EXCEPT FOR TLIM.

 0530    REF   1              06,2517  7 4750 0  TLIM     MASK    POSMAX             REMOVE BIT FROM WORD OF CHANGES AND SET
 0531    REF   5  LAST  154   06,2520  54 071 0           TS      RUPTREG2           DSKY TEMP LAMP ACCORDINGLY.

 0532    REF  18  LAST  156   06,2521  3 1333 0           CA      IMODES30
 05325   REF   1              06,2522  7 4752 1           MASK    TLIMBIT
 0533                         06,2523  0 0006 1           EXTEND
 0534    REF   1              06,2524  1 2531 0           BZF     TEMPOK

 0535    REF  15  LAST  155   06,2525  3 4765 1           CAF     BIT4               TURN ON LAMP.
 0536                         06,2526  0 0006 1           EXTEND
 0537    REF   1              06,2527  05 011 1           WOR     DSALMOUT
 0538    REF   1              06,2530  1 2222 0           TCF     NXTIFAIL

 0539    REF   2  LAST  156   06,2531  0 2771 1  TEMPOK   TC      LAMPTEST           IF TEMP NOW OK, DONT TURN OFF LAMP IF
 0540    REF   2  LAST  157   06,2532  1 2222 0           TCF     NXTIFAIL           LAMP TEST IN PROGRESS.

 0541    REF  16  LAST  157   06,2533  4 4765 0           CS      BIT4
 0542                         06,2534  0 0006 1           EXTEND
 0543    REF   2  LAST  157   06,2535  03 011 1           WAND    DSALMOUT           TURN OFF TEMP CAUTION
 0544    REF   3  LAST  157   06,2536  1 2222 0           TCF     NXTIFAIL
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L       T4RUPT PROGRAM                                                                         USER'S PAGE NO.  16      16 53

R0545   PROGRAM NAME:  ITURNON.

R0546   FUNCTIONAL DESCRIPTION:  THIS PROGRAM IS CALLED BY IMUMON WHEN A CHANGE OF BIT 14 OF CHANNEL 30 (ISS TURN-ON
R0548   REQUEST) IS DETECTED.  UPON ENTRY, ITURNON CHECKS IF A TURN-ON DELAY SEQUENCE HAS FAILED, AND IF SO, IT EXITS.
R0550   IF NOT, IT CHECKS WHETHER THE TURN-ON REQUEST CHANGE IS TO ON OR OFF.  IF ON, IT SETS BIT 7 OF IMODES30 TO 1 SO
R0552   THAT TNONTEST WILL INITIATE THE ISS INITIALIZATION SEQUENCE.  IF OFF, THE TURN-ON DELAY SIGNAL, CHANNEL 12 BIT
R0554   15, IS CHECKED AND IF IT IS ON, ITURNON EXITS.  IF THE DELAY SIGNAL IS OFF, PROGRAM ALARM 00207 IS ISSUED, BIT 2
R0556   OF IMODES30 IS SET TO 1 AND THE PROGRAM EXITS.
R0557           THE SETTING OF BIT 2 OF IMODES30 (ISS DELAY SEQUENCE FAIL) INHIBITS THIS ROUTINE AND IMUOP FROM
R0559   PROCESSING ANY CHANGES.  THIS BIT WILL BE RESET BY THE ENDTNON ROUTINE WHEN THE CURRENT 90 SECOND DELAY PERIOD
R0561   ENDS.

R0562   CALLING SEQUENCE:  FROM IMUMOM WHEN ISS TURN-ON REQUEST CHANGES STATE.

R0563   JOBS OR TASKS INITIATED:  NONE.

R0564   SUBROUTINES CALLED:  ALARM, IF THE ISS TURN-ON REQUEST IS NOT PRESENT FOR 90 SECONDS.

R0566   ERASABLE INITIALIZATION:  FRESH START AND RESTART SET BIT 15 OF CHANNEL 12 AND BITS 2 AND 7 OF IMODES30 TO 0,
R0568   AND BIT 14 OF IMODES30 TO 1.

R0569   ALARMS:  PROGRAM ALARM 00207 IS ISSUED IF THE ISS TURN-ON REQUEST SIGNAL IS NOT PRESENT FOR 90 SECONDS.

R0571   EXIT:  NXTIFAIL.

R0572   OUTPUT:  BIT 7 OF IMODES30 TO START ISS INITIALIZATION, OR BIT 2 OF IMODES30 AND PROGRAM ALARM 00207 TO INDICATE
R0574   A FAILED TURN-ON SEQUENCE.

 0575   REF   3  LAST  150   06,2537  3 4767 0  ITURNON   CAF     DLAYFAIL          IF DELAY REQUEST HAS GONE OFF
 0576   REF  19  LAST  157   06,2540  7 1333 1            MASK    IMODES30          PREMATURELY, DO NOT PROCESS ANY CHANGES
 0577   REF  16  LAST  156   06,2541  10 000 0            CCS     A                 UNTIL THE CURRENT 90 SEC WAIT EXPIRES.
 0578   REF   4  LAST  157   06,2542  1 2222 0            TCF     NXTIFAIL

 0579   REF   4  LAST  151   06,2543  3 4753 1            CAF     TONISSBT          SEE IF JUST ON OR OFF
 0580   REF  20  LAST  158   06,2544  7 1333 1            MASK    IMODES30
 0581                        06,2545  0 0006 1            EXTEND
 0582   REF   1              06,2546  1 2562 0            BZF     ITURNON2          IF JUST ON.

 0583   REF  16  LAST  156   06,2547  3 4752 0            CAF     BIT15
 0584                        06,2550  0 0006 1            EXTEND                    SEE IF DELAY PRESENT DISCRETE HAS BEEN
 0585   REF   7  LAST  155   06,2551  02 012 0            RAND    CHAN12            SENT. IF SO, ACTION COMPLETE.
 0586                        06,2552  0 0006 1            EXTEND
 0587                        06,2553  1 2555 1            BZF     +2
 0588   REF   5  LAST  158   06,2554  1 2222 0            TCF     NXTIFAIL

 0589   REF   4  LAST  158   06,2555  3 4767 0            CAF     DLAYFAIL          IF NOT, SET BIT TO INDICATE REQUEST NOT
 0590   REF  21  LAST  158   06,2556  27'333 1            ADS     IMODES30          PRESENT FOR FULL DURATION.
 0591   REF   2  LAST  150   06,2557  0 5671 1            TC      ALARM
 0592                        06,2560   00207 1            OCT     207
 0593   REF   6  LAST  158   06,2561  1 2222 0            TCF     NXTIFAIL
 0594    REF  22  LAST  158   06,2562  4 1333 1  ITURNON2 CS      IMODES30        SET BIT7 TO INDICATE WAIT OF 1 SAMPLE
 0595    REF   3  LAST  150   06,2563  7 4762 1           MASK    ITNON1BT
 0596    REF  23  LAST  159   06,2564  27'333 1           ADS     IMODES30
 0597    REF   7  LAST  158   06,2565  1 2222 0           TCF     NXTIFAIL
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L        T4RUPT PROGRAM                                                      USER'S PAGE NO.  2        06 53

P0598    PROGRAM NAME:  IMUCAGE.

R0599    FUNCTIONAL DESCRIPTION:  THIS PROGRAM PROCESSES CHANGES OF THE IMUCAGE INBIT, CHANNEL 30 BIT 11.  IF THE BIT
R0601    CHANGES TO 0 (CAGE BUTTON PRESSED), THE ISS IS CAGED (ICDU ZERO + COARSE ALIGN + NO ATT LAMP) UNTIL THE
R0603    ASTRONAUT SELECTS ANOTHER PROGRAM TO ALIGN THE ISS.  ANY PULSE TRAINS TO THE ICDU'S AND GYRO'S ARE TERMINATED,
R0605    THE ASSOCIATED OUTCOUNTERS ARE ZEROED AND THE GYRO'S ARE DE-SELECTED.  NO ACTION OCCURS WHEN THE BUTTON IS
R0607    RELEASED (INBIT CHANGES TO 1).

R0608    CALLING SEQUENCE:  BY IMUMON WHEN IMU CAGE BIT CHANGES.

R0609    JOBS OR TASKS INITIATED:  NONE.

R0610    SUBROUTINES CALLED:  CAGESUB.

R0611    ERASABLE INITIALIZATION:  FRESH START AND RESTART SET BIT 11 OF IMODES30 TO 1.

R0613    ALARMS:  NONE.

R0614    EXIT:  NXTIFAIL.

R0615    OUTPUT:  ISS CAGED, COUNTERS ZEROED, PULSE TRAINS TERMINATED AND NO ATT LAMP LIT.

 0617    REF  17  LAST  158   06,2566  10 000 0  IMUCAGE  CCS    A                  NO ACTION IF GOING OFF.
 0618    REF   1              06,2567  1 2354 0           TCF    ISSZERO
 0619    REF   1              06,2570  3 5021 1           CA     LOW9               TERMINATE ICDU,OPTICS, GYRO PULSE TRAINS
 0620                         06,2571  0 0006 1           EXTEND
 0621    REF   1              06,2572  03 014 1           WAND   CHAN14

 0622    REF   1              06,2573  4 2774 0           CS     CCT272             KNOCK DOWN TVC ENABLE, IMU ERROR COUNTER
 0623                         06,2574  0 0006 1           EXTEND                        ENABLE, ZERO ICDU, COARSE ALIGN
 0624    REF   8  LAST  158   06,2575  03 012 1           WAND   CHAN12                   ENABLE, OPTICS ERR CNTR ENABLE

 06241   REF   1              06,2576  4 4762 1           CS     ENGONBIT           CLEAR ENGINE ON FLAG
 06242   REF   2  LAST  143   06,2577  7 0101 0           MASK   FLAGWRD5
 06243   REF   3  LAST  160   06,2600  54 101 0           TS     FLAGWRD5
 0625    REF  16  LAST   85   06,2601  4 4754 1           CS     BIT13              TURN OFF ENGINE
 0626                         06,2602  0 0006 1           EXTEND
 0627    REF   3  LAST  157   06,2603  03 011 1           WAND   DSALMOUT

 0628    REF   1              06,2604  0 2746 0           TC     CAGESUB1

 0629    REF   5  LAST  156   06,2605  0 4714 1           TC     IBNKCALL           KNOCK DOWN TRACK, REFSMMAT, DRIFT FLAGS
 0630    REF   1              06,2606    17121 0          CADR   RNDREFDR

 0631    REF   4  LAST  156   06,2607  4 4772 0           CS     ZERO               ZERO COMMAND OUT-COUNTERS
 0632    REF   1              06,2610  54 050 0           TS     CDUXCMD
 0633    REF   1              06,2611  54 051 1           TS     CDUYCMD
 0634    REF   1              06,2612  54 052 1           TS     CDUZCMD
 0635    REF   1              06,2613  54 047 0           TS     GYROCMD
 0636   REF   1               06,2614  4 2777 0           CS       OCT740          HAVING WAITED AT LEAST 27 MCT FROM
 0637                         06,2615  0 0006 1           EXTEND                   GYRO PULSE TRAIN TERMINATION, WE CAN
 0638   REF   2  LAST  160    06,2616  03 014 1           WAND     CHAN14          DE-SELECT THE GYROS.
 0639   REF   8  LAST  159    06,2617  1 2222 0           TCF      NXTIFAIL
```

```
R0640    PROGRAM NAME:  IMUOP.

R0641    FUNCTIONAL DESCRIPTION:  THIS PROGRAM PROCESSES CHANGES IN THE ISS OPERATE DISCRETE, BIT 9 OF CHANNEL 30.
R0643    IF THE INBIT CHANGES TO 0, INDICATING ISS ON, IMUOP GENERALLY SETS BIT 7 OF IMODES30 TO 1 TO REQUEST ISS
R0645    INITIALIZATION VIA TNONTEST.  AN EXCEPTION IS DURING A FAILED ISS DELAY DURING WHICH BIT 2 OF IMODES30 IS SET
R0647    TO 1 AND NO FURTHER INITIALIZATION IS REQUIRED.  WHEN THE INBIT CHANGES TO 1, INDICATING ISS OFF, IMUSEFLG IS
R0649    TESTED TO SEE IF ANY PROGRAM WAS USING THE ISS.  IF SO, PROGRAM ALARM 00214 IS ISSUED.

R0651    CALLING SEQUENCE:  BY IMUMON WHEN BIT 9 OF CHANNEL 30 CHANGES.

R0652    JOBS OR TASKS INITIATED:  NONE.

R0653    SUBROUTINES CALLED:  ALARM, IF ISS IS TURNED OFF WHILE IN USE.

R0654    ERASABLE INITIALIZATION:  ON FRESH START AND RESTART, BIT 9 OF IMODES30 IS SET TO 1 EXCEPT WHEN THE GIMBAL LOCK
R0656    LAMP IS ON, IN WHICH CASE IT IS SET TO 0.  THIS PREVENTS ICDU ZERO BY TNONTEST WITH THE ISS IN GIMBAL LOCK.

R0658    ALARMS:  PROGRAM ALARM 00214 IF THE ISS IS TURNED OFF WHILE IN USE.

R0659    EXIT:  NXTIFAIL.

R0660    OUTPUT:  ISS INITIALIZATION REQUEST (IMODES30 BIT 7) OR PROGRAM ALARM 00214.

 0662                             06,2620  0 0006 1  IMUOP     EXTEND                    IF OPERATE JUST ON, WAIT 1 SAMPLE.
 0663    REF   1                  06,2621  1 2646 0            BZF      IMUOP2

 0664    REF  10  LAST  154       06,2622  4 1334 0            CS       IMODES33         DISABLE DAP
 0665    REF   2  LAST  151       06,2623  7 4763 0            MASK     NOIMUDAP
 0666    REF  11  LAST  162       06,2624  27'334 0            ADS      IMODES33

 0667    REF   6  LAST  160       06,2625  0 4714 1            TC       IBNKCALL         KNOCK DOWN TRACK, REFSMMAT, DRIFT FLAGS
 0668    REF   2  LAST  160       06,2626   17121 0            CADR     RNDREFDR

 06682   REF   1                  06,2627  4 4760 0            CS       UTBIT
 06684   REF   1                  06,2630  7 0104 0            MASK     FLAGWRD8
 06686   REF   2  LAST  162       06,2631  54 104 0            TS       FLAGWRD8

 0669    REF   1                  06,2632  3 4762 0            CA       RNDVZBIT         TURN OFF FLAGS
 06692   REF   1                  06,2633  6 4761 0            AD       IMUSEBIT
 06695                            06,2634  4 0000 0            COM
 0670    REF   4  LAST  152       06,2635  7 0074 0            MASK     FLAGWRD0
 0671    REF   5  LAST  162       06,2636  56 074 1            XCH      FLAGWRD0         IF GOING OFF, ALARM IF PROG USING IMU
 0672                             06,2637  4 0000 0            COM
 0673    REF   3  LAST  152       06,2640  7 4761 1            MASK     IMUSEFLG
 0674    REF  18  LAST  160       06,2641  10 000 0            CCS      A
 0675    REF   9  LAST  161       06,2642  1 2222 0            TCF      NXTIFAIL

 0676    REF   3  LAST  158       06,2643  0 5671 1            TC       ALARM
 0677                             06,2644   00214 0            OCT      214
 0678    REF  10  LAST  162       06,2645  1 2222 0            TCF      NXTIFAIL
 0679   REF  5  LAST  158   06,2646  3 4767 0  IMUOP2   CAF    DLAYFAIL
 0680   REF 24  LAST  159   06,2647  7 1333 1           MASK   IMODES33
 0681   REF 19  LAST  162   06,2650  1 0000 0           CCS    A
 0682   REF 11  LAST  162   06,2651  1 2222 0           TCF    NXTIFAIL       IF SO, DONT PROCESS UNTIL PRESENT 90
 0683   REF  2  LAST  158   06,2652  1 2562 0           TCF    ITURNON2       SECONDS EXPIRES.
```

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R0684  PROGRAM NAME:  PIPFAIL

R0685  FUNCTIONAL DESCRIPTION:  THIS PROGRAM PROCESSES CHANGES OF BIT 13 OF CHANNEL 33, PIPA FAIL.  IT SETS BIT 10 OF
R0687  IMODES30 TO AGREE.  IT CALLS SETISSW IN CASE A PIPA FAIL NECESSITATES AN ISS WARNING.  IF NOT,I.E., IMODES30
R0689  BIT 1 = 1, AND A PIPA FAIL IS PRESENT AND THE ISS IS NOT BEING INITIALIZED, PROGRAM ALARM 00212 IS ISSUED.

R0691  CALLING SEQUENCE:  BY C33TEST ON CHANGES OF CHANNEL 33 BIT 13

R0692  JOBS OR TASKS INITIATED:  NONE.

R0693  SUBROUTINES CALLED:  1) SETISSW, AND 2) ALARM (SEE FUNCTIONAL DESCRIPTION).

R0695  ERASABLE INITIALIZATION:  SEE IMUMON FOR INITIALIZATION OF IMODES30.  THE RELAVANT BITS ARE 5, 7, 8, 9, AND 10.

R0697  ALARMS:  PROGRAM ALARM 00212 IF PIPA FAIL IS PRESENT BUT NEITHER ISS WARNING IS TO BE ISSUED NOR THE ISS IS
R0699  BEING INITIALIZED.

R0700  EXIT:  NXTFL33.

R0701  OUTPUT:  PROGRAM ALARM 00212 AND ISS WARNING MAINTENANCE.

 0702  REF 20  LAST  163  06,2653  10 000 0  PIPFAIL  CCS    A              SET BIT10 IN IMODES30 SO ALL ISS WARNING
 0703  REF  1             06,2654  3 4757 0           CAF    PIPAFLBT       INFO IS IN ONE REGISTER
 0704  REF 25  LAST  163  06,2655  57'333 0           XCH    IMODES30
 0705  REF  1             06,2656  7 3000 0           MASK   -BIT10
 0706  REF 26  LAST  164  06,2657  27'333 1           ADS    IMODES30

 0707  REF  2  LAST  151  06,2660  0 2706 1           TC     SETISSW

 0708  REF 27  LAST  164  06,2661  4 1333 1           CS     IMODES30       IF PIP FAIL DOESNT LIGHT ISS WARNING, DO
 0709  REF  1             06,2662  7 4770 1           MASK   ACCFINHT       A PROGRAM ALARM IF IMU OPERATING BUT NOT
 0710  REF 21  LAST  164  06,2663  10 000 0           CCS    A              CAGED OR BEING TURNED ON.
 0711  REF  1             06,2664  1 2424 0           TCF    NXTFL33

 0712  REF 28  LAST  164  06,2665  3 1333 0           CA     IMODES30
 0713  REF  1             06,2666  7 2776 1           MASK   OCT1720
 0714  REF 22  LAST  164  06,2667  10 000 0           CCS    A
 0715  REF  2  LAST  164  06,2670  1 2424 0           TCF    NXTFL33        ABOVE CONDITION NOT MET.

 0716  REF  4  LAST  162  06,2671  0 5671 1           TC     ALARM
 0717                     06,2672   00212 0           OCT    212
 0718  REF  3  LAST  164  06,2673  1 2424 0           TCF    NXTFL33
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R0719   PROGRAM NAMES:  DNTMFAST, UPTMFAST

R0720   FUNCTIONAL DESCRIPTION:  THESE PROGRAMS PROCESS CHANGES OF BITS 12 AND 11 OF CHANNEL 33.  IF A BIT CHANGES TO A
R0722   0, A PROGRAM ALARM IS ISSUED.  THE ALARMS ARE:

R0723             BIT    ALARM          CAUSE
R0724             ---    -----          -----
R0725              12    01105          DOWNLINK TOO FAST
R0726              11    01106          UPLINK TOO FAST

R0727   CALLING SEQUENCE:  BY C33TEST ON A BIT CHANGE.

R0728   SUBROUTINES CALLED:  ALARM, IF A BIT CHANGES TO A 0.

R0729   ERASABLE INITIALIZATION:  FRESH START OR RESTART, BITS 12 AND 11 OF IMODES33 ARE SET TO 1.

R0731   ALARMS:  SEE FUNCTIONAL DESCRIPTION.

R0732   EXIT:  NXTFL33.

R0733   OUTPUT:  PROGRAM ALARM ON A BIT CHANGE TO 0.

 0734   REF  23  LAST  164   06,2674  10 000 0  DNTMFAST CCS     A                     DO PROG ALARM IF TM TOO FAST.
 0735   REF   4  LAST  164   06,2675  1 2424 0           TCF     NXTFL33

 0736   REF   5  LAST  164   06,2676  0 5671 1           TC      ALARM
 0737                        06,2677   01105 1           OCT     1105
 0738   REF   5  LAST  165   06,2700  1 2424 0           TCF     NXTFL33

 0739   REF  24  LAST  165   06,2701  10 000 0  UPTMFAST CCS     A                     SAME AS DNLINK TOO FAST WITH DIFFERENT
 0740   REF   6  LAST  165   06,2702  1 2424 0           TCF     NXTFL33               ALARM CODE.

 0741   REF   6  LAST  165   06,2703  0 5671 1           TC      ALARM
 0742                        06,2704   01106 1           OCT     1106
 0743   REF   7  LAST  165   06,2705  1 2424 0           TCF     NXTFL33
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L        T4RUPT PROGRAM                                                                        USER'S PAGE NO. 28       E6 53

R0744    PROGRAM NAME:  SETISSW

R0745    FUNCTIONAL DESCRIPTION:  THIS PROGRAM TURNS THE ISS WARNING LAMP ON AND OFF (CHANNEL 11 BIT 1 = 1 FOR ON,
R0747    0 FOR OFF) DEPENDING ON THE STATUS OF IMODES30 BITS 13 (IMU FAIL) AND 4 (INHIBIT IMU FAIL), 12 (ICDU FAIL) AND
R0749    3 (INHIBIT ICDU FAIL), AND 10 (PIPA FAIL) AND 1 (INHIBIT PIPA FAIL).  THE LAMP IS LEFT ON IF A LAMP TEST IS IN
R0751    PROGRESS.

R0752    CALLING SEQUENCE:  CALLED BY IMUMON ON CHANGES TO IMU FAIL AND ICDU FAIL.  CALLED BY IFAILOK AND PFAILOK UPON
R0754    REMOVAL OF THE FAIL INHIBITS.  CALLED BY PIPFAIL WHEN THE PIPA FAIL DISCRETE CHANGES.  IT IS CALLED BY PIPUSE
R0756    SINCE THE PIPA FAIL PROGRAM ALARM MAY NECESSITATE AN ISS WARNING, AND LIKEWISE BY PIPFREE WHEN THE ALARM DEPARTS
R0758    AND IT IS CALLED BY IMUZERO3 AND ISSUP AFTER THE FAIL INHIBITS HAVE BEEN REMOVED.

R0760    JOBS OR TASKS INITIATED:  NONE.

R0761    SUBROUTINES CALLED:  NONE.

R0762    ERASABLE INITIALIZATION:

R0763              1) IMODES30 - SEE IMUMON.
R0764              2) IMODES33 BIT 1 = 0 (LAMP TEST NOT IN PROGRESS).

R0765    ALARMS:  ISS WARNING.

R0766    EXIT:  VIA Q.

R0767    OUTPUT:  ISS WARNING LAMP SET PROPERLY.

 0768    REF  1              06,2706  3 4776 0  SETISSW  CAF     OCT15            SET ISS WARNING USING THE FAIL BITS IN
 0769    REF 29  LAST  164   06,2707  7 1333 1           MASK    IMODES30         BITS 13, 12, AND 10 OF IMODES30 AND THE
 0770                        06,2710  0 0006 1           EXTEND                   FAILURE INHIBIT BITS IN POSITIONS
 0771    REF 14  LAST   85   06,2711  7 4757 1           MP      BIT10            4, 3, AND 1.
 0772    REF 30  LAST  166   06,2712  3 1333 0           CA      IMODES30
 0773                        06,2713  0 0006 1           EXTEND
 0774    REF  5  LAST  153   06,2714  04 001 1           ROR     LCHAN            0 INDICATES FAILURE.
 0775                        06,2715  4 0000 0           COM
 0776    REF  1              06,2716  7 5054 1           MASK    OCT15000
 0777    REF 25  LAST  165   06,2717  10 000 0           CCS     A
 0778    REF  1              06,2720  1 2731 1           TCF     ISSWON           FAILURE.

 0779    REF  1              06,2721  3 4770 0  ISSWOFF  CAF     LMPTSTBT         DONT TURN OFF ISS WARNING IF LAMP TEST
 0780    REF 12  LAST  162   06,2722  7 1334 0           MASK    IMODES33         IN PROGRESS.
 0781    REF 26  LAST  166   06,2723  10 000 0           CCS     A
 0782    REF  3  LAST  143   06,2724  0 0002 0           TC      Q

 0783    REF 14  LAST   85   06,2725  4 4770 1           CS      BIT1
 0784                        06,2726  0 0006 1           EXTEND
 0785    REF  4  LAST  160   06,2727  03 011 1           WAND    DSALMOUT         TURN OFF ISS WARNING
 0786    REF  4  LAST  166   06,2730  0 0002 0           TC      Q

 0787                        06,2731  0 0006 1  ISSWON   EXTEND
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07871  REF   1              06,2732  22 066 1            QXCH    ITEMP6
07872  REF   1              06,2733  0 5770 1            TC      VARALARM        TELL EVERYONE WHAT CAUSED THE ISSWARNING
07873  REF  15  LAST  166   06,2734  3 4770 0            CAF     BIT1
0788                        06,2735  0 0006 1            EXTEND
0789   REF   5  LAST  166   06,2736  05 011 1            WOR     DSALMOUT        TURN ON ISS WARNING
0790   REF   2  LAST  167   06,2737  0 0066 1            TC      ITEMP6
0791   REF   1              06,2740  4 7667 0  CAGESUB   CS      BIT15+6         SET OUTBITS + INTERNAL FLAGS FOR
0792                        06,2741  0 0006 1            EXTEND                  SYSTEM TURN-ON OR CAGE. DISABLE THE
0793   REF   9  LAST  160   06,2742  03 012 1            WAND    CHAN12          ERROR COUNTER AND REMOVE IMU DELAY COMP.
0794   REF   2  LAST  151   06,2743  3 5001 0            CAF     BITS4&5         SEND ZERO AND COARSE.
0795                        06,2744  0 0006 1            EXTEND
0796   REF  10  LAST  167   06,2745  05 012 1            WOR     CHAN12

0797   REF  11  LAST  156   06,2746  4 1241 0  CAGESUB1  CS      DSPTAB +11D     TURN ON NO ATT LAMP
0798   REF   1              06,2747  7 7664 0            MASK    OC40010
0799   REF  12  LAST  167   06,2750  27'241 0            ADS     DSPTAB +11D

0800   REF  31  LAST  166   06,2751  4 1333 1  CAGESUB2  CS      IMODES30        SET FLAGS TO INDICATE CAGING OR TURN-ON
0801   REF   1              06,2752  7 5012 0            MASK    OCT75               AND INHIBIT ALL ISS WARNING INFO
0802   REF  32  LAST  167   06,2753  27'333 1            ADS     IMODES30

0803   REF  13  LAST  166   06,2754  4 1334 0            CS      IMODES33        DISABLE DAP AUTO AND HOLD MODES
0804   REF   3  LAST  162   06,2755  7 4763 0            MASK    NOIMUDAP
0805   REF  14  LAST  167   06,2756  27'334 0            ADS     IMODES33

0806   REF   5  LAST  166   06,2757  0 0002 0            TC      Q

0807   REF   3  LAST  164   06,2706            IMUFAIL   EQUALS  SETISSW
0808   REF   4  LAST  167   06,2706            ICDUFAIL  EQUALS  SETISSW
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P0809            JUMP TABLES AND CONSTANTS.

 0810   REF   1                 06,2760  1 2537 0  IFAILJMP TCF     ITURNON          CHANNEL 30 DISPATCH.
 0811   REF   1                 06,2761  1 2706 0           TCF     IMUFAIL
 0812   REF   1                 06,2762  1 2706 0           TCF     ICDUFAIL
 0813   REF   1                 06,2763  1 2566 1           TCF     IMUCAGE
 0814                           06,2764   76400 1  30RDMSK  OCT     76400            (BIT 10 NOT SAMPLED HERE).
 0815   REF   1                 06,2765  1 2620 0           TCF     IMUOP

 0816   REF   1                 06,2766  1 2653 1  C33JMP   TCF     PIPFAIL          CHANNEL 33 DISPATCH.
 0817   REF   1                 06,2767  1 2674 1           TCF     DNTMFAST
 0818   REF   1                 06,2770  1 2701 1           TCF     UPTMFAST

R0819            SUBROUTINE TO SKIP IF LAMP TEST NOT IN PROGRESS.
 0820   REF  15  LAST  167      06,2771  4 1334 0  LAMPTEST CS      IMODES33         BIT 1 OF IMODES33 = 1 IF LAMP TEST IN
 0821   REF   2  LAST  166      06,2772  7 4770 1           MASK    LMPTST3T         PROGRESS
 0822   REF   1                 06,2773  1 5651 1           TCF     INCRWCK
 0823   REF   1                    5055            33RDMSK  EQUALS  PRIO16
 0824   REF   1                    7664            OC40010  EQUALS  OT40010
 0828                           06,2774   00272 0  OCT272   OCT     00272
 0829                           06,2775   00300 1  BITS7&8  OCT     300
 0830                           06,2776   01720 0  OCT1720  OCT     1720
 0831                           06,2777   00740 1  OCT740   OCT     00740
 0832   REF   1                    5054            OCT15000 EQUALS  PRIO15
 0834                           06,3000   76777 1  -BIT10   OCT     -1000

 0836   REF   1                    5775            120MS    =       OCT14            (DEC 12)
 0837   REF   4  LAST  146         5323            CLOCKOK  EQUALS  RESUME
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P0838   OPTICS MONITORING AND ZERO ROUTINES
 0839   REF   2  LAST  135   06,3001  3 1337 1  OPTMON    CA      OPTMODES         MONITOR OPTICS INBITS IN CHAN 30 AND 33
 0840                        06,3002  0 0006 1            EXTEND
 0841   REF   2  LAST  147   06,3003  06 030 1            RXOR    CHAN30           LOOK FOR OCDU FAIL BIT CHANGE
 0842   REF   1              06,3004  7 4762 1            MASK    OCDUFBIT
 0843   REF  13  LAST  154   06,3005  54 070 1            TS      RUPTREG1         STORE CHANGE BIT
 0844   REF  27  LAST  166   06,3006  10 000 0            CCS     A
 0845   REF   1              06,3007  0 3221 0            TC      OCDUFTST         PROCESS OCDUFAIL BIT CHANGE

 0846   REF   1              06,3010  11'323 0  33OPTMON  CCS     OPTIND           BYPASS IF TVC TAKEOVER
 0847                        06,3011  1 3015 1            TCF     +4
 0848                        06,3012  1 3015 1            TCF     +3
 0849   REF   1              06,3013  0 3256 0            TC      OPDISAB          DISABLE OPTICS ERR CNTRS
 0850   REF   5  LAST  168   06,3014  1 5323 1            TCF     RESUME

 0851   REF   3  LAST  169   06,3015  3 1337 1            CA      OPTMODES         LOOK FOR OPTICS MODE SWITCH CHANGE
 0852                        06,3016  0 0006 1            EXTEND
 0853   REF   2  LAST  153   06,3017  06 033 1            RXOR    CHAN33
 0854   REF   1              06,3020  7 5001 1            MASK    OCTHIRTY
 0855   REF  14  LAST  169   06,3021  26 070 1            ADS     RUPTREG1         STORE INBIT CHANGES
 0856   REF   4  LAST  169   06,3022  23'337 1            LXCH    OPTMODES
 0857                        06,3023  0 0006 1            EXTEND
 0858   REF   6  LAST  166   06,3024  06 001 0            RXOR    LCHAN
 0859   REF   5  LAST  169   06,3025  55'337 0            TS      OPTMODES         UPDATE OPTMODES TO SHOW BIT  CHANGES

 08591  REF   2  LAST  135   06,3026  3 0374 1            CA      C31FLWRD
 08592  REF   2  LAST  169   06,3027  7 5001 1            MASK    OCTHIRTY
 08593                       06,3030  0 0006 1            EXTEND
 08594                       06,3031  1 3037 1            BZF     +6
 08595  REF   3  LAST  153   06,3032  54 001 1            TS      L                USE FAILWORD INDICATORS
 08596  REF   3  LAST  169   06,3033  4 5001 1            CS      OCTHIRTY
 08597  REF   6  LAST  169   06,3034  7 1337 0            MASK    OPTMODES
 08598  REF   4  LAST  169   06,3035  6 0001 0            AD      L
 08599  REF   7  LAST  169   06,3036  55'337 0            TS      OPTMODES
 0860   REF   8  LAST  169   06,3037  4 1337 0            CS      OPTMODES         SAMPLE CURRENT SWITCH SETTING
 0861   REF   4  LAST  169   06,3040  7 5001 1            MASK    OCTHIRTY
 0862                        06,3041  0 0006 1            EXTEND
 0863   REF   1              06,3042  1 3047 0            BZF     SETSAMP          MANUAL-SET ZERO IN SWSAMPLE

 0864   REF   1              06,3043  7 4764 1            MASK    OPMD1BIT         SEE IF CSC
 0865   REF  28  LAST  169   06,3044  10 000 0            CCS     A
 0866                        06,3045  0 3047 1            TC      +2               CSC-SET SWSAMPLE  POS
 0867   REF   1              06,3046  3 7702 0            CAF     NEGONE           ZOPTICS-SET SWSAMPLE (-1)
 0868   REF   1              06,3047  55'354 0  SETSAMP   TS      SWSAMPLE         CURRENT OPTICS SWITCH SETTING

 0869   REF   1              06,3050  11'330 1  PROCESSW  CCS     DESOPMOD         BRANCH ON PREVIOUS SETTING
 0870   REF   1              06,3051  0 3143 1            TC      CSCDES           CSC
 0871   REF   1              06,3052  0 3115 1            TC      MANODES          MANUAL
 0873   REF   2  LAST  169   06,3053  11'354 0  ZOPTDES   CCS     SWSAMPLE         IS SWITCH STILL AT ZOPTICS
 0874   REF   1              06,3054  0 3132 1            TC      ZTOCSC           NOW AT CSC
 0875   REF   1                  06,3055  0 3071 1             TC      ZTOMAN         MANUAL
 0876   REF   1                  06,3056  0 3101 1             TC      ZOPFINI        ZOPTICS-SEE IF ZOPT PROCESSING
 0877   REF   1                  06,3057  0 3124 0             TC      SETDESMD       ZOPT NOT PROCESSING-NO ACTION

 0878   REF   1                  06,3060  11'332 0             CCS     ZOPTCNT        ZOPT PROCESSING-CHECK COUNTER
 0879   REF   1                  06,3061  0 3123 1             TC      SETCNT         32 SAMPLE NOT FINISHED-SET COUNTER
 0880   REF  16  LAST  167       06,3062  3 4770 0   SETZOEND  CAF     BIT1           32 SAMPLE WAIT COMPLETED-SET UP ENDZOPT
 08801                           06,3063  0 0006 1             EXTEND
 08802  REF  11  LAST  167       06,3064  05 012 1             WOR     CHAN12         SEND OCDU ZERO
 08803  REF   1                  06,3065  3 4124 1             CAF     200MS          HOLD FOR 200MS
 08804  REF   2  LAST  152       06,3066  0 5223 1             TC      TWIDDLE
 08805  REF   1                  06,3067   03171 0             ADRES   ENDZOPT
 08809  REF   2  LAST  170       06,3070  0 3124 0             TC      SETDESMD
 0881   REF   2  LAST  170       06,3071  0 3101 1   ZTOMAN    TC      ZOPFINI        ZOP TO MANUAL-IS ZOPT DONE
 0882   REF   1                  06,3072  0 3154 1             TC      CSCTOMAN       YES
 0883   REF   7  LAST  165       06,3073  0 5671 1   ZOPALARM  TC      ALARM          ALARM-SWITCHED ALTERED WHILE ZOPTICS
 0884                            06,3074   00116 1             OCT     00116
 0885   REF   1                  06,3075  3 4775 0             CAF     OCT13          PROCESSING-SET RETURN OPTION
 0886   REF   1                  06,3076  55'331 0             TS      WTOPTION

 0887   REF   1                  06,3077  0 3104 1             TC      CANZOPT        CANCEL ZOPT

 0888   REF   2  LAST  170       06,3100  0 3154 1             TC      CSCTOMAN
A0897                                                                                 BIT 1 OF OPTMODES HAS BEEN ELIMINATED.
A0898                                                                                 IF T4RUPT TIMING IS REDUCED, IT WILL
A0899                                                                                 BE NECESSARY TO REINSTATE THE BIT AS
A0900                                                                                 BEFORE, BUT PREVENT OPTICS LOCKOUT.
 0901   REF   1                  06,3101  3 4766 1   ZOPFINI   CAF     ZOPTCS
 0902   REF   9  LAST  169       06,3102  7 1337 0   ZOPFIN2   MASK    OPTMODES       RETURNS TO L+1 PROCESSING AND
 0903   REF   2  LAST  168       06,3103  1 5651 1             TCF     INCRQCK        L+2 IF NOT
 0906   REF   2  LAST  170       06,3104  3 4766 1   CANZOPT   CAF     ZOPTCS         CANCEL ZERO OPTICS
 09062  REF   1                  06,3105  6 4767 0             AD      OCDUINHT
 09065                           06,3106  4 0000 0             COM
 0907   REF  10  LAST  170       06,3107  7 1337 0             MASK    OPTMODES       ZERO ZOPT PROCESSING BIT-ENABLE OCDUFAIL
 0908   REF  11  LAST  170       06,3110  55'337 0             TS      OPTMODES
 0909   REF  17  LAST  170       06,3111  4 4770 1             CS      BIT1           MAKE SURE ZERO OCDU IS OFF
 0910                            06,3112  0 0006 1             EXTEND
 0911   REF  12  LAST  170       06,3113  03 012 1             WAND    CHAN12
 0912   REF   6  LAST  167       06,3114  0 0002 0             TC      Q
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0913   REF   3  LAST  169   06,3115  11'354 0  MANUDES  CCS    SWSAMPLE        SEE IF SWITCH STILL IN MANUAL MODE
0914   REF   1              06,3116  0 3137 1           TC     MANTOCSC        NOW AT CSC
0915   REF   1              06,3117  0 3127 0           TC     MANTOMAN        STILL MANUAL
0916   REF   2  LAST  170   06,3120  11'331 0           CCS    WTOPTION        ZOPTICS-LOOK AT ZOPTICS RETURN OPTION
0917   REF   1              06,3121  0 3150 0           TC     CSCTOZOP +2     5 SEC RETURN GOOD- CONTINUE ZOPTICS
0918   REF   2  LAST  171   06,3122  0 3146 1           TC     CSCTOZOP
09182  REF   2  LAST  170   06,3123  55'332 0  SETCNT   TS     ZOPTCNT
09183  REF   4  LAST  171   06,3124  3 1354 1  SETDESMD CA     SWSAMPLE        SET CURRENT SWITCH INDICATOR- RESUME
09184  REF   2  LAST  169   06,3125  55'330 1           TS     DESOPMOD
09185  REF   6  LAST  169   06,3126  0 5323 0           TC     RESUME
0922   REF   3  LAST  171   06,3127  11'331 0  MANTOMAN CCS    WTOPTION        DECREMENT RETURN OPTION TIME
0923   REF   4  LAST  171   06,3130  55'331 0           TS     WTOPTION
0924   REF   3  LAST  170   06,3131  0 3124 0           TC     SETDESMD

09241  REF   3  LAST  170   06,3132  0 3101 1  ZTOCSC   TC     ZOPFINI         SEE IF ZOPT PROCESSING
09242  REF   2  LAST  171   06,3133  0 3142 0           TC     MANTOCSC +3     NO- RETURN TO COARS OPT
09243  REF   8  LAST  170   06,3134  0 5671 1           TC     ALARM           ZOPT PROCESSING- ALARM
09244                       06,3135   00116 1           OCT    00116
09245  REF   2  LAST  170   06,3136  0 3104 1           TC     CANZOPT         CANCEL ZOPT
0925   REF   5  LAST  160   06,3137  3 4772 1  MANTOCSC CAF    ZERO            CANCEL ZOPT RETURN OPTION IF SET
0926   REF   5  LAST  171   06,3140  55'331 0           TS     WTOPTION
0927   REF   3  LAST  171   06,3141  55'332 0           TS     ZOPTCNT

0935   REF   3  LAST  170   06,3142  0 3154 1    +3     TC     CSCTOMAN
0936   REF   5  LAST  171   06,3143  11'354 0  CSCDES   CCS    SWSAMPLE        SEE IF SWITCH STILL AT CSC
0937   REF   4  LAST  171   06,3144  0 3124 0           TC     SETDESMD        STILL AT CSC
0938   REF   4  LAST  171   06,3145  0 3154 1           TC     CSCTOMAN        MANUAL
0939   REF   1              06,3146  3 4763 1  CSCTOZOP CAF    OCT40           ZOPTICS-INITIALIZE FOR ZOPT
0940   REF   4  LAST  171   06,3147  55'332 0           TS     ZOPTCNT
0941   REF   1              06,3150  0 3213 1    +2     TC     INITZOPT
09412  REF   1              06,3151  0 4077 0           TC     NOOPRATE
09414  REF   1              06,3152  0 3257 1           TC     ECDISAB
09416  REF   5  LAST  171   06,3153  0 3124 0           TC     SETDESMD
0942   REF   2  LAST  169   06,3154  11'323 0  CSCTOMAN CCS    OPTIND          IS THE OPTICS IN USE
0943   REF   1              06,3155  0 3161 1           TC     CANCOARS        YES DISABLE OPTICS ERR CNTRS,SET TVC
0944   REF   2  LAST  171   06,3156  0 3161 1           TC     CANCOARS        ENABLE BIT IF IN MANUAL AND REENABLE
0945                        06,3157  0 3160 0           TC     +1              OPTICS ERR CNTRS
0946   REF   6  LAST  171   06,3160  0 3124 0           TC     SETDESMD        NO NORMAL EXIT
0947   REF   6  LAST  171   06,3161  3 4772 1  CANCOARS CAF    ZERO
0948   REF   1              06,3162  54 740 0           TS     TOLD
0949   REF   1              06,3163  54 741 1           TS     SOLD
0950   REF   2  LAST  171   06,3164  0 3257 1           TC     ECDISAB         DISABLE OP ERR CNTRS
0951   REF   2  LAST  156   06,3165  3 6211 0           CA     SIX             ENABLE ERR CNTRS AFTER 60 MS
0952   REF   3  LAST  170   06,3166  0 5223 1           TC     TWIDDLE
0953   REF   1              06,3167   03263 0           ADRES  ECENAB
0955   REF   7  LAST  171   06,3170  0 3124 0           TC     SETDESMD
0973   REF   7  LAST  171   06,3171  3 4772 1  ENDZOPT  CA     ZERO
09731  REF   2  LAST  135   06,3172  54 036 0           TS     CDUS            ZERO IN CDUS, -20 IN CDUT
09732  REF   1              06,3173  55'327 1           TS     ZONE            INITIALIZE SHAFT MONITOR ZONE
09733  REF   1              06,3174  4 3671 0           CS     20DEGS
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0973*  REF   1               06,3175  54 035 0            TS      CDUT
0974   REF  18  LAST  170    06,3176  4 4770 1            CS      BIT1          TURN OFF ZERO OCDU
0975                         06,3177  0 0006 1            EXTEND
0976   REF  13  LAST  170    06,3200  03 012 1            WAND    CHAN12
0977   REF   2  LAST  170    06,3201  3 4124 1            CAF     200MS         DELAY 200MS FOR CDUS TO RESYNCHRONIZE
0978   REF   3  LAST  151    06,3202  0 5260 0            TC      VARDELAY

0979   REF  12  LAST  170    06,3203  4 1337 0            CS      OPTMODES      SHOW ZOPTICS SINCE LAST FRESH START
0980   REF   1               06,3204  7 4757 1            MASK    ZROPTFIN      OR RESTART
0981   REF  13  LAST  172    06,3205  27'337 0            ADS     OPTMODES

0982   REF   3  LAST  171    06,3206  4 6211 1            CS      SIX
0983   REF  14  LAST  172    06,3207  7 1337 0            MASK    OPTMODES
0984   REF  15  LAST  172    06,3210  55'337 0            TS      OPTMODES

0985   REF   2  LAST  169    06,3211  0 3221 0            TC      OCDUFTST      CHECK OCDU FAIL BIT AFTER ENABLE

0986   REF   3  LAST  152    06,3212  0 5314 1            TC      TASKOVER

0992   REF   8  LAST  171    06,3213  3 4772 1  INITZOPT  CAF     ZERO          INITIALIZE ZOPTICS-INHIBIT OCDUFAIL
0993   REF   6  LAST  171    06,3214  55'331 0            TS      WTOPTION      AND SHOW OPTICS PROCESSING
0994   REF  16  LAST  172    06,3215  4 1337 0            CS      OPTMODES      SET ZERO OPTICS PROCESSING
0995   REF   4  LAST  172    06,3216  7 6211 1            MASK    SIX               OPTICS CDU FAIL INHIBITED
0996   REF  17  LAST  172    06,3217  27'337 0            ADS     OPTMODES
0997   REF   7  LAST  170    06,3220  0 0002 0            TC      Q
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L        T4RUPT PROGRAM                                                                       USER'S PAGE NO.  33     E6 S3

0998     REF  15  LAST   85   06,3221  3 4762 0  OCDUFTST CAF    BIT7             SEE IF OCDUFAIL ON OR OFF
0999                          06,3222  0 0006 1           EXTEND
1000     REF   3  LAST  169   06,3223  02 030 0           RAND   CHAN30
1001     REF  29  LAST  169   06,3224  10 000 0           CCS    A
1002     REF   1              06,3225  1 3247 1           TCF    OPFAILOF         OCDUFAIL LIGHT OFF

1003     REF   2  LAST  170   06,3226  3 4767 0           CAF    OCDUINHT         OCDUFAIL LIGHT ON UNLESS INHIBITED
1004     REF  18  LAST  172   06,3227  7 1337 0           MASK   OPTMODES
1005     REF  30  LAST  173   06,3230  10 000 0           CCS    A
1006     REF   8  LAST  172   06,3231  0 0002 0           TC     Q                OCDUFAIL INHIBITED

1007     REF  15  LAST   84   06,3232  3 4761 0  OPFAILON CAF    BIT8             ON BIT
1008     REF  13  LAST  167   06,3233  6 1241 1           AD     DSPTAB +11D
1009     REF  16  LAST  173   06,3234  7 4761 1           MASK   BIT8
1010                          06,3235  0 0006 1  SETOFF   EXTEND
1011     REF   1              06,3236  1 6711 1           BZF    TCQ              NO CHANGE

1012     REF   5  LAST  169   06,3237  54 001 1           TS     L
1013     REF  14  LAST  173   06,3240  3 1241 1           CA     DSPTAB +11D
1014                          06,3241  0 0006 1           EXTEND
1015     REF   7  LAST  169   06,3242  06 001 0           RXOR   LCHAN
1016     REF   2  LAST  157   06,3243  7 4750 0           MASK   POSMAX
1017     REF  17  LAST  158   06,3244  6 4752 0           AD     BIT15            SHOW ACTION WANTED
1018     REF  15  LAST  173   06,3245  55'241 0           TS     DSPTAB +11D
1019     REF   9  LAST  173   06,3246  0 0002 0           TC     Q

1020     REF   3  LAST  168   06,3247  3 4770 0  OPFAILOF CAF    LMPTSTBT         DONT TURN OFF IF LAMP TEST
1021     REF  16  LAST  168   06,3250  7 1334 0           MASK   IMODES33
1022     REF  31  LAST  173   06,3251  10 000 0           CCS    A
1023     REF  10  LAST  173   06,3252  0 0002 0           TC     Q                LAMP TEST IN PROGRESS

1024     REF  17  LAST  173   06,3253  3 4761 0           CAF    BIT8             TURN OFF OCDUFAIL LIGHT
1025     REF  16  LAST  173   06,3254  7 1241 0           MASK   DSPTAB +11D
1026     REF   1              06,3255  1 3235 1           TCF    SETOFF

102605   REF  11  LAST  173   06,3256  24 002 0  OPDISAB  INCR   Q
10261    REF  14  LAST   86   06,3257  4 4767 1  ECDISAB  CS     BIT2
102615                        06,3260  0 0006 1           EXTEND
10262    REF  14  LAST  172   06,3261  03 012 1           WAND   CHAN12
102625   REF  12  LAST  173   06,3262  0 0002 0           TC     Q
10263    REF   6  LAST  171   06,3263  3 1354 1  ECENAB   CA     SWSAMPLE
102635                        06,3264  0 0006 1           EXTEND
10264                         06,3265  1 3267 0           BZF    +2               MANUAL SET TVC ENABLE
102645   REF   1              06,3266  1 3272 1           TCF    ECENAB1
10265    REF  18  LAST  173   06,3267  3 4761 0           CAF    BIT8
102655                        06,3270  0 0006 1           EXTEND
10266    REF  15  LAST  173   06,3271  05 012 1           WOR    CHAN12
102665   REF  15  LAST  173   06,3272  3 4767 0  ECENAB1  CAF    BIT2
10267                         06,3273  0 0006 1           EXTEND
102675   REF  16  LAST  173   06,3274  05 012 1           WOR    CHAN12
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 10266  REF   4  LAST  172  06,3275  0 5314 1            TC       TASKOVER
 1027   REF   1                4775             OCT13      =        ELEVEN
 1028   REF   3  LAST  167     5001             OCTHIRTY EQUALS BITS4&5
 1030   REF  18  LAST  156     4763             OCT40    EQUALS BIT6
 1031   REF   1                4124             200MS    EQUALS OCT24
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P1032   OPTICS CCU DRIVING PROGRAM

 1034   REF   1               10,2000                       SETLOC OPTDRV
 1035                         10,2000                       BANK
 1036   REF   1                                             COUNT* $$/SXT

R1037   SHAFT STEP MONITOR-ZONE UPDATE

 1038   REF   3  LAST  171    10,2000  3 0036 1  OPTDRIVE CA      CDUS           GRAB OPTIC SHAFT CDU
 1039   REF   6  LAST  173    10,2001  54 001 1           TS      L
 1040   REF  32  LAST  173    10,2002  10 000 0           CCS     A              GET ABS(CDUS)
 1041   REF   1               10,2003  6 7673 1           AD      13,14,15
 1042                         10,2004  1 2006 1           TCF     +2             ABS(CDUS) - 45 DEG
 1043                         10,2005  1 2003 1           TCF     -2
 1044                         10,2006  0 0006 1           EXTEND
 1045   REF   1               10,2007  6 2016 1           BZMF    OZONE          LESS THAN 45 DEG-SET ZONE 0
 1046   REF   2  LAST  171    10,2010  3 1327 0           CA      ZONE           IF ZONE ZERO, CHANGE TO + OR - OTHERWISE
 1047                         10,2011  0 0006 1           EXTEND                 DONT MESS WITH ZONE
 1048                         10,2012  1 2014 1           BZF     +2
 1049   REF   1               10,2013  1 2020 0           TCF     CONTDRVE       JUST CONTINUE
 1050   REF   7  LAST  175    10,2014  56 001 0           XCH     L              GREATER THAN 45 DEG-SET ZONE TO SIGN CDU
 1051   REF   2  LAST  175    10,2015  1 2017 1           TCF     OZONE +1
 1052   REF   9  LAST  172    10,2016  3 4772 1  OZONE    CAF     ZERO           ABS(CDUS) LESS THEN 90 DEG-ZONE ZERO
 1053   REF   3  LAST  175    10,2017  55'327 1           TS      ZONE
 1054   REF   1                                           COUNT* $$/T4RPT
 1055   REF   3  LAST  171    10,2020  11'323 0  CONTDRVE CCS     OPTIND
 1056                         10,2021  0 2025 1           TC      +4             WORK COARS OPTICS
 1057                         10,2022  0 2025 1           TC      +3             WORK COARS OPTICS
 1058   REF   2  LAST  171    10,2023  0 4077 0           TC      NOOPRATE       NO OPT  DISABLE   TVC
 1059   REF   7  LAST  171    10,2024  0 5323 0           TC      RESUME         NO OPT

 1060   REF   7  LAST  173    10,2025  3 1354 1           CA      SWSAMPLE       SEE IF SWITCH AT CMC
 1061                         10,2026  0 0006 1           EXTEND
 1062   REF   1               10,2027  1 2226 1           BZF     TVCBCK
 10623                        10,2030  0 0006 1           EXTEND
 10625  REF   8  LAST  175    10,2031  6 5323 0           BZMF    RESUME
 1063   REF   2  LAST  172    10,2032  3 4757 0  RATEDRV1 CAF     ZRUPTFIN       SEE IF OCDUS ZEROED SINCE LAST FSTART
 1064   REF  19  LAST  173    10,2033  7 1337 0           MASK    OPTMODES
 1065   REF  33  LAST  175    10,2034  10 000 0           CCS     A
 1066                         10,2035  0 2040 1           TC      +3
 1067   REF   9  LAST  171    10,2036  0 5671 1           TC      ALARM          OPTICS NOT ZEROED
 1068                         10,2037   00120 1           OCT     00120

 1069   REF  16  LAST  173    10,2040  3 4767 0           CA      BIT2           SEE IF ERR CNTS ENABLED
 1070                         10,2041  0 0006 1           EXTEND
 1071   REF  17  LAST  173    10,2042  02 012 0           RAND    CHAN12
 1072                         10,2043  0 0006 1           EXTEND
 1073   REF   1               10,2044  1 2204 1           BZF     SETBIT         CNTS NOT ENABLED-DO IT AND RESUME

 1074   REF   5  LAST  154    10,2045  3 4770 0           CAF     ONE            INITIALIZE OPTIND
 1075   REF   4  LAST  175    10,2046  55'323 0  OPT2      TS      OPTIND
 1078   REF   5  LAST  176    10,2047  51'323 1  GETOPCMD  INDEX   OPTIND
 1079   REF   1               10,2050  3 1312 0            CA      DESOPTT        PICK UP DESIRED OPT ANGLE
 1080                         10,2051  0 0006 1            EXTEND
 1081   REF   6  LAST  176    10,2052  5 1323 1            INDEX   OPTIND
 1082   REF   2  LAST  172    10,2053  20 035 0            MSU     COUT           GET DIFFERENCE
 1083                         10,2054  0 0006 1            EXTEND
 1084   REF  17  LAST  160    10,2055  7 4754 1            MP      BIT13
 1085   REF   8  LAST  175    10,2056  56 001 0            XCH     L
 1086                         10,2057  6 0000 1            DOUBLE
 1087   REF   3  LAST   69    10,2060  54 061 1            TS      ITEMP1
 1088                         10,2061  1 2063 1            TCF     +2             NO OVFL

 1089   REF   9  LAST  176    10,2062  26 001 1            ADS     L              WITH OVFL
 1090   REF   7  LAST  176    10,2063  51'323 1  STORCMD   INDEX   OPTIND
 1091   REF   1               10,2064  23'325 1            LXCH    COMMANDO       STORE COMMAND
 1092   REF   8  LAST  176    10,2065  11'323 0            CCS     OPTIND
 1093   REF   1               10,2066  1 2140 1            TCF     TRUNCMD        GET TRUN COMMAND
 1094   REF   4  LAST  176    10,2067  54 061 1            TS      ITEMP1         INITIALIZE SEND INDICATOR TO ZERO
 1095   REF   2 LAST  175 TO  175:     16      16*         COUNT*  $$/SXT

R1096   SHAFT STOP AVOIDANCE

 10961  REF   4  LAST  175    10,2070  10 036 0            CCS     CDUS           IF CDUS GREATER THAN +OR- 90 DEG CHECK
 10962  REF   1               10,2071  6 4751 0            AD      NEG1/2          FOR POSSIBLE STOP PROBLEM
 10963                        10,2072  1 2074 1            TCF     +2
 10964                        10,2073  1 2071 1            TCF     -2
 10965                        10,2074  0 0006 1            EXTEND
 10966  REF   1               10,2075  6 2124 1            BZMF    CMDSETUP       CDUS LESS THAN 90 DEG, NO PROBLEMS

 1097   REF   4  LAST  175    10,2076  3 1327 0            CA      ZONE
 1098                         10,2077  0 0006 1            EXTEND
 1099   REF   2  LAST  176    10,2100  1 2124 0            BZF     CMDSETUP       ZONE=3,NORMAL COMMAND
 1100   REF  18  LAST  173    10,2101  7 4752 1            MASK    BIT15          GRAB SIGN OF ZONE
 1101   REF  10  LAST  176    10,2102  54 001 1            TS      L
 1102   REF   2  LAST  176    10,2103  3 1326 1            CA      COMMANDO +1
 1103   REF  19  LAST  176    10,2104  7 4752 1            MASK    BIT15          GRAB SIGN OF SHAFT COMMAND
 1104                         10,2105  0 0006 1            EXTEND
 1105   REF   8  LAST  173    10,2106  06 001 0            RXOR    LCHAN
 1106   REF  34  LAST  175    10,2107  10 000 0            CCS     A
 1107   REF   3  LAST  176    10,2110  1 2124 0            TCF     CMDSETUP       SIGN ZONE NOT EQUAL TO SIGN COMMAND
 1108   REF   1               10,2111  11'313 0            CCS     DESOPTS        SEE IF DESOPTS BETWEEN -90 AND +90
 1109   REF   2  LAST  176    10,2112  6 4751 0            AD      NEG1/2
 1110                         10,2113  1 2115 1            TCF     +2             ABS(DESOPTS) - 90 DEG
 1111                         10,2114  1 2112 0            TCF     -2
 1112                         10,2115  0 0006 1            EXTEND
 1113                         10,2116  6 2120 0            BZMF    +2             DESOPTS IN FIRST OR FOURTH QUAD
 1114   REF   4  LAST  176    10,2117  1 2124 0            TCF     CMDSETUP
 1115   REF   3  LAST  176    10,2120  4 1326 0            CS      COMMANDO +1    REVERSE REGULAR COMMAND
 1116   REF   4  LAST  176    10,2121  55'326 0            TS      COMMANDO +1
 11163  REF  10  LAST  175    10,2122  3 4772 1            CAF      ZERO              ZERO DESIRED SHAFT RATE
 11166  REF   1               10,2123  54 736 1            TS       SRATE
 1117   REF   2 LAST  175 TO  176:     40     40*          COUNT*   $$/T4RPT

 1118   REF   8  LAST  175    10,2124  3 1354 1  CMDSETUP  CA       SWSAMPLE
 11182                        10,2125  0 0006 1            EXTEND
 11184  REF   1               10,2126  1 2212 0            BZF      RATEDRV2
 11186  REF   3  LAST  175    10,2127  0 4077 0            TC       NOOPRATE          DISABLE   TVC DAP BIT
 11188  REF   6  LAST  175    10,2130  3 4770 0            CAF      ONE               SET OPTIND
 1119   REF   9  LAST  176    10,2131  55'323 0  CMDSET    TS       OPTIND
 1120   REF  35  LAST  176    10,2132  50 000 1            INDEX    A
 1121   REF   5  LAST  176    10,2133  11'325 0            CCS      COMMANDO          GET SIGN OF COMMAND
 1122   REF   1               10,2134  0 2153 1            TC       POSOPCMD
 1123   REF   1               10,2135  0 2160 1            TC       NEXTOPT +1        ZERO COMMAND-SKIP SEND INDICATOR
 1124   REF   1               10,2136  0 2170 0            TC       NEGOPCMD
 1125   REF   2  LAST  177    10,2137  0 2160 1            TC       NEXTOPT +1        ZERO COMMAND

 1126   REF  10  LAST  177    10,2140  55'323 0  TRUNCMD   TS       OPTIND
 11265  REF   3  LAST  176    10,2141  4 0035 0            CS       CDUT              IF COMMAND GREATER THAN 45 DEG- COMMAND
 1127   REF   2  LAST  176    10,2142  6 1312 0            AD       DESOPTT           45 DEG
 1128   REF  13  LAST  173    10,2143  54 002 1            TS       Q
 1129   REF   1               10,2144  0 2047 0            TC       GETOPCMD          LESS THAN 45 DEG-NORMAL OPERATION

 1130   REF  36  LAST  177    10,2145  10 000 0            CCS      A                 GREATER THAN 45 DEG-USE OPSMAX WITH
 1131   REF   3  LAST  173    10,2146  3 4750 1            CA       POSMAX            CORRECT SIGN
 1132                         10,2147  0 2151 0            TC       +2
 1133   REF   4  LAST  177    10,2150  4 4750 0            CS       POSMAX
 1134   REF  11  LAST  176    10,2151  54 001 1            TS       L
 1135   REF   1               10,2152  0 2063 0            TC       STORCMD
 1136   REF   1               10,2153  6 2211 1  POSOPCMD  AD       MAXPLS1
 1137                         10,2154  0 0006 1            EXTEND
 1138   REF   1               10,2155  6 2175 0            BZMF     DELOPCMD          COMMAND LESS THAN MAX PULSE
 1139   REF   1               10,2156  4 2210 1            CS       MAXPLS            GREATER THAN MAX PULSE-USE MAX PULSE

 1140   REF   5  LAST  176    10,2157  24 061 0  NEXTOPT   INCR     ITEMP1            SET SEND INDICATOR
 1141   REF   2  LAST  143    10,2160  6 4771 1    +1      AD       NEG0              MAKE SURE ZERO COMMAND IS -ZERO
 1142   REF  11  LAST  177    10,2161  51'323 1            INDEX    OPTIND
 1143   REF   2  LAST   40    10,2162  54 053 0            TS       CDUTCMD           STORE PULSE IN SEND REG

 1144   REF  12  LAST  177    10,2163  11'323 0            CCS      OPTIND
 1145   REF   1               10,2164  0 2131 0            TC       CMDSET            GET NEXT OPT
 1146   REF   6  LAST  177    10,2165  10 061 1            CCS      ITEMP1            ARE ANY PULSES TO GO
 1147   REF   1               10,2166  1 2200 0            TCF      SENDOCMD          YES-SEND EM
 1148   REF   9  LAST  175    10,2167  0 5323 0            TC       RESUME            NO

 1149   REF   2  LAST  177    10,2170  6 2211 1  NEGOPCMD  AD       MAXPLS1
 1150                         10,2171  0 0006 1            EXTEND
 1151   REF   2  LAST  177    10,2172  6 2175 0            BZMF     DELOPCMD          LESS THAN MAX PULSE
 1152   REF   2  LAST  177    10,2173  3 2210 0            CA       MAXPLS            MAX PULSES
 1153   REF   3  LAST  177    10,2174  1 2157 1            TCF      NEXTOPT
 1154    REF  13  LAST  177   10,2175  51'323 1  DELOPCMD INDEX   OPTIND
 1155    REF   6  LAST  177   10,2176  57'325 1           XCH     COMMANDO          SET UP SMALL COMMAND
 1156    REF   4  LAST  177   10,2177  1 2157 1           TCF     NEXTOPT

 1157    REF   1              10,2200  3 5050 1  SENDOCMD CAF     11,12             SEND OCDU DRIVE COMMANDS
 1158                         10,2201  0 0006 1           EXTEND
 1159    REF   3  LAST  161   10,2202  05 014 1           WOR     CHAN14
 1160    REF  10  LAST  177   10,2203  0 5323 0           TC      RESUME

 1161    REF  17  LAST  175   10,2204  3 4767 0  SETBIT   CAF     BIT2              ENABLE OCDU ERR CNTS
 1162                         10,2205  0 0006 1           EXTEND
 1163    REF  18  LAST  175   10,2206  05 012 1           WOR     CHAN12
 1164    REF  11  LAST  178   10,2207  0 5323 0           TC      RESUME            START  COARS NEXT TIME AROUND

 1165                         10,2210   77654 0  MAXPLS   DEC     -83               WAS -165
 1166                         10,2211   77655 1  MAXPLS1  DEC     -82               WAS -164
 1167    REF   1                 5050            11,12    EQUALS  PRIO6
 1168    REF   2  LAST  171   10,2212  4 0741 1  RATEDRV2 CS      SOLD
 11681   REF   2  LAST  177   10,2213  6 0736 0           AD      SRATE
 1169    REF   3  LAST  177   10,2214  6 4771 1           AD      NEG0
 1170    REF  12  LAST  177   10,2215  54 001 1           TS      L
 11713   REF   2  LAST  171   10,2216  4 0740 0           CS      TOLD
 11714   REF   1              10,2217  6 0735 0           AD      TRATE
 1172    REF   4  LAST  178   10,2220  6 4771 1           AD      NEG0
 1173    REF   3  LAST  177   10,2221  52 054 1           DXCH    CDUTCMD
 11731                        10,2222  0 0006 1           EXTEND
 11732   REF   2  LAST  178   10,2223  3 0736 0           DCA     TRATE
 11733   REF   3  LAST  178   10,2224  52 741 1           DXCH    TOLD
 1177    REF   2  LAST  177   10,2225  0 2200 1           TC      SENDOCMD
 1183    REF  19  LAST  173   10,2226  3 4761 0  TVCBCK   CAF     BIT8              IS TVC BIT ENABLED
 1184                         10,2227  0 0006 1           EXTEND
 1185    REF  19  LAST  178   10,2230  02 012 0           RAND    CHAN12
 1186                         10,2231  0 0006 1           EXTEND
 1187                         10,2232  1 2234 1           BZF     +2
 1188    REF   1              10,2233  0 2032 1           TC      RATEDRV1
 1189    REF  20  LAST  178   10,2234  3 4761 0           CAF     BIT8              NO TURN IT ON
 1190                         10,2235  0 0006 1           EXTEND
 1191    REF  20  LAST  178   10,2236  05 012 1           WOR     CHAN12
 1192    REF  12  LAST  178   10,2237  0 5323 0           TC      RESUME
 1193    REF   1                 4000                     SETLOC  STOPRAT
 1194                            4077                     BANK
 11945   REF   1                                          COUNT*  $$/T4RPT
 1195    REF  21  LAST  178      4077  4 4761 1  NOOPRATE CS      BIT8
 1196                            4100  0 0006 1           EXTEND
 1197    REF  21  LAST  178      4101  03 012 1           WAND    CHAN12
 1198    REF  14  LAST  177      4102  0 0002 0           TC      Q
```

```
L       DOWNLINK LISTS                                                                 USER'S PAGE NO.  1      OF 53

 0002   REF   1                 05,2000                    SETLOC DOWNTELM
 0003                           05,2000                    BANK

 0004   REF   1                    0337                    EBANK= DNTMBUFF

R0005   SPECIAL DOWNLINK OP CODES
A0006                                                      OP CODE ADDRESS(EXAMPLE) SENDS..      BIT 15  BITS 14-12 BITS 11
A0007                                                                                                                   -0
A0008                                                      ------ ----------       ----------    ------  ---------- -------
A0009                                                                                                                   --
A0010                                                      1DNADR TIME2            (2 AGC WDS)     0         0      ECADR
A0011                                                      2DNADR TEPHEM           (4 AGC WDS)     0         1      ECADR
A0012                                                      3DNADR VGBODY           (6 AGC WDS)     0         2      ECADR
A0013                                                      4DNADR STATE            (8 AGC WDS)     0         3      ECADR
A0014                                                      5DNADR UPBUFF           (10AGC WDS)     0         4      ECADR
A0015                                                      6DNADR DSPTAB           (12AGC WDS)     0         5      ECADR
A0016                                                      DNCHAN 30               CHANNELS        0         7      CHANNEL
A0017                                                                                                               ADDRESS
A0018                                                      DNPTR  NEXTLIST         POINTS TO NEXT  0         6      ADRES
A0019                                                                               LIST.

R0020   DOWNLIST FORMAT DEFINITIONS AND RULES-
R0021   1. END OF A LIST = -XDNADR (X = 1 TO 6), -DNPTR, OR -DNCHAN.
R0022   2. SNAPSHOT SUBLIST = LIST WHICH STARTS WITH A -1DNADR.
R0023   3. SNAPSHOT SUBLIST CAN ONLY CONTAIN 1DNADRS.
R0024   4. TIME2 1DNADR MUST BE LOCATED IN THE CONTROL LIST OF A DOWNLIST.
R0025   5. ERASABLE DOWN TELEMETRY WORDS SHOULD BE GROUPED IN SEQUENTIAL
R0026     LOCATIONS AS MUCH AS POSSIBLE TO SAVE STORAGE USED BY DOWNLINK LISTS.
R00261  6. THE DOWNLINK LISTS(INCLUDING SUBLISTS) ARE ORGANIZED SUCH THAT THE ITEMS LISTED FIRST(IN FRONT OF FBANK) ARE
R00263     SENT FIRST. EXCEPTION--- SNAPSHOT SUBLISTS. IN THE SNAPSHOT SUBLISTS THE DATA REPRESENTED BY THE FIRST
R00265     11 1DNADRS IS PRESERVED (IN ORDER) IN DNTMBUFF AND SENT BY THE NEXT 11 DOWNRUPTS. THE DATA REPRESENTED BY THE
R00267     LIST IS SENT IMMEDIATELY.
R00268

 0027   REF   1                                             COUNT* $$/DLIST
 0028                              0007             ERASZERO EQUALS 7
 0029   REF   1                    0007             SPARE    EQUALS ERASZERO            USE SPARE TO INDICATE AVAILABLE SPACE
 0030                           05,2000   77340 0   LOWIDCOD OCT    77340               LOW ID CODE

 0031   REF   1                 05,2113             NOMDNLST EQUALS CMCSTADL            FRESH START AND POST P27 DOWNLIST
 0032   REF   1                 05,2211             UPDNLIST EQUALS CMENTRDL            UPDATE PROGRAM (P27) DOWNLIST
```

```
L        DOWNLINK LISTS                                                                     USER'S PAGE NO.  2      E0 S3

P0033    CSM POWERED FLIGHT DOWNLIST

R0034    --------------------------CONTROL LIST-----------------------------------

 0035                             05,2001            CMPOWEDL EQUALS
 0036    REF   1                  05,2001   32043 1           DNPTR   CMPOWE01         COLLECT SNAPSHOT
 0037    REF   2  LAST  179       05,2002   24337 0           6DNADR DNTMBUFF          SEND SNAPSHOT
 0038    REF   1                  05,2003   32052 1           DNPTR   CMPOWE02         COLLECT SECOND SNAPSHOT
 0039    REF   3  LAST  180       05,2004   14337 0           4DNADR DNTMBUFF          SEND SNAPSHOT
 0040    REF   1                  05,2005   32057 1           DNPTR   CMPOWE03         COMMON DATA
 0041    REF   5  LAST  137       05,2006   03412 0           1DNADR TIG               TIG,+1
 0042    REF   2  LAST  121       05,2007   03422 0           1DNADR DELLT4            DELLT4,+1
 0043    REF   2  LAST  121       05,2010   13414 1           3DNADR RTARG             RTARG,+1,+2,...+5
 0044    REF   2  LAST  121       05,2011   03427 0           1DNADR TGO               TGO,+1
 0045    REF   2  LAST   79       05,2012   01104 0           1DNADR PIPTIME1          PIPTIME1,+1
 0046    REF   7  LAST  136       05,2013   11314 1           3DNADR DELV              DELV,+1,...+4,+5
 0047    REF   2  LAST  135       05,2014   03023 0           1DNADR PACTOFF           PACTOFF,YACTOFF
 0048    REF   3  LAST  136       05,2015   03223 1           1DNADR PCMD              PCMD,YCMD
 0049    REF   2  LAST  128       05,2016   03702 1           1DNADR CSTEER            CSTEER,GARBAGE
 0050    REF   2  LAST  105       05,2017   12444 0           3DNADR DELVEET1          CSI DELTA VELOCITY COMPONENTS   (31-33)
 0053    REF   2  LAST   36       05,2020   25733 1           6DNADR REFSMMAT          REFSMMAT,+1,...+10,+11
 0054    REF   1                  05,2021   32061 1           DNPTR   CMPOWE04         COMMON DATA
 0055    REF   2  LAST  135       05,2022   00024 1           1DNADR TIME2             TIME2,TIME1
 0056    REF   1                  05,2023   32063 0           DNPTR   CMPOWE05         COLLECT SNAPSHOT
 0057    REF   4  LAST  180       05,2024   24337 0           6DNADR DNTMBUFF          SEND SNAPSHOT
 0058    REF   2  LAST  180       05,2025   32052 1           DNPTR   CMPOWE02         COLLECT SNAPSHOT
 0059    REF   5  LAST  180       05,2026   14337 0           4DNADR DNTMBUFF          SEND SNAPSHOT
 0060    REF   2  LAST  180       05,2027   32057 1           DNPTR   CMPOWE03         COMMON DATA
 0061    REF   1                  05,2030   32075 1           DNPTR   CMPOWE06         COMMON DATA
 0062    REF   3  LAST  134       05,2031   03743 1           1DNADR ELEV              ELEV,+1
 006205  REF   2  LAST  133       05,2032   03753 0           1DNADR CENTANG           CENTANG,+1
 00621   REF   1                  05,2033   00007 0           1DNADR SPARE
 0063    REF  13  LAST   67       05,2034   00106 0           1DNADR STATE +1 0        FALGWRDS 10 AND 11
 0064    REF   3  LAST  136       05,2035   01021 0           1DNADR TEVENT            TEVENT,+1
 0065    REF   4  LAST  180       05,2036   03223 1           1DNADR PCMD              PCMD,YCMD
 0066    REF  20  LAST  175       05,2037   01337 1           1DNADR OPTMODES          OPTMODES,HOLDFLAG
 0067    REF   1                  05,2040   32101 0           DNPTR   CMPOWE07         COMMON DATA
 0068    REF   5  LAST  137       05,2041   13720 0           3DNADR VGTIG             VGTIG,+1,...+4,+5
 0069    REF   2  LAST  129       05,2042   64111 1          -3DNADR DELVEET2          COH DELTA VELOCITY COMPONENTS   (98-100)
R0072    ---------------------------SUB LISTS-------------------------------

 0073    REF   1                  05,2043   76746 0  CMPOWE01-1DNADR RN +2             RN+2,+3              SNAPSHOT DATA
 0074    REF   2  LAST  180       05,2044   01033 0           1DNADR RN +4             RN+4,+5
 0075    REF   1                  05,2045   01035 0           1DNADR VN                VN,+1
 0076    REF   2  LAST  180       05,2046   01037 1           1DNADR VN +2             VN+2,+3
 0077    REF   3  LAST  180       05,2047   01041 0           1DNADR VN +4             VN+4,+5
 0078    REF   2  LAST   78       05,2050   01043 1           1DNADR PIPTIME           PIPTIME,+1
 0079    REF   3  LAST  180       05,2051   76750 1          -1DNADR RN                RN,+1

 0080    REF   3  LAST  155       05,2052   77743 1  CMPOWE02-1DNADR CDUZ              CDUZ,CDUT                  SNAPSHOT DATA
```

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L         DOWNLINK LISTS                                                                   USER'S PAGE NO.  3       E0 S3

 0081    REF   5  LAST  137   05,2053   03133 0              1DNADR ADOT             ADOT,+1/OGARATE,+1
 0082    REF   6  LAST  181   05,2054   03135 0              1DNADR ADOT +2          ADOT+2,+3/OMEGAB+2,+3
 0083    REF   7  LAST  181   05,2055   03137 1              1DNADR ADOT +4          ADOT+4,+5/OMEGAB+4,+5
 0084    REF   2  LAST  135   05,2056   77745 1             -1DNADR CDUX             CDUX,CDUY

 0085    REF   4  LAST  136   05,2057   07076 1   CMPOWE03 2DNADR AK               AK,AK1,AK2,RCSFLAGS           COMMON DATA
 0086    REF   5  LAST  137   05,2060   70605 0            -2DNADR THETADX          THETADX,THETADY,THETADZ,GARBAGE

 0087    REF  14  LAST  180   05,2061   20074 0   CMPOWE04 5DNADR STATE            FLAGWRD0 THRU FLAGWRD9      COMMON DATA
 0088    REF  17  LAST  173   05,2062   52551 1            -6DNADR DSPTAB           DISPLAY TABLES

 0089    REF   1              05,2063   76056 0   CMPOWE05-1DNADR R-OTHER +2       R-OTHER+2,+3              SNAPSHOT DATA
 0090    REF   2  LAST  181   05,2064   01723 0              1DNADR R-OTHER +4       R-OTHER+4,+5
 0091    REF   1              05,2065   01725 0              1DNADR V-OTHER          V-OTHER,+1
 0092    REF   2  LAST  181   05,2066   01727 1              1DNADR V-OTHER +2       V-OTHER+2,+3
 0093    REF   3  LAST  181   05,2067   01731 0              1DNADR V-OTHER +4       V-OTHER+4,+5
 0094    REF   3  LAST  136   05,2070   01642 0              1DNADR T-OTHER          T-OTHER,+1
 0095    REF   3  LAST  181   05,2071   76060 0             -1DNADR R-OTHER          R-OTHER,+1

 0096    REF   2  LAST  135   05,2072   00775 1   CMPOWE06 1DNADR OPTION1          OPTION1,2           COMMON DATA
 00961   REF   2  LAST   89   05,2073   01516 1            1DNADR TET               TET,+1
 00962   REF   6  LAST  181   05,2074   07172 1            2DNADR THETADX           THETADX,THETADY,THETEDZ,GARBAGE
 00963   REF   1              05,2075   01432 0   CMPOWE08 1DNADR RSBBQ            RSBBQ,+1
 0097                         05,2076   34076 1            DNCHAN 76                CHANNELS 76(GARBAGE),77
 00971   REF   3  LAST  169   05,2077   04374 0            2DNADR C31FLWRD          C31FLWRD,FAILREG,+1,+2
 0098    REF   5  LAST  176   05,2100   73741 1           -2DNADR CDUS             CDUS,PIPAX,PIPAY,PIPAZ

 0099    REF   2  LAST  135   05,2101   03072 1   CMPOWE07 1DNADR LEMMASS          LEMMASS,CSMMASS          COMMON DATA
 0100    REF   4  LAST  155   05,2102   03065 1            1DNADR DAPDATR1          DAPDATR1,DAPDATR2
 0101    REF   5  LAST  137   05,2103   07167 0            2DNADR ERRORX            ERRORX,ERRORY,ERRORZ,GARBAGE
 0102    REF   6  LAST  136   05,2104   13125 0            3DNADR WBODY             WBODY,...+5/OMEGAC,...+5
 0103    REF   2  LAST  135   05,2105   05306 1            2DNADR REDOCTR           REDOCTR,THETAD,+1,+2
 0104    REF  33  LAST  167   05,2106   01333 0            1DNADR IMODES30          IMODES30,IMODES33
 0105                         05,2107   34011 0   CMPOWE09 DNCHAN 11                CHANNELS 11,12
 0106                         05,2110   34013 1            DNCHAN 13                CHANNELS 13,14
 0107                         05,2111   34030 0            DNCHAN 30                CHANNELS 30,31
 0108                         05,2112   43745 0           -DNCHAN 32                CHANNELS 32,33

R0109    ----------------------------------------------------------------------------------
R0110    *** THE FOLLOWING IS A LIST OF LOCATIONS IN DOWNLINK LISTS
R0111    *** BUT NOT REFERENCED IN THE DIRECTORY BECAUSE THEY ARE NOT
R0112    *** THE FIRST LOCATION REFERENCED IN AN INSTRUCTION
R0113    *** THIS LIST SHOULD BE UPDATED WHEN ANY CHANGES ARE MADE TO LISTS.

A0114                                                               LOCATION         LIST NAME

 0115    REF   1              E6,1424              DL101      =     YACTOFF          CMPOWEDL
 0116    REF   2  LAST  109   E6,1624              DL102      =     YCMD
 0117    REF   2  LAST  140      0025              DL103      =     TIME1
```

```
L        DOWNLINK LISTS                                                        USER'S PAGE NO.   4      L  S3

 0118    REF   3  LAST  181   E6,1624            DL104      =      YCMD
 01185   REF   1                 1340            DL105      =      HOLDFLAG
 01186   REF   5  LAST  137   E7,1722            DL1055     =      VMAGI
 01187   REF   1              E7,1724            DL1056     =      VGTLI
 0119    REF   4  LAST  177      0035            DL106      =      CDUT           CMPOWE02
 0120    REF   2  LAST  136   E6,1533            DL107      =      OGARATE
 0121    REF   9  LAST  137   E6,1533            DL108      =      OMEGAB
 0122    REF   1                 0033            DL109      =      CDUY
 0123    REF   2  LAST  135   E6,1477            DL110      =      AK1            CMPOWE03
 0124    REF   2  LAST  135   E6,1500            DL111      =      AK2
 0125    REF   1              E6,1501            DL112      =      RCSFLAGS
 0126    REF   4  LAST  137   E6,1573            DL113      =      THETADY
 0127    REF   4  LAST  137   E6,1574            DL114      =      THETADZ
 0128    REF   1                 0776            DL115      =      OPTION2        CMPOWE06
 0129    REF   5  LAST  182   E6,1573            DL116      =      THETADY
 0130    REF   5  LAST  182   E6,1574            DL117      =      THETADZ
 0131    REF   1                 0375            DL118      =      FAILREG        CMPOWE08
 0132    REF   2  LAST  135      0037            DL119      =      PIPAX
 0133    REF   2  LAST  135      0040            DL120      =      PIPAY
 0134    REF   1                 0041            DL121      =      PIPAZ
 0136    REF   1              E6,1473            DL122      =      CSMMASS        CMPOWE07
 0137    REF   1              E6,1466            DL123      =      DAPDATR2
 0138    REF   5  LAST  137   E6,1570            DL124      =      ERRORY
 0139    REF   3  LAST  136   E6,1571            DL125      =      ERRORZ
 0140    REF  10  LAST  137   E6,1525            DL126      =      OMEGAC
 0141    REF  10  LAST  136      1307            DL127      =      THETAD
 0142    REF  17  LAST  173      1334            DL128      =      IMODES33
```

```
L        DOWNLINK LISTS                                                              USER'S PAGE NO.   5      E  53

P0143    CSM COAST AND ALIGNMENT DOWNLIST

R0144    ------------------------------CONTROL LIST-----------------------------

 0145                          05,2113                CMCSTADL EQUALS                     SEND ID BY SPECIAL CODING
 0146   REF    1               05,2113   32043 1               DNPTR    CMCSTA01          COLLECT SNAPSHOT
 0147   REF    6  LAST  180    05,2114   24337 0               6DNADR DNTMBUFF            SEND SNAPSHOT
 0148   REF    1               05,2115   32052 1               DNPTR    CMCSTA02          COLLECT SECOND SNAPSHOT
 0149   REF    7  LAST  183    05,2116   14337 0               4DNADR DNTMBUFF            SEND SNAPSHOT
 0150   REF    1               05,2117   32057 1               DNPTR    CMCSTA03          COMMON DATA
 0151   REF    6  LAST  180    05,2120   03412 0               1DNADR TIG                 TIG,+1
 0152   REF    3  LAST  135    05,2121   00302 0               1DNADR BESTI               BESTI,BESTJ
 0153   REF    3  LAST  136    05,2122   17674 1               4DNADR MARKDOWN            MARKDOWN,+1...+5,+6,GARBAGE
 0154   REF    1               05,2123   17460 0               4DNADR MARK2DWN            MARK2DWN,+1...+5,+6
 0155   REF    3  LAST  135    05,2124   06342 1               2DNADR HAPOX               HAPOX,+1,HPERX,+1
 0156   REF    3  LAST  180    05,2125   03023 0               1DNADR PACTOFF             PACTOFF, YACTOFF                     (30)
 0157   REF    6  LAST  180    05,2126   13720 0               3DNADR VGTIG               VGTIG,...+5
 0158   REF    3  LAST  180    05,2127   25733 1               6DNADR REFSMMAT            REFSMMAT,+1,...,+10,+11
 0159   REF    1               05,2130   32061 1               DNPTR    CMCSTA04          COMMON DATA
 0160   REF    3  LAST  180    05,2131   00024 1               1DNADR TIME2               TIME2,TIME1
 0161   REF    1               05,2132   32063 0               DNPTR    CMCSTA05          COLLECT SNAPSHOT
 0162   REF    8  LAST  183    05,2133   24337 0               6DNADR DNTMBUFF            SEND SNAPSHOT
 0163   REF    2  LAST  183    05,2134   32052 1               DNPTR    CMCSTA02          COLLECT SNAPSHOT
 0164   REF    9  LAST  183    05,2135   14337 0               4DNADR DNTMBUFF            SEND SNAPSHOT
 0165   REF    1               05,2136   32072 0               DNPTR    CMCSTA06          COMMON DATA
 0166   REF    3  LAST  135    05,2137   12757 1               3DNADR OGC                 OGC,+1,IGC,+1,MGC,+1
 0167   REF   15  LAST  181    05,2140   00106 0               1DNADR STATE +100          FALGWRDS 10 AND 11
 0168   REF    4  LAST  180    05,2141   01021 0               1DNADR TEVENT              TEVENT,+1
 0169   REF    1               05,2142   02633 0               1DNADR LAUNCHAZ            LAUNCHAZ,+1
 0170   REF   21  LAST  180    05,2143   01337 1               1DNADR OPTMODES            OPTMODES,HOLDFLAG
 0171   REF    1               05,2144   32101 0               DNPTR    CMCSTA07          COMMON DATA
 0172   REF   18  LAST  181    05,2145   52551 1              -6DNADR DSPTAB              DISPLAY TABLES

R0173    -------------------------SUB LISTS------------------------------------

 0174   REF    2  LAST  180    05,2043                CMCSTA01 EQUALS CMPOWE01            COMMON DOWNLIST DATA

 0175   REF    3  LAST  180    05,2052                CMCSTA02 EQUALS CMPOWE02            COMMON DOWNLIST DATA

 0176   REF    3  LAST  180    05,2057                CMCSTA03 EQUALS CMPOWE03            COMMON DOWNLIST DATA

 0177   REF    2  LAST  180    05,2061                CMCSTA04 EQUALS CMPOWE04            COMMON DOWNLIST DATA

 0178   REF    2  LAST  180    05,2063                CMCSTA05 EQUALS CMPOWE05            COMMON DOWNLIST DATA

 0179   REF    1               05,2072                CMCSTA06 EQUALS CMPOWE06            COMMON DOWNLIST DATA

 0180   REF    2  LAST  180    05,2101                CMCSTA07 EQUALS CMPOWE07            COMMON DOWNLIST DATA

R0181    ------------------------------------------------------------------------
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L        DOWNLINK LISTS                                                          USER'S PAGE NO.  6      E1 S3

R0182    *** UNREFERENCED LOCATIONS USED IN LIST 2
R0183    *** UPDATE THIS LIST WHEN ANY CHANGES ARE MADE TO DOWNLINK LISTS

A0184                                                          LOCATION      LIST NAME

 0185    REF  2  LAST   73       0303          DL201    =      BESTJ         CSMSTADL
 0186    REF  2  LAST   95    E4,1744          DL202    =      HPERX
 0187    REF  2  LAST  181    E6,1424          DL203    =      YACTOFF
 0188    REF  3  LAST  181       0025          DL204    =      TIME1
 0189    REF  3  LAST  135    E5,1761          DL205    =      IGC
 0190    REF  2  LAST   99    E5,1763          DL206    =      MGC
```

```
P0191    CSM RENDEZVOUS AND PRETHRUST LIST

R0192    ---------------------------CONTROL LIST--------------------------------

 0193                            05,2146             CMRENDOL EQUALS                   SEND ID BY SPECIAL CODING
 0194    REF   1                 05,2146   32043 1            DNPTR   CMREND01         COLLECT SNAPSHOT
 0195    REF  10  LAST  183      05,2147   24337 0            6DNADR  DNTMBUFF         SEND SNAPSHOT
 0196    REF   1                 05,2150   32052 1            DNPTR   CMREND02         COLLECT SECOND SNAPSHOT
 0197    REF  11  LAST  185      05,2151   14337 0            4DNADR  DNTMBUFF         SEND SNAPSHOT
 0198    REF   1                 05,2152   32057 1            DNPTR   CMREND03         COMMON DATA
 0199    REF   7  LAST  183      05,2153   03412 0            1DNADR  TIG              TIG,+1
 0200    REF   3  LAST  180      05,2154   03422 0            1DNADR  DELLT4           DELLT4,+1
 0201    REF   3  LAST  180      05,2155   13414 1            3DNADR  RTARG            RTARG,+1...+4,+5
 0202    REF   1                 05,2156   01007 1            1DNADR  VHFTIME          VHFTIME,+1
 0203    REF   4  LAST  183      05,2157   17674 1            4DNADR  MARKDOWN         MARKDOWN,+1...+5,+6,RM
 0204    REF   3  LAST  135      05,2160   00771 0            1DNADR  VHFCNT           VHFCNT,TRKMKCNT
 0205    REF   2  LAST  127      05,2161   03662 0            1DNADR  TTPI             TTPI,+1
 0206    REF   1                 05,2162   03424 0            1DNADR  ECSTEER          ECSTEER,GARBAGE
 0207    REF   2  LAST   98      05,2163   02636 0            1DNADR  DELVTPF          DELVTPF,+1
 0208    REF   3  LAST  135      05,2164   06460 0            2DNADR  TCDH             CDH AND CSI TIME           (32-33)
 0209    REF   3  LAST  133      05,2165   03655 1            1DNADR  TPASS4           TPASS4,+1
 0210    REF   5  LAST  137      05,2166   13404 0            3DNADR  DELVSLV          DELVSLV,+1...+4,+5
 0211    REF   6  LAST  135      05,2167   06311 1            2DNADR  RANGE            RANGE,+1,RRATE,+1
 0212    REF   1                 05,2170   32061 1            DNPTR   CMREND04         COMMON DATA
 0213    REF   4  LAST  183      05,2171   00024 1            1DNADR  TIME2            TIME2,TIME1
 0214    REF   1                 05,2172   32063 0            DNPTR   CMREND05         COLLECT SNAPSHOT
 0215    REF  12  LAST  185      05,2173   24337 0            6DNADR  DNTMBUFF         SEND SNAPSHOT
 0216    REF   2  LAST  185      05,2174   32052 1            DNPTR   CMREND02         COLLECT SNAPSHOT
 0217    REF  13  LAST  185      05,2175   14337 0            4DNADR  DNTMBUFF         SEND SNAPSHOT
 0218    REF   1                 05,2176   32072 0            DNPTR   CMREND06         COMMON DATA
 0219    REF   1                 05,2177   02632 1            1DNADR  DIFFALT          CDH DELTA ALTITUDE         (74)
 0220    REF   3  LAST  180      05,2200   03753 0            1DNADR  CENTANG          CENTANG,+1
 0221    REF   2  LAST  180      05,2201   00007 0            1DNADR  SPARE
 0222    REF   4  LAST  137      05,2202   13645 1            3DNADR  DELVEET3         DELVEET3,+1,...+4,+5
 0223    REF  22  LAST  183      05,2203   01337 1            1DNADR  OPTMODES         OPTMODES,HOLDFLAG
 0224    REF   1                 05,2204   32101 0            DNPTR   CMREND07         COMMON DATA
 0225    REF   5  LAST  136      05,2205   02315 1            1DNADR  RTHETA           RTHETA,+1
 0226    REF   4  LAST  136      05,2206   07400 1            2DNADR  LAT(SPL)         LAT(SPL),+1,LNG(SPL),+1
 0227    REF   5  LAST  137      05,2207   07756 1            2DNADR  VPRED            VPRED,+1,GAMMAEI,+1
 0228    REF  16  LAST  183      05,2210   77671 1           -1DNADR  STATE +100       FALGWRDS 10 AND 11
R0229    ---------------------------SUB LISTS-----------------------------------

 0230    REF   3  LAST  183      05,2043             CMREND01 EQUALS CMPOWE01          COMMON DOWNLIST DATA

 0231    REF   4  LAST  183      05,2052             CMREND02 EQUALS CMPOWE02          COMMON DOWNLIST DATA

 0232    REF   4  LAST  183      05,2057             CMREND03 EQUALS CMPOWE03          COMMON DOWNLIST DATA

 0233    REF   3  LAST  183      05,2061             CMREND04 EQUALS CMPOWE04          COMMON DOWNLIST DATA
```

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L       DOWNLINK LISTS                                                           USER'S PAGE NO.   8      10 53

 0234   REF   3  LAST  183   05,2063           CMREND005 EQUALS CMPOWE05       COMMON DOWNLIST DATA

 0235   REF   2  LAST  183   05,2072           CMREND006 EQUALS CMPOWE06       COMMON DOWNLIST DATA

 0236   REF   3  LAST  183   05,2101           CMREND007 EQUALS CMPOWE07       COMMON DOWNLIST DATA

R0237   -----------------------------------------------------------------------
R0238   *** UNREFERENCED LOCATIONS USED IN LIST 3
R0239   *** UPDATE THIS LIST WHEN ANY CHANGES ARE MADE TO DOWNLINK LISTS


A0240                                                           LOCATION        LIST NAME

 0241   REF   3  LAST  140   E7,1703           DL301     =      RM              CMRENDDL
 0242   REF   1                 0772           DL3015    =      TRKMKCNT
 0243   REF   2  LAST  105   E5,1462           DL302     =      TCSI
 0244   REF   3  LAST   94   E4,1713           DL303     =      RRATE
 0245   REF   4  LAST  184      0025           DL304     =      TIME1
 0246   REF   2  LAST  121   E7,1402           DL305     =      LNG(SPL)
 0247   REF   7  LAST  137   E7,1760           DL306     =      GAMMAEI
```

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L        DOWNLINK LISTS                                                                          USER'S PAGE NO.   9      OF 33

P0248    CSM ENTRY AND UPDATE DOWNLIST

R0249    ---------------------------CONTROL LIST--------------------------------

  0250                          05,2211                CMENTRDL EQUALS                        SEND ID BY SPECIAL CODING
  0251   REF   1                05,2211   32043 1               DNPTR   CMENTR01              COLLECT SNAPSHOT
  0252   REF  14  LAST  185     05,2212   24337 0               6DNADR  DNTMBUFF              SEND SNAPSHOT
  0253   REF   1                05,2213   32052 1               DNPTR   CMENTR02              COLLECT SECOND SNAPSHOT
  0254   REF  15  LAST  187     05,2214   14337 0               4DNADR  DNTMBUFF              SEND SNAPSHOT
  0255   REF   1                05,2215   32057 1               DNPTR   CMENTR03              COMMON DATA
  0256   REF   3  LAST  136     05,2216   07300 0               2DNADR  CMDAPMOD              CMDAPMOD,PREL,QREL,RREL
  0257   REF   2  LAST  122     05,2217   03635 1               1DNADR  L/D1                  L/D1,+1
  0258   REF   8  LAST  136     05,2220   24304 0               6DNADR  UPBUFF                UPBUFF,+1...+10,+11
  0259   REF   9  LAST  187     05,2221   14320 0               4DNADR  UPBUFF +12D           UPBUFF+12,13...+18,19D
  0260   REF   4  LAST  135     05,2222   04300 0               2DNADR  COMPNUMB              COMPNUMB,UPOLDMOD,UPVERB,UPCOUNT
  0261   REF   3  LAST  136     05,2223   03313 0               1DNADR  PAXERR1               PAXERR1,ROLLTM
  0262   REF   4  LAST  136     05,2224   13675 1               3DNADR  LATANG                LATANG,+1,RDOT,+1,THETAH,+1
  0263   REF   5  LAST  185     05,2225   07400 1               2DNADR  LAT(SPL)              LAT(SPL),+1,LNG(SPL),+1
  0264   REF   3  LAST  136     05,2226   03265 0               1DNADR  ALFA/180              ALFA/180,BETA/180
  0265   REF   1                05,2227   32061 1               DNPTR   CMENTR04              COMMON DATA
  0266   REF   5  LAST  185     05,2230   00024 1               1DNADR  TIME2                 TIME2,TIME1
  0267   REF   1                05,2231   32260 1               DNPTR   CMENTR05              COLLECT SNAPSHOT
  0268   REF  16  LAST  187     05,2232   24337 0               6DNADR  DNTMBUFF              SEND SNAPSHOT
  0269   REF   2  LAST  187     05,2233   32052 1               DNPTR   CMENTR02              COLLECT SNAPSHOT
  0270   REF  17  LAST  187     05,2234   14337 0               4DNADR  DNTMBUFF              SEND SNAPSHOT
  0271   REF   3  LAST  181     05,2235   00775 1               1DNADR  OPTION1               OPTION1,OPTION2
  0272   REF   3  LAST  181     05,2236   01516 1               1DNADR  TET                   TET,+1
  0273   REF   6  LAST  181     05,2237   13167 0               3DNADR  ERRORX                ERRORX/Y/Z,THETADX/Y/Z
  0274   REF   4  LAST  187     05,2240   07300 0               2DNADR  CMDAPMOD              CMDAPMOD,PREL,QREL,RREL
  0275   REF  10  LAST  187     05,2241   24304 0               6DNADR  UPBUFF                UPBUFF+0,+1...+10,+11D
  0276   REF  11  LAST  187     05,2242   14320 0               4DNADR  UPBUFF +12D           UPBUFF+12,+13...+18,+19D
  0277   REF   3  LAST  181     05,2243   03072 1               1DNADR  LEMMASS               LEMMASS,CSMMASS
  0278   REF   5  LAST  181     05,2244   03065 1               1DNADR  DAPDATR1              DAPDATR1,DAPDATR2
  0279   REF   3  LAST  136     05,2245   03314 1               1DNADR  ROLLTM                ROLLTM,ROLLC
  0280   REF  23  LAST  185     05,2246   01337 1               1DNADR  OPTMODES              OPTMODES,HOLDFLAG
  0281   REF   7  LAST  181     05,2247   13125 0               3DNADR  WBODY                 WBODY,...+5/OMEGAC,...+5
  0282   REF   3  LAST  181     05,2250   05306 1               2DNADR  REDOCTR               REDOCTR,THETAD+0,+1,+2
  0283   REF  34  LAST  181     05,2251   01333 0               1DNADR  IMODES30              IMODES30,IMODES33
  0284   REF   1                05,2252   32107 0               DNPTR   CMENTR09              COMMON DATA
  0285   REF   2  LAST  181     05,2253   01432 0               1DNADR  RSBBQ                 RSBBQ,+1
  0286                          05,2254   34076 1               DNCHAN  76                    CHANNELS 76(GARBAGE),77
  0287   REF   4  LAST  181     05,2255   04374 0               2DNADR  C31FLWRD              C31FLWRD,FAILREG,+1,+2
  0288   REF  17  LAST  185     05,2256   00106 0               1DNADR  STATE +10D            FALGWRDS 10 AND 11
  0289   REF   8  LAST  186     05,2257   74017 1              -1DNADR  GAMMAEI               GAMMAEI,+1

R0290    ---------------------------SUB LISTS-----------------------------------

  0291   REF   4  LAST  185     05,2043                CMENTR01 EQUALS CMPOWE01               COMMON DOWNLIST DATA

  0292   REF   5  LAST  185     05,2052                CMENTR02 EQUALS CMPOWE02               COMMON DOWNLIST DATA
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L       DOWNLINK LISTS                                                          USER'S PAGE NO.  1        E. 53

 0293   REF   5  LAST  185   05,2057                CMENTR03 EQUALS CMPOWE03     COMMON DOWNLIST DATA

 0294   REF   4  LAST  185   05,2061                CMENTR04 EQUALS CMPOWE04     COMMON DOWNLIST DATA

 0295   REF   8  LAST  180   05,2260   76463 1      CMENTR05-1DNADR DELV         DELV,+1              SNAPSHOT DATA
 0296   REF   9  LAST  188   05,2261   01316 1               1DNADR DELV +2      DELV+2,+3
 0297   REF  10  LAST  188   05,2262   01320 1               1DNADR DELV +4      DELV+4,+5
 0298   REF   4  LAST  137   05,2263   03726 1               1DNADR TTE          TTE,+1
 0299   REF   4  LAST  137   05,2264   03724 0               1DNADR VIO          VIO,+1
 0300   REF   6  LAST  185   05,2265   03756 0               1DNADR VPRED        VPRED,+1
 0301   REF   3  LAST  180   05,2266   76673 1              -1DNADR PIPTIME1     PIPTIME1,+1

 0302   REF   4  LAST  186   05,2101                CMENTR07 EQUALS CMPOWE07     COMMON DOWNLIST DATA

 0303   REF   1              05,2107                CMENTR09 EQUALS CMPOWE09     COMMON DOWNLIST DATA

R0304   ----------------------------------------------------------------------------------------------------
R0305   *** UNREFERENCED LOCATIONS USED IN LIST 4
R0306   *** UPDATE THIS LIST WHEN ANY CHANGES ARE MADE TO DOWNLINK LISTS


A0307                                                               LOCATION         LIST NAME

 0308   REF   3  LAST  136   E6,1701                DL401     =     PREL             CMENTRDL
 0309   REF   3  LAST  136   E6,1702                DL402     =     QREL
 0310   REF   2  LAST  115   E6,1703                DL403     =     RREL
 0311   REF   3  LAST  135      0301                DL404     =     UPOLDMOD
 0312   REF   3  LAST  135      0302                DL405     =     UPVERB
 0313   REF   2  LAST   73      0303                DL406     =     UPCOUNT
 0314   REF   4  LAST  187   E6,1714                DL407     =     ROLLTM
 0315   REF   3  LAST  136   E7,1677                DL408     =     RDOT
 0316   REF   2  LAST  123   E7,1701                DL409     =     THETAH
 0317   REF   3  LAST  186   E7,1402                DL410     =     LNG(SPL)
 0318   REF   2  LAST  115   E6,1666                DL411     =     BETA/180
 0319   REF   5  LAST  186      0025                DL412     =     TIME1
 0320   REF   2  LAST  182      0776                DL413     =     OPTION2
 0321   REF   6  LAST  182   E6,1570                DL414     =     ERRORY
 0322   REF   4  LAST  182   E6,1571                DL415     =     ERRORZ
 0323   REF   7  LAST  181   E6,1572                DL416     =     THETADX
 0324   REF   6  LAST  182   E6,1573                DL417     =     THETADY
 0325   REF   6  LAST  182   E6,1574                DL418     =     THETADZ
 0326   REF   4  LAST  188   E6,1701                DL419     =     PREL
 0327   REF   4  LAST  188   E6,1702                DL420     =     QREL
 0328   REF   3  LAST  188   E6,1703                DL421     =     RREL
 0329   REF   2  LAST  182   E6,1473                DL422     =     CSMMASS
 0330   REF   2  LAST  182   E6,1466                DL423     =     DAPDATR2
 0331   REF   2  LAST  116   E6,1715                DL424     =     ROLLC
 0332   REF   2  LAST  182      1340                DL425     =     HOLDFLAG
 0333   REF   2  LAST  182      0375                DL426     =     FAILREG
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P0334    P22 DOWNLISTS

R0335    -----------------------------CONTROL LIST-------------------------------

 0336                         05,2267             CMPG22DL EQUALS                   SEND ID BY SPECIAL CODING
 0337    REF   1              05,2267   32043 1            DNPTR   CMPG2201         COLLECT SNAPSHOT
 0338    REF  18  LAST  187   05,2270   24337 0            6DNADR  DNTMBUFF         SEND SNAPSHOT
 0339    REF   1              05,2271   32052 1            DNPTR   CMPG2202         COLLECT SNAPSHOT
 0340    REF  19  LAST  189   05,2272   14337 0            4DNADR  DNTMBUFF         SEND SNAPSHOT
 0341    REF   1              05,2273   32057 1            DNPTR   CMPG2203         COMMON DATA
 0342    REF   1              05,2274   32340 1            DNPTR   MARK1/2          MARK 1&2 DATA SNAPSHOT
 0343    REF  20  LAST  189   05,2275   24337 0            6DNADR  DNTMBUFF         SEND SNAPSHOT
 0344    REF   1              05,2276   32347 0            DNPTR   MARK3/4          MARK 3&4 DATA SNAPSHOT
 0345    REF  21  LAST  189   05,2277   24337 0            6DNADR  DNTMBUFF         SEND SNAPSHOT
 0346    REF   1              05,2300   32356 0            DNPTR   MARK5            MARK5 DATA SNAPSHOT
 0347    REF  22  LAST  189   05,2301   10337 1            3DNADR  DNTMBUFF         SEND SNAPSHOT
 0348    REF   2  LAST  134   05,2302   03751 1            1DNADR  LANDMARK         LANDMARK,GARBAGE
 0349    REF   3  LAST  185   05,2303   00007 0            1DNADR  SPARE
 0350    REF   4  LAST  189   05,2304   00007 0            1DNADR  SPARE
 0351    REF   5  LAST  189   05,2305   00007 0            1DNADR  SPARE
 0352    REF   1              05,2306   32061 1            DNPTR   CMPG2204         COMMON DATA
 0353    REF   6  LAST  187   05,2307   00024 1            1DNADR  TIME2            TIME2,TIME1
 0354    REF   1              05,2310   32335 0            DNPTR   CMPG2205         COLLECT SNAPSHOT
 0355    REF  23  LAST  189   05,2311   04337 1            2DNADR  DNTMBUFF         SEND SNAPSHOT
 0356    REF   6  LAST  189   05,2312   00007 0            1DNADR  SPARE
 0357    REF   7  LAST  189   05,2313   00007 0            1DNADR  SPARE
 0358    REF   8  LAST  189   05,2314   00007 0            1DNADR  SPARE
 0359    REF   9  LAST  189   05,2315   00007 0            1DNADR  SPARE
 0360    REF   2  LAST  189   05,2316   32052 1            DNPTR   CMPG2202         COLLECT SNAPSHOT
 0361    REF  24  LAST  189   05,2317   14337 0            4DNADR  DNTMBUFF         SEND SNAPSHOT
 0362    REF   1              05,2320   32072 0            DNPTR   CMPG2206         COMMON DATA
 0363    REF   2  LAST  134   05,2321   03747 0            1DNADR  8NN              8NN,GARBAGE
 0364    REF  13  LAST  187   05,2322   00106 0            1DNADR  STATE +10D       FALGWRDS 10 AND 11
 0365    REF   2  LAST   36   05,2323   12025 0            3DNADR  RLS              RLS,+1,...+4,+5
 0366    REF  10  LAST  189   05,2324   00007 0            1DNADR  SPARE
 0367    REF  24  LAST  187   05,2325   01337 1            1DNADR  OPTMODES         OPTMODES,HOLDFLAG
 0368    REF   1              05,2326   32101 0            DNPTR   CMPG2207         COMMON DATA
 0369    REF  11  LAST  189   05,2327   00007 0            1DNADR  SPARE
 0370    REF  12  LAST  189   05,2330   00007 0            1DNADR  SPARE
 0371    REF  13  LAST  189   05,2331   00007 0            1DNADR  SPARE
 0372    REF  14  LAST  189   05,2332   00007 0            1DNADR  SPARE
 0373    REF  15  LAST  189   05,2333   00007 0            1DNADR  SPARE
 0374    REF  16  LAST  189   05,2334   77770 1           -1DNADR  SPARE

R0375    -----------------------------SUB LISTS----------------------------------

 0376    REF   5  LAST  187   05,2043             CMPG2201 EQUALS CMPOWE01          COMMON DOWNLIST DATA

 0377    REF   6  LAST  187   05,2052             CMPG2202 EQUALS CMPOWE02          COMMON DOWNLIST DATA
 0378   REF  6  LAST 188   05,2057             CMPG2203 EQUALS CMPOWE03         COMMON DOWNLIST DATA

 0379   REF  5  LAST 188   05,2061             CMPG2204 EQUALS CMPOWE04         COMMON DOWNLIST DATA

 0380   REF  2  LAST  77   05,2335   77027 1   CMPG2205-1DNADR LONG             LONG,+1            SNAPSHOT DATA
 0381   REF  2  LAST  77   05,2336   00752 1             1DNADR ALT              ALT,+1
 0382   REF  4  LAST 136   05,2337   77031 0            -1DNADR LAT              LAT,+1

 0383   REF  3  LAST 186   05,2072             CMPG2206 EQUALS CMPOWE06         COMMON DOWNLIST DATA

 0384   REF  5  LAST 188   05,2101             CMPG2207 EQUALS CMPOWE07         COMMON DOWNLIST DATA

 0385   REF  2  LAST 125   05,2340   74236 0   MARK1/2 -1DNADR SVMRKDAT +2       SVMRKDAT+2,+3      SNAPSHOT DATA
 0386   REF  3  LAST 190   05,2341   03543 0            1DNADR SVMRKDAT +4       SVMRKDAT+4,+5
 0387   REF  4  LAST 190   05,2342   03545 0            1DNADR SVMRKDAT +6       SVMRKDAT+6,+7
 0388   REF  5  LAST 190   05,2343   03547 1            1DNADR SVMRKDAT +8D      SVMRKDAT+8,+9
 0389   REF  6  LAST 190   05,2344   03551 0            1DNADR SVMRKDAT +10D     SVMRKDAT+10,+11
 0390   REF  7  LAST 190   05,2345   03553 1            1DNADR SVMRKDAT +12D     SVMRKDAT+12,+13
 0391   REF  8  LAST 190   05,2346   74240 1           -1DNADR SVMRKDAT          SVMRKDAT,+1

 0392   REF  9  LAST 190   05,2347   74220 1   MARK3/4 -1DNADR SVMRKDAT +16D     SVMRKDAT+16,+17    SNAPSHOT DATA
 0393   REF 10  LAST 190   05,2350   03561 0            1DNADR SVMRKDAT +18D     SVMRKDAT+18,+19
 0394   REF 11  LAST 190   05,2351   03563 1            1DNADR SVMRKDAT +20D     SVMRKDAT+20,+21
 0395   REF 12  LAST 190   05,2352   03565 1            1DNADR SVMRKDAT +22D     SVMRKDAT+22,+23
 0396   REF 13  LAST 190   05,2353   03567 0            1DNADR SVMRKDAT +24D     SVMRKDAT+24,+25
 0397   REF 14  LAST 190   05,2354   03571 1            1DNADR SVMRKDAT +26D     SVMRKDAT+26,+27
 0398   REF 15  LAST 190   05,2355   74222 0           -1DNADR SVMRKDAT +14D     SVMRKDAT+14,+15

 0399   REF 16  LAST 190   05,2356   74202 1   MARK5   -1DNADR SVMRKDAT +30D     SVMRKDAT+30,+31    SNAPSHOT DATA
 0400   REF 17  LAST 190   05,2357   03577 1            1DNADR SVMRKDAT +32D     SVMRKDAT+32,+33
 0401   REF 18  LAST 190   05,2360   03601 0            1DNADR SVMRKDAT +34D     SVMRKDAT+34,GARBAGE
 0402   REF 19  LAST 190   05,2361   74204 1           -1DNADR SVMRKDAT +28D     SVMRKDAT+28,+29

R0403    ---------------------------------------------------------------------------------------

R0404    *** UNREFERENCED LOCATIONS USED IN LIST 5
R0405    *** UPDATE THIS LIST WHEN ANY CHANGES ARE MADE TO DOWNLINK LISTS

A0406                                                          LOCATION         LIST NAME

 0407   REF  6  LAST 188       0025            DL501     =      TIME1            CMPG22DL
R0408    ---------------------------------------------------------------------------------------
 0409   REF  2  LAST 179   05,2362   02113 0   DNTABLE  GENADR CMCSTADL
 0410   REF  2  LAST 179   05,2363   02211 1            GENADR CMENTRDL
 0411   REF  1             05,2364   02146 0            GENADR CMRENDDL
 0412   REF  1             05,2365   02001 1            GENADR CMPOWEDL
 0413   REF  1             05,2366   02267 0            GENADR CMPG22DL

R0414    ---------------------------------------------------------------------------------------
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L         FRESH START AND RESTART                                                USER'S PAGE NO.  1       E0 53

R0001     PROGRAM DESCRIPTION                               5 APRIL, 1967
R0002                                                       SUNDISK REV 120
R0003     FUNCTIONAL DESCRIPTION

R0004          SLAP1        MAN INITIATED FRESH START
R0005            1. EXECUTE STARTSUB
R0006            2. TURN OFF DSKY DISCRETE-LAMPS
R0007            3. CLEAR FAIL REGISTERS,SELF CHECK ERROR COUNTER AND RESTART
R0008               COUNTER
R0009           4. INITIALIZE OUTBIT CHANNEL 77
R0010           5. EXECUTE DOFSTART

R0011          DOFSTART    MACHINE INITIATED FRESH START

R0012             1. CLEAR SELF-CHECK REGISTERS, MODE REGISTER AND CDUZ REGISTER
R0013             2. CLEAR PHASE TABLE
R0014             3. INITIALIZE IMU FLAGS
R0015             4. INITIALIZE FLAGWORDS
R0016             5. TRANSFER CONTROL TO IDLE LOOP IN DUMMYJOB

R0017          GOPROG      HARDWARE RESTART

R0018             0. EXECUTE STARTSUB
R0019             1. TRANSFER CONTROL TO DOFSTART IF ANY OF THE FOLLOWING CONDITIONS
R0020                EXIST.
R0021                A. RESTART OCCURED DURING EXECUTION OF ERASCHK
R0022                B. BOTH OSCILLATOR FAIL AND AGC WARNING ARE ON
R0023                C. MARK REJECT AND EITHER NAV OR MAIN DSKY ERROR LIGHT RESET
R0024                   ARE ON.
R0025             2. SCHEDULE A T5RUPT PROGRAM FOR THE DAP
R0026             3. SET FLAGWRD5 BITS FOR INTWAKE ROUTINE
R0027             4. EXTINGUISH ALL DSKY LAMPS, EXCEPT PROGRAM ALARM,GIMBAL LOCK AND
R0028                NO ATT
R0029             5. INITIALIZE IMU FLAGS
R0030             6. IF ENGINE COMMAND IS ON (FLAGWRD5,BIT 7), SET ENGINE ON (CHAN-
R0031                NEL 11, BIT 13)
R0032             7. TRANSFER CONTROL TO GOPROG3

R0033          ENEMA        SOFTWARE RESTART    INITIATED BY MAJOR MODE CHANGE

R0034             1. EXECUTE STARTSB2
R0035             2. KILL PROGRAMS THAT WERE INTEGRATING OR WAITING FOR INTEGRATION
R0036                ROUTINE
R0037             3. TRANSFER CONTROL TO GOPROG3

R0038          GOPROG3     SUBROUTINE COMMON TO GOPROG AND ENEMA

R0039             1. TEST PHASE TABLES - IF INCORRECT, DISPLAY ALARM 1107 AND
R0040                TRANSFER CONTROL TO DOFSTART
R0041             2. DISPLAY MAJOR MODE
```

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L          FRESH START AND RESTART                                                 USER'S PAGE NO.   2      E0 53

R0042            3. IF ANY GROUPS WERE ACTIVE UPON RESTART,TRANSFER CONTROL TO THE
R0043               RESTARTS SUBROUTINE TO RESCHEDULE PENDING TASKS, LONGCALLS, AND
R0044               JOBS (P20 IS RESTARTED VIA FINDVAC)
R0045            4. IF NO GROUPS WERE ACTIVE UPON RESTART, DISPLAY ALARM CODE
R0046               1110 (RESTART WITH NO ACTIVE GROUPS).
R0047            5. TRANSFER CONTROL TO IDLE LOOP IN DUMMYJOB

R0048        STARTSUB    SUBROUTINE COMMON TO SLAP1 AND GOPROG

R0049            1. CLEAR OUTBIT CHANNELS 5 AND 6
R0050            2. INITIALIZE TIME5,TIME4,TIME3
R0051            3. TRANSFER CONTROL TO STARTSB2

R0052        STARTSB2    SUBROUTINE COMMON TO STARTSUB AND ENEMA

R0053            1. INITIALIZE OUTBIT CHANNELS 11,12,13 AND 14
R0054            2. REPLACE ALL TASKS ON WAITLIST WITH ENDTASK
R0055            3. MAKE ALL EXECUTIVE REGISTERS AVAILABLE
R0056            4. MAKE ALL VAC AREAS AVAILABLE
R0057            5. CLEAR DSKY REGISTERS
R0058            6. ZERO NUMEROUS SWITCHES
R0059            7. INITIALIZE OPTICS FLAGS
R0060            8. INITIALIZE PIPA AND TELEMETRY FAIL FLAGS
R0061            9. INITIALIZE DOWN TELEMETRY


R0062      INPUT/OUTPUT INITIALIZATION

R0063          A. CALLING SEQUENCE

R0064                SLAP1 -  TC    POSTJUMP     OR     VERB 36,ENTER
R0065                         CADR SLAP1

R0066                ENEMA -  TC    POSTJUMP     ***  DO NOT CALL ENEMA WITHOUT   ***
R0067                         CADR ENEMA         ***  CONSULTING POOH PEOPLE      ***

R0068          B. OUTPUT

R0069                ERASABLE MEMORY INITIALIZATION

R0070      PROGRAM ANALYSIS

R0071          A. SUBROUTINES CALLED

R0072                MR.KLEAN,WAITLIST,DSPMM,ALARM,RESTARTS,FINDVAC

R0073          B. ALARMS

R0074                1107  PHASE TABLE ERROR
R0075                1110  RESTART WITH NO ACTIVE GROUPS
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L         FRESH START AND RESTART                                                          USER'S PAGE NO.   3      ED 53

 0077   REF   1                   05,2000                        SETLOC FRANDRES
 0078                             05,2367                        BANK

 0079   REF   3  LAST  140        E3,1400                        EBANK= LST1

 0080   REF   1                                                  COUNT* $$/START
 0081                             05,2367  0 0004 0  SLAP1       INHINT                    FRESH START. COMES HERE FROM PINBALL.
 0082   REF   1                   05,2370  0 3046 0              TC      STARTSUB          SUBROUTINE DOES MOST OF THE WORK.

 0083   REF   1                   05,2371  1 2376 0  STARTSW     TCF     SKIPSIM

 0084   REF  18  LAST  146        05,2372  3 4753 1  STARTSIM    CAF     BIT14

 0085   REF   1                   05,2373  0 5135 0              TC      FINDVAC

 0086                             05,2374   77777 0  SIM2CADR    OCT     77777

 0087                             05,2375   77777 0              OCT     77777
 0088   REF  19  LAST  183        05,2376  3 1241 1  SKIPSIM     CA      DSPTAB +11D
 0089   REF   1                   05,2377  7 5004 1              MASK    BITS4&6
 0090   REF  20  LAST  176        05,2400  6 4752 0              AD      BIT15
 0091   REF  20  LAST  194        05,2401  55'241 0              TS      DSPTAB +11D       REQUESTED FRESH START.

 0092   REF  11  LAST  177        05,2402  3 4772 1              CAF     ZERO              SAME STORY ON ZEROING FAILREG.
 0093   REF   2  LAST   87        05,2403  55'365 1              TS      ERCOUNT
 0094   REF   3  LAST  188        05,2404  54 375 1              TS      FAILREG
 0095   REF   4  LAST  194        05,2405  54 376 1              TS      FAILREG +1
 0096   REF   5  LAST  194        05,2406  54 377 0              TS      FAILREG +2
 0097   REF   4  LAST  187        05,2407  55'306 1              TS      REDOCTR

 0098                             05,2410  0 0006 1              EXTEND
 0099   REF   1                   05,2411  01 077 0              WRITE   CHAN77            ZERO CHANNEL 77
 0100   REF   1                   05,2412  4 4664 0              CS      PRIO12
 0101   REF  10  LAST  145        05,2413  55'322 1              TS      DSRUPTSW

 0102   REF  12  LAST  194        05,2414  3 4772 1  DOFSTART    CAF     ZERO              DO A FRESH START.
 0103   REF   2  LAST   87        05,2415  55'360 1              TS      ERESTORE          ***** MUST NOT BE REMOVED FROM DOFSTART
 0104   REF   2  LAST   87        05,2416  55'362 0              TS      SMODE             ***** MUST NOT BE REMOVED FROM DOFSTART
 0105   REF   3  LAST   89        05,2417  55'501 0              TS      UPSVFLAG          UPDATE STATE VECTOR REQUEST FLAGWORD
 0106                             05,2420  0 0006 1              EXTEND
 0107   REF   1                   05,2421  01 005 0              WRITE   CHAN5             TURN OFF RCS JETS
 0108                             05,2422  0 0006 1              EXTEND
 0109   REF   1                   05,2423  01 006 0              WRITE   CHAN6             TURN OFF RCS JETS
 0110                             05,2424  0 0006 1              EXTEND
 0111   REF   6  LAST  167        05,2425  01 011 0              WRITE   DSALMOUT          ZERO CHANNEL 11
 0112                             05,2426  0 0006 1              EXTEND
 0113   REF  22  LAST  178        05,2427  01 012 0              WRITE   CHAN12            ZERO CHANNEL 12
 0114                             05,2430  0 0006 1              EXTEND
 0115   REF   1                   05,2431  01 013 1              WRITE   CHAN13            ZERO CHANNEL 13
 0116                             05,2432  0 0006 1              EXTEND
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L        FRESH START AND RESTART                                                                 USER'S PAGE NO.  4      E3 S3

 0117    REF   4  LAST  178   05,2433  01 014 0                WRITE   CHAN14              ZERO CHANNEL 14
 0118    REF   7  LAST  172   05,2434  55'331 0                TS      WTOPTION
 0119    REF   4  LAST  136   05,2435  54 332 1                TS      ONLSTCOD

 0120    REF   1              05,2436  54 370 1                TS      NVSAVE
 0121    REF   1              05,2437  55'275 1                TS      EBANKTEM
 0122    REF   2  LAST  186   05,2440  54 772 1                TS      TRKMKCNT
 0123    REF   4  LAST  185   05,2441  54 771 1                TS      VHFCNT
 0124    REF   1              05,2442  55'247 0                TS      EXTVBACT

 0125    REF   3  LAST  178   05,2443  54 735 1                TS      TRATE               ZERO AUTO OPTICS RATE REGS
 0126    REF   3  LAST  178   05,2444  54 736 1                TS      SRATE
 0127    REF   4  LAST  178   05,2445  54 740 0                TS      TOLD
 0128    REF   3  LAST  178   05,2446  54 741 1                TS      SOLD
 0129    REF  21  LAST  194   05,2447  4 1241 0                CS      DSPTAB +11D
 0130    REF   2  LAST  194   05,2450  7 5004 1                MASK    BITS4&6
 0131    REF  37  LAST  177   05,2451  10 000 0                CCS     A
 0132                         05,2452  0 2456 1                TC      +4
 0133    REF   3  LAST  195   05,2453  3 5004 0                CA      BITS4&6
 0134                         05,2454  0 0006 1                EXTEND                      THE IMU WAS IN COARSE ALIGN IN GIMBAL
 0135    REF  23  LAST  194   05,2455  05 012 1                WOR     CHAN12              LOCK, SO PUT IT BACK INTO COARSE ALIGN.
 0136    REF   1              05,2456  0 2536 0                TC      MR.KLEAN

 0137    REF  13  LAST  194   05,2457  4 4772 0                CS      ZERO
 0138    REF   1              05,2460  55'214 0                TS      MODREG

 0139    REF   2  LAST  155   05,2461  3 4346 1                CAF     PRIO30
 0140    REF   1              05,2462  54 365 0                TS      RESTREG

 0141    REF   1              05,2463  3 3247 0                CAF     IM30INIF            FRESH START IMU INITIALIZATION.
 0142    REF  35  LAST  187   05,2464  55'333 1                TS      IMODES30

 0143    REF   2  LAST  169   05,2465  3 7702 0                CAF     NEGONE
 0144    REF  14  LAST  178   05,2466  55'323 0                TS      OPTIND              KILL COARSE OPTICS

 0145    REF   1              05,2467  3 3251 1                CAF     OPTINITF
 0146    REF  25  LAST  189   05,2470  55'337 0                TS      OPTMODES

 0147    REF   1              05,2471  3 5055 1                CAF     IM33INIT
 0148    REF  18  LAST  182   05,2472  55'334 0                TS      IMODES33

 0149                         05,2473  0 0006 1                EXTEND                      LET T5 IDLE.
 0150    REF   1              05,2474  3 3231 1                DCA     T5IDLER
 0151    REF   2  LAST  140   05,2475  52 113 0                DXCH    T5LOC

 0152    REF   1              05,2476  3 3252 1                CA      SWINIT
 0153    REF  19  LAST  189   05,2477  54 074 0                TS      STATE

 0154    REF   2  LAST  156   05,2500  3 0075 0                CA      FLAGWRD1
 0155    REF   1              05,2501  7 4755 0                MASK    NOP01BIT            LEAVE NODOP01 FLAG UNTOUCHED
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0156   REF   2  LAST  195   05,2502  6 3253 0            AD      SWINIT +1
0157   REF   3  LAST  195   05,2503  54 075 1            TS      FLAGWRD1

0158   REF   3  LAST  196   05,2504  3 3254 1            CA      SWINIT +2
0159   REF  20  LAST  195   05,2505  54 076 1            TS      STATE +2

0160   REF   1              05,2506  3 0077 1            CA      FLAGWRD3
0161   REF   1              05,2507  7 4754 1            MASK    REFSMBIT
0162   REF   4  LAST  196   05,2510  6 3255 0            AD      SWINIT +3
0163   REF   2  LAST  196   05,2511  54 077 0            TS      FLAGWRD3

0164                        05,2512  0 0006 1            EXTEND
0165   REF   5  LAST  196   05,2513  3 3257 1            DCA     SWINIT +4
0166   REF  21  LAST  196   05,2514  52 101 0            DXCH    STATE +4
0167                        05,2515  0 0006 1            EXTEND
0168   REF   6  LAST  196   05,2516  3 3261 1            DCA     SWINIT +6
0169   REF  22  LAST  196   05,2517  52 103 1            DXCH    STATE +6
0170   REF   3  LAST  162   05,2520  3 0104 1            CA      FLAGWRD8
0171   REF   1              05,2521  7 2562 0            MASK    OCT6200         CMOONFLG, LMOONFLG, AND SUFFLAG
0172   REF   7  LAST  196   05,2522  6 3262 1            AD      SWINIT +8D
0173   REF   4  LAST  196   05,2523  54 104 0            TS      FLAGWRD8

0174   REF   8  LAST  196   05,2524  3 3263 0            CA      SWINIT +9D
0175   REF  23  LAST  196   05,2525  54 105 1            TS      STATE +9D

0176   REF   1              05,2526  3 4756 1            CAF     HDSUPBIT
0177   REF   1              05,2527  7 0106 1            MASK    FLGWRD10
0178   REF   9  LAST  196   05,2530  6 3264 1            AD      SWINIT +10D
0179   REF   2  LAST  196   05,2531  54 106 1            TS      FLGWRD10

0180   REF  10  LAST  196   05,2532  3 3265 0            CAF     SWINIT +11D
0181   REF   1              05,2533  54 107 0            TS      FLGWRD11

0182   REF   2  LAST  151   05,2534  0 4655 0  ENDRSTRT  TC      POSTJUMP
0183   REF   1              05,2535   03173 1            CADR    DUMMYJOB + 2    DOES A RELINT.  (IN A SWITCHED BANK.)

0184                        05,2536  0 0004 0  MR.KLEAN  INHINT
0185                        05,2537  0 0006 1            EXTEND
0186   REF   5  LAST  178   05,2540  3 4772 1            DCA     NEG0
0187   REF   1              05,2541  53'160 0            DXCH    -PHASE2
0188                        05,2542  0 0006 1  POOKLEAN  EXTEND
0189   REF   6  LAST  196   05,2543  3 4772 1            DCA     NEG0
0190   REF   1              05,2544  53'164 1            DXCH    -PHASE4
0191                        05,2545  0 0006 1            EXTEND
0192   REF   7  LAST  196   05,2546  3 4772 1            DCA     NEG0
0193   REF   1              05,2547  53'156 0            DXCH    -PHASE1
0194                        05,2550  0 0006 1  V37KLEAN  EXTEND
0195   REF   8  LAST  196   05,2551  3 4772 1            DCA     NEG0
0196   REF   1              05,2552  53'162 1            DXCH    -PHASE3
0197                        05,2553  0 0006 1            EXTEND
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 0198    REF   9  LAST  196    05,2554  3 4772 1             DCA     NEG0
 0199    REF   1               05,2555  53'166 0             DXCH    -PHASE5
 0200                          05,2556  0 0006 1  UPKLEAN    EXTEND
 0201    REF  10  LAST  197    05,2557  3 4772 1             DCA     NEG0
 0202    REF   1               05,2560  53'170 1             DXCH    -PHASE6
 0203    REF  15  LAST  178    05,2561  0 0002 0             TC      Q

 0204                          05,2562   06200 0  OCT6200    OCT     6200
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L       FRESH START AND RESTART                                                     USER'S PAGE NO.  7     E3 S3

P0205             COMES HERE FROM LOCATION 4000, GOJAM. RESTART ANY PROGRAMS WHICH MAY HAVE BEEN RUNNING AT THE TIME.

 0207   REF  5  LAST 194   05,2563  25'306 0  GOPROG   INCR    REDUCTR         ADVANCE RESTART COUNTER.

 0208   REF 16  LAST 197   05,2564  22 002 0           LXCH    Q
 0209                      05,2565  0 0006 1           EXTEND
 0210   REF  1             05,2566  04 007 1           ROR     SUPERBNK
 0211   REF  3  LAST 187   05,2567  53'433 0           DXCH    RSBBQ
 0212   REF  1             05,2570  0 4636 0           TC      BANKCALL        STORE ERASABLES FOR DEBUGGING PURPOSES.
 0213   REF  1             05,2571   40000 0           CADR    VAC5STOR
 0214   REF 21  LAST 194   05,2572  3 4752 0           CA      BIT15           TEST OSC FAIL BIT TO SEE IF WE HAVE
 0215                      05,2573  0 0006 1           EXTEND                  HAD A POWER TRANSIENT. IF SO, ATTEMPT
 0216   REF  3  LAST 169   05,2574  03 033 1           WAND    CHAN33          A RESTART. IF NOT, CHECK THE PRESENT
 0217                      05,2575  0 0006 1           EXTEND                  STATE OF AGC WARNING BIT.
 0218   REF  1             05,2576  1 2604 0           BZF     BUTTONS

 0219   REF 19  LAST 194   05,2577  3 4753 1           CA      BIT14           IF AGC WARNING ON (BIT = 0), DO A
 0220                      05,2600  0 0006 1           EXTEND                  FRESH START ON ASSUMPTION THAT
 0221   REF  4  LAST 198   05,2601  02 033 0           RAND    CHAN33          WE ARE IN A RESTART LOOP.
 0222                      05,2602  0 0006 1           EXTEND
 0223   REF  1             05,2603  1 3044 0           BZF     NONAVKEY +1

 0224   REF  1             05,2604  0 3023 0  BUTTONS  TC      LIGHTSET        MAKE FRESH START CHECKS BEFORE ERESTORE.

R0225                                         ERASCHK TEMPORARILY STORES THE CONTENTS OF TWO ERASABLE LOCATIONS, X
R0227                                         AND X+1 INTO SKEEP5 AND SKEEP6. IT ALSO STORES X INTO SKEEP7 AND
R0229                                         ERESTORE. IF ERASCHK IS INTERRUPTED BY A RESTART, C(ERESTORE) SHOULD
R0231                                         EQUAL C(SKEEP7),AND BE A + NUMBER LESS THAN 2000 OCT. OTHERWISE
R0233                                         C(ERESTORE) SHOULD EQUAL +0.

 0234   REF  2  LAST 143   05,2605  3 4344 0           CAF     HI5
 0235   REF  3  LAST 194   05,2606  7 1360 1           MASK    ERESTORE
 0236                      05,2607  0 0006 1           EXTEND
 0237                      05,2610  1 2612 1           BZF     +2              IF ERESTORE NOT = +0 OR +N LESS THAN 2K,
 0238   REF  2  LAST 198   05,2611  1 3044 0           TCF     NONAVKEY +1     DOUBT E MEMORY AND DO FRESH START.
 0239   REF  4  LAST 198   05,2612  4 1360 1           CS      ERESTORE
 0240                      05,2613  0 0006 1           EXTEND
 0241   REF  1             05,2614  1 2631 0           BZF     ELRSKIP -1
 0242   REF  1             05,2615  6 1377 0           AD      SKEEP7
 0243                      05,2616  0 0006 1           EXTEND
 0244                      05,2617  1 2621 1           BZF     +2              = SKEEP7, RESTORE E MEMORY.
 0245   REF  3  LAST 198   05,2620  1 3044 0           TCF     NONAVKEY +1     NOT=SKEEP7, DOUBT EMEM, DO FRESH START
 0246   REF  2  LAST  87   05,2621  3 1374 0           CA      SKEEP4
 0247   REF  2  LAST 155   05,2622  54 003 0           TS      EBANK           EBANK OF E MEMORY THAT WAS UNDER TEST.
 0248                      05,2623  0 0006 1           EXTEND                  (NOT DXCH SINCE THIS MIGHT HAPPEN AGAIN)
 0249   REF  2  LAST  87   05,2624  3 1376 1           DCA     SKEEP5
 0250   REF  2  LAST 198   05,2625  51'377 0           INDEX   SKEEP7
 0251                      05,2626  52 001 1           DXCH    000             E MEMORY RESTORED.
 0252   REF 14  LAST 195   05,2627  3 4772 1           CA      ZERO
 0253   REF  5  LAST 198   05,2630  55'360 1           TS      ERESTORE
 0254    REF   2  LAST  194   05,2631  0 3046 0    -1      TC       STARTSUB         DO INITIALIZATION AFTER ERASE RESTORE.
 0255    REF   1              05,2632  3 0102 1  ELRSKIP   CA       FLAGWRD6         RESTART AUTOPILOTS
 0256    REF   1              05,2633  7 4076 0            MASK     DPCONFIG
 0257                         05,2634  0 0006 1            EXTEND
 0258    REF  14  LAST   85   05,2635  7 4766 0            MP       BIT3             BITS 15,14 00 T5IDLOC
 0259    REF   5  LAST  172   05,2636  7 6211 1            MASK     SIX                         01 REDORCS
 0260                         05,2637  0 0006 1            EXTEND                               10 REDOTVC
 0261    REF  38  LAST  195   05,2640  5 0000 1            INDEX    A                           11 REDOSAT
 0262    REF   2  LAST  195   05,2641  3 3231 1            DCA      T5IDLER
 0263    REF   3  LAST  195   05,2642  52 113 0            DXCH     T5LOC

 0264    REF   1              05,2643  4 4753 0            CS       INTFLBIT
 0265    REF   3  LAST  196   05,2644  7 0106 1            MASK     FLGWRD10
 0266    REF   4  LAST  199   05,2645  54 106 1            TS       FLGWRD10

 0267    REF  26  LAST  195   05,2646  3 1337 1            CA       OPTMODES
 0268    REF   1              05,2647  7 5001 1            MASK     OPTINITR
 0269    REF   2  LAST  169   05,2650  6 4762 0            AD       OCDUFBIT
 0270    REF  27  LAST  199   05,2651  55'337 0            TS       OPTMODES

 0271    REF   4  LAST  167   05,2652  3 4763 1            CAF      NOIMUDAP
 0272    REF  19  LAST  195   05,2653  7 1334 0            MASK     IMODES33
 0273    REF   2  LAST  195   05,2654  6 5055 1            AD       IM33INIT
 0274    REF  20  LAST  199   05,2655  55'334 0            TS       IMODES33

 0275    REF  15  LAST  198   05,2656  3 4772 1            CAF      ZERO
 0276    REF   5  LAST  195   05,2657  54 740 0            TS       TOLD
 0277    REF   4  LAST  195   05,2660  54 741 1            TS       SOLD
 0278    REF   1              05,2661  3 3250 0            CA       5,6,4            LEAVE PROG ALARM,GIMBAL LOCK, NO ATT
 0279    REF  22  LAST  195   05,2662  7 1241 0            MASK     DSPTAB +11D      LAMPS INTACT ON HARDWARE RESTART
 0280    REF  22  LAST  198   05,2663  6 4752 0            AD       BIT15
 0281    REF  23  LAST  199   05,2664  57'241 1            XCH      DSPTAB +11D
 0282    REF  17  LAST  157   05,2665  7 4765 0            MASK     BIT4             IF NO ATT LAMP WAS ON, LEAVE ISS IN
 0283                         05,2666  0 0006 1            EXTEND                    COURSE ALIGN
 0284    REF   1              05,2667  1 2676 0            BZF      NOCOARSE
 0285    REF   7  LAST  162   05,2670  0 4714 1            TC       IBNKCALL         IF NO ATT LAMP ON, RETURN ISS TO
 0286    REF   2  LAST  156   05,2671   17070 0            CADR     SETCOARS             COARSE ALIGN

 0287    REF   6  LAST  199   05,2672  3 6211 0            CAF      SIX
 0288    REF   4  LAST  156   05,2673  0 5233 0            TC       WAITLIST
 0289    REF   4  LAST  156   E3,1474                      EBANK=   CDUIND
 0290    REF   2  LAST  156   05,2674   03064 0            2CADR    CA+ECE
 0290                         05,2675   16063 0
 0291    REF   1              05,2676  3 3240 1  NOCOARSE  CAF      IFAILINH         LEAVE FAILURE INHIBITS INTACT ON
 0292    REF  36  LAST  195   05,2677  7 1333 1            MASK     IMODES30             HARDWARE RESTART. RESET ALL
 0293    REF   1              05,2700  6 7660 0            AD       IM30INIR             FAILURE CODES.
 0294    REF  37  LAST  199   05,2701  55'333 1            TS       IMODES30

 0295    REF   4  LAST  160   05,2702  4 0101 0            CS       FLAGWRD5
 0296    REF   2  LAST  160   05,2703  7 4762 1            MASK     ENGONBIT
 0297   REF  39  LAST  199   05,2704  10 000 0             CCS      A
 0298   REF   1              05,2705  1 2730 0             TCF      GOPROG3
 0299   REF  18  LAST  176   05,2706  3 4754 0             CAF      BIT13
 0300                        05,2707  0 0006 1             EXTEND
 0301   REF   7  LAST  194   05,2710  05 011 1             WOR      DSALMOUT        TURN ENGINE ON
 0302   REF   2  LAST  200   05,2711  1 2730 0             TCF      GOPROG3
 0303                        05,2712  0 0004 0   ENEMA     INHINT
 0304   REF   2  LAST  198   05,2713  0 3023 0             TC       LIGHTSET        EXIT TO DOFSTART IF ERROR RESET AND
 0305   REF   1              05,2714  0 3054 0             TC       STARTSB2        MARK REJECT DEPRESSED SIMULTANEOUSLY
 0306   REF   2  LAST  199   05,2715  4 4753 0             CS       INTFLBIT
 0309   REF   5  LAST  199   05,2716  7 0106 1             MASK     FLGWRD10
 0310   REF   6  LAST  200   05,2717  54 106 1             TS       FLGWRD10

 0311   REF   2  LAST  199   05,2720  4 0102 0             CS       FLAGWRD6        IS TVC ON
 0312   REF   2  LAST  199   05,2721  7 4076 0             MASK     DPCONFIG
 0313                        05,2722  0 0006 1             EXTEND
 0314   REF   3  LAST  200   05,2723  6 2730 1             BZMF     GOPROG3         NO

 0315   REF   2  LAST  139   05,2724  3 5011 1             CAF      .5SEC           YES, CALL TVCEXEC TASK WHICH WAS KILLED
 0316   REF   5  LAST  199   05,2725  0 5233 0             TC       WAITLIST             IN STARTSB2.
 0317   REF   1              E6,1446                       EBANK=   CNTR
 0318   REF   1              05,2726   03037 0             2CADR    TVCEXEC
 0318   REF   1              05,2727   34066 0
 0319   REF   3  LAST  200   05,2730  3 0102 1   GOPROG3   CA       FLAGWRD6
 0320   REF   3  LAST  200   05,2731  7 4076 0             MASK     DPCONFIG
 0321                        05,2732  0 0006 1             EXTEND
 0322   REF   1              05,2733  6 2744 1             BZMF     GOPROG4
 0323   REF   1              05,2734  3 4764 0             CAF      TRACKBIT
 0324   REF   4  LAST  196   05,2735  7 0075 1             MASK     FLAGWRD1
 0325   REF  40  LAST  200   05,2736  10 000 0             CCS      A
 0326   REF   2  LAST  200   05,2737  1 2744 0             TCF      GOPROG4
 0327   REF   1              05,2740  0 4611 0             TC       E6SETTER
 0328   REF   1              05,2741  0 4463 1             TC       STOPRATE
 0329   REF   1              05,2742  3 5024 1             CAF      EBANK3
 0330   REF   3  LAST  198   05,2743  54 003 0             TS       EBANK
 0331   REF   1              05,2744  3 4773 0   GOPROG4   CAF      NUMGRPS         VERIFY PHASE TABLE AGREEMENTS
 0332   REF   1              05,2745  54 161 0   PCLOOP    TS       MPAC +5
 0333                        05,2746  6 0000 1             DOUBLE
 0334                        05,2747  0 0006 1             EXTEND
 0335   REF  41  LAST  200   05,2750  5 0000 1             INDEX    A
 0336   REF   2  LAST  196   05,2751  3 1156 1             DCA      -PHASE1         COMPLEMENT INTO A, DIRECT INTO L.
 0337                        05,2752  0 0006 1             EXTEND
 0338   REF   9  LAST  176   05,2753  06 001 0             RXOR     LCHAN           RESULT MUST BE -0 FOR AGREEMENT.
 0339   REF  42  LAST  200   05,2754  10 000 0             CCS      A
 0340   REF   1              05,2755  1 3012 0             TCF      PTBAD           RESTART FAILURE.
 0341   REF   2  LAST  200   05,2756  1 3012 0             TCF      PTBAD
 0342   REF   3  LAST  200   05,2757  1 3012 0             TCF      PTBAD

 0343   REF   2  LAST  200   05,2760  10 161 0             CCS      MPAC +5         PROCESS ALL RESTART GROUPS.
 0344   REF   1              05,2761  1 2745 1             TCF      PCLOOP
 0345   REF   3  LAST  200   05,2762  54 162 0             TS       MPAC +6          SET TO +0.
 0346   REF   1              05,2763  0 5350 1             TC       MMDSPLAY         DISPLAY MAJOR MODE

 0347                        05,2764  0 0004 0             INHINT                    RELINT DONE IN MMDSPLAY

 0348   REF   2  LAST  200   05,2765  3 4773 0             CAF      NUMGRPS          SEE IF ANY GROUPS RUNNING.
 0349   REF   4  LAST  201   05,2766  54 161 0  NXTRST     TS       MPAC +5
 0350                        05,2767  6 0000 1             DOUBLE
 0351   REF  43  LAST  200   05,2770  50 000 1             INDEX    A
 0352   REF   1              05,2771  11'156 0             CCS      PHASE1
 0353   REF   1              05,2772  1 2774 0             TCF      PACTIVE          PNZ - GROUP ACTIVE.
 0354   REF   1              05,2773  1 3001 1             TCF      PINACT           +0 - GROUP NOT RUNNING.

 0355   REF   5  LAST  201   05,2774  54 154 0  PACTIVE    TS       MPAC
 0356   REF   6  LAST  201   05,2775  24 154 1             INCR     MPAC             ABS OF PHASE.
 0357   REF   7  LAST  201   05,2776  24 162 1             INCR     MPAC +6          INDICATE GROUP DEMANDS PRESENT.
 0358   REF   2  LAST  198   05,2777  0 4636 0             TC       BANKCALL
 0359   REF   1              05,3000   03467 1             CADR     RESTARTS

 0360   REF   8  LAST  201   05,3001  10 161 0  PINACT     CCS      MPAC +5          PROCESS ALL RESTART GROUPS.
 0361   REF   1              05,3002  1 2766 0             TCF      NXTRST

 0362   REF   9  LAST  201   05,3003  10 162 0             CCS      MPAC +6          NO, CHECK PHASE ACTIVITY FLAG
 0363   REF   1              05,3004  1 2534 0             TCF      ENDRSTRT         PHASE ACTIVE
 0364   REF  23  LAST  199   05,3005  3 4752 0             CAF      BIT15            IS MODE -0
 0365   REF   2  LAST  195   05,3006  7 1214 0             MASK     MODREG
 0366                        05,3007  0 0006 1             EXTEND
 0367   REF   1              05,3010  1 4103 0             BZF      GOTOPOOH         NO
 0368   REF   2  LAST  201   05,3011  1 2534 0             TCF      ENDRSTRT         YES
 0369   REF  10  LAST  175   05,3012  0 5671 1  PTBAD      TC       ALARM            SET ALARM TO SHOW PHASE TABLE FAILURE.
 0370                        05,3013   01107 0             OCT      1107

 0371   REF   1              05,3014  1 2414 0             TCF      DOFSTART         IN R21.

R0372   ********* ****** ******
R0373
R0374   DO NOT USE GOPROG2 OR ENEMA WITHOUT CONSULTING POOH PEOPLE
R0375
 0376                        05,3015  0 0004 0  GOPROG2    INHINT
 0377   REF   2  LAST  200   05,3016  0 3054 0             TC       STARTSB2
 0378   REF   3  LAST  200   05,3017  4 4753 0             CS       INTFLBIT
 0379   REF   7  LAST  200   05,3020  7 0106 1             MASK     FLGWRD10
 0380   REF   8  LAST  201   05,3021  54 106 1             TS       FLGWRD10
 0381   REF   3  LAST  200   05,3022  1 2744 0             TCF      GOPROG4
 0382   REF  19  LAST  200       4754               OCT10000 =        BIT13
 0383   REF   3  LAST  195       4346               OCT30000 =        PRIO30
 0384   REF  16  LAST  173   05,3023  3 4762 0  LIGHTSET   CAF      BIT7             DOFSTART IF MARK REJECT AND EITHER
 0385                        05,3024  0 0006 1             EXTEND                    ERROR LIGHT RESET BUTTONS ARE DEPRESSED
 0386   REF   1              05,3025  02 016 1             RAND     NAVKEYIN
 0387                        05,3026  0 0006 1             EXTEND
 0388  REF   4 LAST  198  05,3027  1 3043 1            BZF     NONAVKEY        NO MARK REJECT
 0389  REF   1            05,3030  3 4342 0            CAF     OCT37
 0390                     05,3031  0 0006 1            EXTEND
 0391  REF   2 LAST  201  05,3032  02 016 1            RAND    NAVKEYIN        NAV DSKY KEYCODES,MARK,MARK REJECT
 0392  REF   1            05,3033  6 3246 1            AD      -ELR
 0393                     05,3034  0 0006 1            EXTEND
 0394  REF   5 LAST  202  05,3035  1 3044 0            BZF     NONAVKEY +1
 0395                     05,3036  0 0006 1            EXTEND
 0396  REF   1            05,3037  00 015 0            READ    MNKEYIN         MAIN DSKY KEYCODES
 0397  REF   2 LAST  202  05,3040  6 3246 1            AD      -ELR
 0398                     05,3041  0 0006 1            EXTEND
 0399                     05,3042  1 3044 0            BZF     +2

 0400  REF  17 LAST  198  05,3043  0 0002 0  NONAVKEY  TC      Q

 0401  REF   3 LAST  199  05,3044  0 3046 0    +1      TC      STARTSUB
 0402  REF   2 LAST  201  05,3045  1 2414 0            TCF     DOFSTART
 0403  REF   1            05,3046  3 3241 0  STARTSUB  CAF     LDNPHAS1        SET POINTER SO NEXT 20MS DOWNRUPT WILL
 0404  REF   1            05,3047  54 334 1            TS      DNTMGOTO        CAUSE THE CURRENT DOWNLIST TO BE
A0405                                                                          INTERRUPTED AND START SENDING FROM THE
A0406                                                                          BEGINNING OF THE CURRENT DOWNLIST

 0407  REF   1            05,3050  3 7662 1            CAF     OCT37774        37774 TO TIME5
 0408  REF   2 LAST  139  05,3051  54 030 0            TS      TIME5
 0409  REF   7 LAST  177  05,3052  6 4770 0            AD      ONE             37775 TO TIME4
 0410  REF   4 LAST  145  05,3053  54 027 0            TS      TIME4

 0411  REF   1            05,3054  3 3244 0  STARTSB2  CAF     OCT77603        TURN OFF UPLINK ACTY, TEMP CAUTION, KR,
 0412                     05,3055  0 0006 1            EXTEND                  FLASH, OP. ERROR. LEAVE OTHERS UNCHANGED
 0413  REF   8 LAST  200  05,3056  03 011 1            WAND    DSALMOUT

 0414  REF   5 LAST  177  05,3057  3 4750 1            CAF     POSMAX          37777 TO TIME3.
 0415  REF   1            05,3060  54 026 1            TS      TIME3

 0416  REF   1            05,3061  3 3245 1            CAF     OCT74777        TURN OFF TEST ALARMS, STANDBY ENABLE.
 0417                     05,3062  0 0006 1            EXTEND
 0418  REF   2 LAST  194  05,3063  03 013 0            WAND    CHAN13
 0419  REF   1            05,3064  3 4753 1            CAF     R21BIT          CLEAR BITS
 0420  REF   1            05,3065  6 4755 1            AD      P21BIT
 0421  REF   1            05,3066  6 4757 0            AD      SKIPVBIT
 0422                     05,3067  4 0000 0            COM
 0423  REF   1            05,3070  7 0076 1            MASK    FLAGWRD2
 0424  REF   2 LAST  202  05,3071  6 4757 0            AD      SKIPVBIT        NOW SET SKIPVHF FLAG.
 0425  REF   2 LAST  202  05,3072  54 076 1            TS      FLAGWRD2
 0426  REF   1            05,3073  4 4765 0            CS      MARKBIT
 0427  REF   5 LAST  200  05,3074  7 0075 1            MASK    FLAGWRD1
 0428  REF   6 LAST  202  05,3075  54 075 1            TS      FLAGWRD1

 0429  REF   1            05,3076  4 4765 0            CS      CYC61BIT
 0430  REF   6 LAST  162  05,3077  7 0074 0            MASK    FLAGWRD0
 0431   REF   7  LAST  202   05,3100  54 074 0          TS       FLAGWRD0
 0432   REF   4  LAST  194   E3,1400                    EBANK=   LST1
 0433   REF   2  LAST  200   05,3101  3 5024 1          CAF      EBANK3
 0434   REF   4  LAST  200   05,3102  54 003 0          TS       EBANK              SET FOR E3

 0435   REF   3  LAST  176   05,3103  3 4751 0          CAF      NEG1/2             INITIALIZE WAITLIST DELTA-TS.
 0436   REF   5  LAST  203   05,3104  55'407 1          TS       LST1 +7
 0437   REF   6  LAST  203   05,3105  55'406 0          TS       LST1 +6
 0438   REF   7  LAST  203   05,3106  55'405 0          TS       LST1 +5
 0439   REF   8  LAST  203   05,3107  55'404 1          TS       LST1  +4
 0440   REF   9  LAST  203   05,3110  55'403 0          TS       LST1  +3
 0441   REF  10  LAST  203   05,3111  55'402 1          TS       LST1  +2
 0442   REF  11  LAST  203   05,3112  55'401 1          TS       LST1  +1
 0443   REF  12  LAST  203   05,3113  55'400 0          TS       LST1

 0444   REF   1              05,3114  4 5274 1          CS       ENDTASK
 0445   REF   1              05,3115  55'410 1          TS       LST2
 0446   REF   2  LAST  203   05,3116  55'412 0          TS       LST2 +2
 0447   REF   3  LAST  203   05,3117  55'414 0          TS       LST2 +4
 0448   REF   4  LAST  203   05,3120  55'416 1          TS       LST2 +6
 0449   REF   5  LAST  203   05,3121  55'420 1          TS       LST2 +8D
 0450   REF   6  LAST  203   05,3122  55'422 0          TS       LST2 +10D
 0451   REF   7  LAST  203   05,3123  55'424 0          TS       LST2 +12D
 0452   REF   8  LAST  203   05,3124  55'426 1          TS       LST2 +14D
 0453   REF   9  LAST  203   05,3125  55'430 0          TS       LST2 +16D
 0454   REF   2  LAST  203   05,3126  4 5275 0          CS       ENDTASK +1
 0455   REF  10  LAST  203   05,3127  55'411 0          TS       LST2 +1
 0456   REF  11  LAST  203   05,3130  55'413 1          TS       LST2 +3
 0457   REF  12  LAST  203   05,3131  55'415 1          TS       LST2 +5
 0458   REF  13  LAST  203   05,3132  55'417 0          TS       LST2 +7
 0459   REF  14  LAST  203   05,3133  55'421 0          TS       LST2 +9D
 0460   REF  15  LAST  203   05,3134  55'423 1          TS       LST2 +11D
 0461   REF  16  LAST  203   05,3135  55'425 1          TS       LST2 +13D
 0462   REF  17  LAST  203   05,3136  55'427 0          TS       LST2 +15D
 0463   REF  18  LAST  203   05,3137  55'431 1          TS       LST2 +17D

 0464   REF  16  LAST  199   05,3140  4 4772 0          CS       ZERO               MAKE ALL EXECUTIVE REGISTER SETS
 0465   REF   1              05,3141  54 167 0          TS       PRIORITY           AVAILABLE.
 0466   REF   2  LAST  203   05,3142  54 203 1          TS       PRIORITY +12D
 0467   REF   3  LAST  203   05,3143  54 217 1          TS       PRIORITY +24D
 0468   REF   4  LAST  203   05,3144  54 233 1          TS       PRIORITY +36D
 0469   REF   5  LAST  203   05,3145  54 247 1          TS       PRIORITY +48D
 0470   REF   6  LAST  203   05,3146  54 263 1          TS       PRIORITY +60D
 0471   REF   7  LAST  203   05,3147  54 277 1          TS       PRIORITY +72D

 0472   REF  11  LAST  194   05,3150  55'322 1          TS       DSRUPTSW
 0473   REF   1              05,3151  54 067 1          TS       NEWJOB             SHOWS NO ACTIVE JOBS.

 0474   REF   1              05,3152  3 3243 1          CAF      VAC1ADRC           MAKE ALL VAC AREAS AVAILABLE.
 0475   REF   1              05,3153  54 400 1          TS       VAC1USE
 0476   REF   2  LAST  143   05,3154  6 5005 1             AD      LTHVACA
 0477   REF   1              05,3155  54 454 0             TS      VAC2USE
 0478   REF   3  LAST  204   05,3156  6 5005 1             AD      LTHVACA
 0479   REF   1              05,3157  54 530 0             TS      VAC3USE
 0480   REF   4  LAST  204   05,3160  6 5005 1             AD      LTHVACA
 0481   REF   1              05,3161  54 604 1             TS      VAC4USE
 0482   REF   5  LAST  204   05,3162  6 5005 1             AD      LTHVACA
 0483   REF   1              05,3163  54 660 0             TS      VAC5USE

 0484   REF   1              05,3164  3 4355 0             CAF     TEN              BLANK DSKY REGISTERS (PROGRAM,VERB,NOUN,
A0485                                                                               R1,R2,R3)
 0486   REF  10  LAST  201   05,3165  54 154 0   DSPOFF    TS      MPAC
 0487   REF  15  LAST   85   05,3166  4 4755 0             CS      BIT12
 0488   REF  11  LAST  204   05,3167  50 154 1             INDEX   MPAC
 0489   REF  24  LAST  199   05,3170  55'226 1             TS      DSPTAB
 0490   REF  12  LAST  204   05,3171  10 154 0             CCS     MPAC
 0491   REF   1              05,3172  1 3165 1             TCF     DSPOFF

 0492   REF   1              05,3173  55'000 1             TS      DELAYLOC
 0493   REF   2  LAST  204   05,3174  55'001 0             TS      DELAYLOC +1
 0494   REF   3  LAST  204   05,3175  55'002 0             TS      DELAYLOC +2
 0495   REF   4  LAST  204   05,3176  55'003 1             TS      DELAYLOC +3
 0496   REF   1              05,3177  54 045 1             TS      INLINK
 0497   REF   7  LAST  143   05,3200  55'201 1             TS      DSPCNT
 0498   REF   1              05,3201  55'245 1             TS      CADRSTOR
 0499   REF   1              05,3202  55'216 1             TS      REQRET
 0500   REF   1              05,3203  55'220 1             TS      CLPASS
 0501   REF   1              05,3204  55'215 1             TS      DSPLOCK
 0502   REF   1              05,3205  55'223 1             TS      MONSAVE          KILL MONITOR
 0503   REF   1              05,3206  55'224 0             TS      MONSAVE1
 0504   REF   1              05,3207  55'204 1             TS      VERBREG
 0505   REF   1              05,3210  55'205 0             TS      NOUNREG
 0506   REF   1              05,3211  55'246 1             TS      DSPLIST
 0507   REF   1              05,3212  55'335 1             TS      IMUCADR
 0508   REF   1              05,3213  55'324 1             TS      LGYRO
 0509   REF   1              05,3214  54 100 1             TS      FLAGWRD4         KILL INTERFACE DISPLAYS
 0510   REF   2  LAST   73   05,3215  54 301 1             TS      MARKINDX
 0511   REF   2  LAST  195   05,3216  55'247 0             TS      EXTVBACT
 0512   REF   1              05,3217  3 4775 0             CAF     NOUTCON
 0513   REF   5  LAST  145   05,3220  55'221 0             TS      NOUT

 0514   REF   1              05,3221  3 3242 0             CAF     LESCHK           SELF CHECK GO-TO REGISTER.
 0515   REF   2  LAST   87   05,3222  55'361 0             TS      SELFRET

 0516   REF   1              05,3223  4 4351 0             CS      VD1
 0517   REF   2  LAST  144   05,3224  55'202 1             TS      DSPCOUNT

 0518   REF  18  LAST  202   05,3225  0 0002 0             TC      Q
 0519   REF  13  LAST  178   05,3226  3 0001 0   T5IDLOC   CA      L                T5RUPT COMES HERE EVERY 163.84 SECS
 0520   REF   1              05,3227  1 5326 1             TCF     NOQRSM +1        WHEN NOBODY IS USING IT.
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L          FRESH START AND RESTART                                                                     USER'S PAGE NO. 14       E3 S3

 0521   REF    2  LAST  110   E6,1645                          EBANK=  CGANOW
 0522   REF    1              05,3230   03226 1   T5IDLER   2CADR   T5IDLOC
 0522   REF    1              05,3231   12066 1
 0523   REF    3  LAST  205   E6,1645                          EBANK=  CGANOW
 0524   REF    1              05,3232   02123 0             2CADR   REDORCS
 0524   REF    1              05,3233   42066 1
 0525   REF    4  LAST  205   E6,1645                          EBANK=  CGANOW
 0526   REF    1              05,3234   03222 0             2CADR   REDOTVC
 0526   REF    1              05,3235   34066 0
 0527   REF    5  LAST  205   E6,1645                          EBANK=  CGANOW
 0528   REF    1              05,3236   02000 0             2CADR   REDOSAT
 0528   REF    1              05,3237   54066 0
 0529                         05,3240   00435 0   IFAILINH  OCT     435
 0530   REF    1              05,3241   03446 1   LDNPHAS1  GENADR  DNPHASE1
 0531   REF    1              05,3242   03270 1   LESCHK    GENADR  SELFCHK
 0532   REF    2  LAST  203   05,3243   00400 0   VAC1ADRC  ADRES   VAC1USE
 0533                         05,3244   77603 1   OCT77603  OCT     77603
 0534                         05,3245   74777 0   OCT74777  OCT     74777
 0535   REF    1                 4773             NUMGRPS   EQUALS  FIVE
 0536                         05,3246   77755 0   -ELR      OCT     -22                -ERROR LIGHT RESET KEY CODE.
 0537                         05,3247   37411 1   IM30INIF  OCT     37411              INHIBITS IMU FAIL FOR 5 SEC AND PIP ISSW
 0538   REF    1                 7660             IM30INIR  =       PRIO37
 0539   REF    2  LAST  168      5055             IM33INIT  =       PRIO16             NO PIP OR TM FAIL SIGNALS.
 0540                         05,3250   00450 0   9,6,4     OCT     450
 0541                         05,3251   00130 0   OPTINITF  OCT     130
 0542   REF    4  LAST  174      5001             OPTINITR  =       BITS465
 0543                         05,3252   00000 1   SWINIT    OCT     0
 0544                         05,3253   00000 1             OCT     0
 0545                         05,3254   00000 1             OCT     0
 0546                         05,3255   00000 1             OCT     0

 0547                         05,3256   00000 1             OCT     0
 0548                         05,3257   00200 0             OCT     00200
 0549                         05,3260   00004 0             OCT     00004              .05GSW
 0550                         05,3261   00000 1             OCT     0
 0551                         05,3262   00000 1             OCT     0
 0552                         05,3263   00000 1             OCT     0
 0553                         05,3264   00000 1             OCT     0
 0554                         05,3265   00000 1             OCT     0
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R0555   ROUTINE NAME    GOTOPOOH -- ENTRANCE TO ROUTINE R00 (SELECTION OF NEW PROGRAM VIA V37)
R0557   FUNCTIONAL DESCRIPTION

R0558              1. FLASH V37 TO REQUEST SELECTION OF NEW PROGRAM
 0560   REF   1                   4000                          SETLOC FFTAG10
 0561                             4103                          BANK

 0562   REF   1                                                 COUNT* $$/P00
 0563   REF   1                   4103  0 5561 0   GOTOPOOH TC     DOWNFLAG
 0564   REF   1                   4104   00236 0            ADRES  AUTOSEQ
 0565   REF   1                   4105  0 5402 1   MNKGOPOO TC     PHASCHNG
 0566  *                          4106   05024 1            OCT    05024
 05665 *                          4107   13000 0            OCT    13000
 0567   REF   3  LAST  196        4110  0 4655 0            TC     POSTJUMP
 0568   REF   1                   4111   10000 0            CADR   GOPOOFIX
 0569   REF   1                   4112  3 4762 0   AUTOCHK  CAF    AUTSQBIT        IS THIS AN AUTO SEQUENCE
 0570   REF   9  LAST  201        4113  7 0106 1            MASK   FLGWRD10
 0571                             4114  0 0006 1            EXTEND
 0572   REF   2  LAST  173        4115  1 6711 1            BZF    TCQ             NO, RETURN TO CALLER
 0573   REF   2  LAST  206        4116  0 5402 1   AUTOCHK1 TC     PHASCHNG
 0574                             4117   05024 1            OCT    05024
 0575                             4120   13000 0            OCT    13000

A05755 *                                                                        GROUP 4 USE IS OK SINCE V37 TO FOLLOW
 0576   REF  20  LAST  201        4121  3 4754 0            CAF    BIT13
 0577   REF   1                   4122  56 0004 0           XCH    FBANK           INCORRECT IF P00'S NOT IN BANK4 (BIT13)
 0578   REF   1                   4123  0 1012 0            TC     AUTPOINT
 0580   REF   1                04,2000                          SETLOC VERB37
 0581                          04,2000                          BANK

 0582   REF   1                                                 COUNT* $$/P00
 0583   REF   1                04,2000  0 2767 0   GOPOOFIX TC     INITSUB
 0584   REF   1                04,2001  0 5531 0            TC     CLEARMRK +2
 0585   REF   1                04,2002  0 4112 1            TC     AUTOCHK
 0586   REF   1                04,2003  3 2006 0            CAF    V37N99
 0587   REF   1                04,2004  0 5535 1            TC     VNFLASH
 0588                          04,2005  0 2003 0            TC     -2

 0589                          04,2006   11343 0   V37N99   VN     3799
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P0590    PROGRAM NAME    V37                       ASSEMBLY        SUNDISK
R0591    LOG SECTION       FRESH START AND RESTART

R0592    FUNCTIONAL DESCRIPTION

R0593              1. CHECK IF NEW PROGRAM ALLOWED. IF BIT 1 OF FLAGWRD2(NODOFLAG) ISSET, AN ALARM 1520 IS CALLED.
R0595              2. CHECK FOR VALIDITY OF PROGRAM SELECTED. IF AN INVALID PROGRAM  IS SELECTED, THE OPERATOR ERROR LIGHT IS
R0597                 SET AND CURRENT ACTIVITY, IF ANY, CONTINUES.
R0598              3. SERVICER IS TERMINATED IF IT HAS BEEN RUNNING.
R0599              4. INSTALL IS EXECUTED TO AVOID INTERRUPTING INTEGRATION.
R0600              5. THE ENGINE IS TURNED OFF AND THE DAP IS INITIALIZED FOR COAST.
R0601              6. TRACK, UPDATE AND TARG1 FLAGS ARE SET TO ZERO.
R0602              7. DISPLAY SYSTEM IS RELEASED.
R0603              8. THE FOLLOWING ARE PERFORMED FOR EACH OF THE THREE CASES.
R0604                 A. PROGRAM SELECTED IS P00.
R0605                    1. RENDEZVOUS FLAG IS RESET (KILL P20).
R0606                    2. STATINT1      IS SCHEDULED BY SETTING RESTART GROUP 2.
R0607                    3. MAJOR MODE 00 IS STORED IN THE MODE REGISTER(MODREG).
R0608                    4. SUPERBANK 3 IS SELECTED.
R0609                    5. NOWOFLAG IS RESET.
R0610                    6. ALL RESTART GROUPS EXCEPT GROUP 2 ARE CLEARED. CONTROL ISTRANSFERRED TO RESTART PROGRAM (GOPROG2)
R0612                       WHICH CAUSES ALL CURRENT ACTIVITY TO BE DISCONTINUED AND A 9 MINUTE INTEGRATION CYCLE TO BE
R0614                       INITIATED.
R0615                 B. PROGRAM SELECTED IS P20
R0616                    1. IF THE CURRENT MAJOR MODE IS THE SAME AS THE SELECTED NEWPROGRAM, THE PROGRAM IS RE-INITIALIZED
R0618                       VIA V37XEQ, ALL RESTART GROUPS, EXCEPT GROUP 4 ARE CLEARED.
R0620                    2. IF THE CURRENT MAJOR MODE IS NOT EQUAL TO THE NEW REQUEST, A CHECK IS MADE TO SEE IF THE REQUEST-
R0622                       ED MAJOR MODE HAS BEEN RUNNING IN THE BACKGROUND,
R0623                       AND IF IT HAS, NO NEW PROGRAM IS SCHEDULED, THE EXISTING
R0624                       P20 IS RESTARTED TO CONTINUE, AND ITS MAJOR MODE IS SET.
R0625                    3. CONTROL IS TRANSFERRED TO GOPROG2.
R0626                 C. PROGRAM SELECTED IS NEITHER P00 NOR P20
R0627                    1. V37XEQ IS SCHEDULED (AS A JOB) BY SETTING RESTART GROUP 4
R0628                    2. ALL CURRENT ACTIVITY EXCEPT RENDEZVOUS AND TRACKING IS DISCONTINUED BY CLEARING ALL RESTART
R0630                       GROUPS. GROUP 2 IS CLEARED. IF THE RENDEZVOUS FLAG IS ON P20 IS RESTARTED IN GOPROG2 VIA REDOP20.
R0632                       TO CONTINUE.

R0633    INPUT/OUTPUT INFORMATION

R0634              A. CALLING SEQUENCE

R0635                 CONTROL IS DIRECTED TO V37 BY THE VERBFAN ROUTINE.
R0636                    VERBFAN GOES TO C(VERBTAB+C(VERBREG)). VERB 37 = MMCHANG.
R0637                    MMCHANG EXECUTES A   TC POSTJUMP, CADR V37.

R0638              B. ERASABLE INITIALIZATION       NONE

R0639              C. OUTPUT
R0640                 MAJOR MODE CHANGE
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L        FRESH START AND RESTART                                                                 USER'S PAGE NO. 17     E3 S3

R0641          D. DEBRIS
R0642             MMNUMBER, MPAC +1, MINDEX, BASETEMP +C(MINDEX), FLAGWRD0, FLAGWRD1, FLAGWRD2, MODREG, GOLOC -1,
R0644             GOLOC, GOLOC +1, GOLOC +2, BASETEMP, -PHASE2, PHASE2, -PHASE4

R0645    PROGRAM ANALYSIS

R0646          A. SUBROUTINES CALLED
R0647             ALARM, RELDSP, PINBRNCH, INTSTALL, ENGINOF2, ALLCOAST, V37KLEAN, GOPROG2, FALTON, FINDVAC, SUPERSW,
R0648             DSPMM

R0650          B. NORMAL EXIT        TC ENDOFJOB

R0651          C. ALARMS      1520 (MAJOR MODE CHANGE NOT PERMITTED)

 0653    REF   2  LAST  206     4000                         SETLOC FFTAG10
 0654                           4124                         BANK

 0655    REF   1                                             COUNT* $$/V37
 0656                           4124   00024 1  OCT24        MM      20
 0657                           4125   00031 0  OCT31        MM      25
 0659    REF   2  LAST  206  04,2000                         SETLOC VERB37
 0660                        04,2007                         BANK

 0661    REF   1                                             COUNT* $$/V37
 0662    REF   1             04,2007  55'200 0  V37          TS      MMNUMBER          SAVE MAJOR MODE
 0663    REF   2  LAST  206  04,2010  0 5561 0               TC      DOWNFLAG
 0664    REF   2  LAST  206  04,2011   00236 0               ADRES   AUTOSEQ
 0665    REF   3  LAST  208  04,2012  0 5561 0               TC      DOWNFLAG
 0666    REF   1             04,2013   00226 1               ADRES   PCMANFLG
 0667    REF   4  LAST  208  04,2014  0 5561 0               TC      DOWNFLAG
 0668    REF   1             04,2015   00215 1               ADRES   VHFRFLAG
 06681   REF   1             04,2016  0 4606 0               TC      E7SETTER
 06682   REF   3  LAST  140  E7,1722                         EBANK=  MRKBUF1
 06683   REF   3  LAST  195  04,2017  3 7702 0               CAF     NEGONE
 06684   REF   4  LAST  208  04,2020  55'722 0               TS      MRKBUF1           TO PREVENT P20 FROM PROCESSING P50'S MRK
 0669    REF   3  LAST  196  04,2021  4 0077 0               CS      FLAGWRD3
 0670    REF   2  LAST  196  04,2022  7 4754 1               MASK    REFSMBIT
 0671    REF  44  LAST  201  04,2023  10 000 0               CCS     A
 0672    REF   1             04,2024  1 2044 1               TCF     AUTO37
 0673    REF   2  LAST  208  04,2025  3 1200 1               CA      MMNUMBER
 0674    REF   1             04,2026  6 2031 1               AD      NEG79
 0675    REF  45  LAST  208  04,2027  10 000 0               CCS     A
 0676    REF   1             04,2030  1 2375 0               TCF     V37NONO
 0677                        04,2031   77660 1  NEG79        DEC     -79
 0678    REF   1             04,2032  1 2035 1               TCF     MMOK
 0679    REF   3  LAST  208  04,2033  3 1200 1  RENDP79      CA      MMNUMBER
 0680    REF   1             04,2034  1 2410 1               TCF     REND30S +1
 0681    REF   4  LAST  208  04,2035  3 1200 1  MMOK         CA      MMNUMBER
 0682    REF   1             04,2036  6 2406 1               AD      NEG30
 0683                        04,2037  0 0006 1               EXTEND
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0684   REF   2  LAST  208   04,2040  6 2044 0             BZMF    AUTO37        P01 - P30
0685   REF   1              04,2041  6 3770 1             AD      NEG6
0686                        04,2042  0 0006 1             EXTEND
0687   REF   2  LAST  208   04,2043  6 2407 0             BZMF    REND30S       P31 - P36 RENDEZVOUS
0688   REF   4  LAST  201   04,2044  3 4346 1  AUTO37     CAF     PRIO30
0689   REF   2  LAST  195   04,2045  54 365 0             TS      RESTREG

0690   REF  17  LAST  203   04,2046  3 4772 1             CAF     ZERO          ZERO OUT AUTO OPTICS RATE REGS
0691   REF   6  LAST  199   04,2047  54 740 0             TS      TOLD
0692   REF   5  LAST  199   04,2050  54 741 1             TS      SOLD
0693   REF   4  LAST  195   04,2051  54 735 1             TS      TRATE
0694   REF   4  LAST  195   04,2052  54 736 1             TS      SRATE
0695   REF   5  LAST  208   04,2053  0 5561 0             TC      DOWNFLAG
0696   REF   1              04,2054    00210 1            ADRES   P24FLAG
0697   REF  38  LAST  199   04,2055  3 1333 0             CA      IMODES30      IS IMU BEING INITIALIZED
0698   REF   3  LAST  156   04,2056  7 4763 0             MASK    IMUNITBT
0699   REF  46  LAST  208   04,2057  10 000 0             CCS     A
0700   REF   1              04,2060  1 2125 1             TCF     CANTR00

0701   REF   3  LAST  199   04,2061  3 4762 0             CAF     ENGONBIT      IS ENGINE ON
0702   REF   5  LAST  199   04,2062  7 0101 0             MASK    FLAGWRD5
0703   REF  47  LAST  209   04,2063  10 000 0             CCS     A
0704   REF   1              04,2064  1 2071 1             TCF     ROOTOP00      YES, SET UP FOR P00

0705   REF   4  LAST  200   04,2065  4 0102 0             CS      FLAGWRD6      NO, IS TVC DAP ON
0706   REF   4  LAST  200   04,2066  7 4076 0             MASK    DPCONFIG
0707                        04,2067  0 0006 1             EXTEND
0708   REF   1              04,2070  6 2116 0             BZMF    ISITP00       NO, CONTINUE WITH R00

0709   REF   2  LAST  200   04,2071  0 4611 0  ROOTOP00   TC      E6SETTER

0710   REF   6  LAST  187   E6,1465                       EBANK=  DAPDATR1
0711   REF   3  LAST  201   04,2072  0 4636 0             TC      BANKCALL      SPSOFF DOES AN INHINT
0712   REF   1              04,2073    51045 1            CADR    SPSOFF
0713   REF   8  LAST  199   04,2074  0 4714 1             TC      IBNKCALL
0714   REF   1              04,2075    13313 1            CADR    MASSPROP
0715   REF   1              04,2076  3 3054 0             CAF     3.1SEC
0716   REF   9  LAST  209   04,2077  0 4714 1             TC      IBNKCALL
0717   REF   1              04,2100    42043 0            CADR    RCSDAPON +1

0718   REF  10  LAST  209   04,2101  0 4714 1             TC      IBNKCALL
0719   REF   1              04,2102    51161 0            CADR    TVCZAP        DISABLE TVC
0720   REF  18  LAST  209   04,2103  3 4772 1             CAF     ZERO
0721   REF   5  LAST  208   04,2104  55'200 0             TS      MMNUMBER
0722                        04,2105  0 0003 1             RELINT
0723   REF   2  LAST  205   04,2106  3 4773 0             CAF     FIVE
0724   REF   4  LAST  209   04,2107  0 4636 0             TC      BANKCALL
0725   REF   1              04,2110    01731 0            CADR    DELAYJOB
0726   REF  19  LAST  209   04,2111  3 4772 1             CAF     ZERO
0727                        04,2112  0 0006 1             EXTEND
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0728                        04,2113  01 005 0             WRITE   5
0729                        04,2114  0 0006 1             EXTEND
0730                        04,2115  01 006 0             WRITE   6
0731  REF   6  LAST  209    04,2116  3 1200 1  ISITPOO    CA      MMNUMBER
0732                        04,2117  0 0006 1             EXTEND
0733  REF   1               04,2120  1 2151 1             BZF     ISSERVON        YES, CHECK SERVICER STATUS

0734  REF   3  LAST  202    04,2121  4 0076 1             CS      FLAGWRD2        NO, IS NODO V37 FLAG SET
0735  REF   1               04,2122  7 4770 1             MASK    NODOBIT
0736  REF  48  LAST  209    04,2123  10 000 0             CCS     A
0737  REF   1               04,2124  1 2132 1             TCF     CHECKTAB        NO
0738  REF  11  LAST  201    04,2125  0 5671 1  CANTROO    TC      ALARM
0739                        04,2126   01520 1             OCT     1520

0740  REF   1               04,2127  0 4432 0  V37BAD     TC      RELDSP          RELEASES DISPLAY FROM ASTRONAUT

0741  REF   4  LAST  206    04,2130  0 4655 0             TC      POSTJUMP        BRING BACK LAST NORMAL DISPLAY IF THERE
0742  REF   1               04,2131   21275 1             CADR    PINBRNCH        WAS ONE. OY

0743  REF   1               04,2132  3 3173 1  CHECKTAB   CA      NOV37MM         THE NO. OF MM
0744  REF  13  LAST  204    04,2133  54 155 1  AGAINMM    TS      MPAC +1
0745  REF  14  LAST  210    04,2134  50 155 0             NDX     MPAC +1
0746  REF   1               04,2135  3 3124 0             CA      PREMM1          OBTAIN WHICH MM THIS IS FOR
0747  REF   1               04,2136  7 6043 1             MASK    LOW7
0748                        04,2137  4 0000 0             COM
0749  REF   7  LAST  210    04,2140  6 1200 1             AD      MMNUMBER
0750  REF  49  LAST  210    04,2141  10 000 0             CCS     A
0751  REF  15  LAST  210    04,2142  10 155 1             CCS     MPAC +1         IF GR, SEE IF ANYMORE  IN LIST
0752  REF   1               04,2143  1 2133 0             TCF     AGAINMM         YES, GET NEXT ONE
0753  REF   2  LAST  208    04,2144  1 2375 0             TCF     V37NONO         LAST TIME OR PASSED MM

0754  REF  16  LAST  210    04,2145  3 0155 0             CA      MPAC +1
0755  REF   1               04,2146  55'177 0             TS      MINDEX          SAVE INDEX FOR LATER

0756  REF   1               04,2147  0 5547 1             TC      UPFLAG
0757  REF   1               04,2150   00055 1             ADRES   V50N18FL        66º35 55  518 490731Y

0758  REF   1               04,2151  4 0103 1  ISSERVON   CS      FLAGWRD7        V37 FLAG SET - I.E. IS SERVICER GOING
0759  REF   1               04,2152  7 4763 0             MASK    V37FLBIT
0760  REF  50  LAST  210    04,2153  10 000 0             CCS     A
0761  REF   1               04,2154  1 2162 1             TCF     CANV37          NO

0762                        04,2155  0 0004 0             INHINT
0763  REF   2  LAST  156    04,2156  4 4770 1             CS      AVEGBIT           YES TURN OFF AVERAGE G FLAG AND WAIT
0764  REF   7  LAST  202    04,2157  7 0075 1             MASK    FLAGWRD1        FOR SERVICER TO RETURN TO CANV37
0765  REF   8  LAST  210    04,2160  54 075 1             TS      FLAGWRD1

0766  REF   1               04,2161  1 5205 1             TCF     ENDOFJOB

0767  REF   1               04,2162  3 3053 1  CANV37     CAF     RODAD
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 0768   REF   1              04,2163  54 373 1              TS      TEMPFLSH

 0769   REF   3  LAST  206   04,2164  0 5402 1              TC      PHASCHNG
 0770                        04,2165   00014 1              OCT     14

 0771   REF   1              04,2166  0 6006 1   R00        TC      INTPRET

 0772                        04,2167   77624 1              CALL                  WAIT FOR INTEGRATION TO FINISH
 0773   REF   1              04,2170   27516 0                      INTSTALL
 0774                        04,2171   77776 1   DUMMYAD    EXIT

 0775   REF   1              04,2172  4 5024 0              CS      OCT1400       CLEAR CAUTION RESET
 0776                        04,2173  0 0006 1              EXTEND                  AND TEST CONNECTOR OUTBIT
 0777                        04,2174  03 011 1              WAND    11

 0778   REF   1              04,2175  3 3046 0              CAF     OCT44571      CLEAR ENABLE OPTICS ERROR COUNTER, STAR
 0779                        04,2176  0 0006 1              EXTEND                TRAKERS ON BIT, TVC ENABLE, ZERO OPTICS,
 0780                        04,2177  03 012 1              WAND    12            DISENGAGE OPTICS DAP, SIVB IN J SEQUENCE
A0781                                                                             START, AND SIVB CUTOFF BIT.
A0782
 0783   REF   1              04,2200  4 3047 0              CS      OCT600        CLEAR UNUSED BITS
 0784                        04,2201  0 0006 1              EXTEND
 0785                        04,2202  03 013 0              WAND    13

 0786   REF   2  LAST  206   04,2203  0 2767 0              TC      INITSUB

 0787   REF   2  LAST  206   04,2204  0 5527 1              TC      CLEARMRK

 0788   REF  20  LAST  209   04,2205  3 4772 1              CAF     ZERO
 0789   REF   1              04,2206  54 304 1              TS      STARIND

 0790   REF   6  LAST  209   04,2207  0 5561 0              TC      DOWNFLAG
 0791   REF   1              04,2210   00020 0              ADRES   STIKFLAG

 0792   REF   1              04,2211  0 4415 0              TC      UPACTOFF      TURN OFF UPLINK ACTIV LITE

 0793   REF   7  LAST  211   04,2212  0 5561 0              TC      DOWNFLAG
 0794   REF   1              04,2213   00037 0              ADRES   R21MARK

 0795   REF   8  LAST  210   04,2214  11'200 0              CCS     MMNUMBER      IS THIS A POOH REQUEST
 0796   REF   1              04,2215  1 2352 0              TCF     NOUVEAU       NO, PICK UP NEW PROGRAM

 0797   REF   2 LAST  206 TO  208:      7     7*            COUNT*  $$/P00
 0798   REF   2  LAST  210   04,2216  0 4432 0   POOH       TC      RELDSP        RELEASE DISPLAY SYSTEM

 0799   REF   1              04,2217  3 5047 1              CAF     PRIO5         SET VARIABLE RESTART REGISTER FOR P00.
 0800   REF   1              04,2220  55'262 1              TS      PHSPRDT2

 0801                        04,2221  0 0004 0              INHINT
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L        FRESH START AND RESTART                                                             USER'S PAGE NO.  21       E6 S3

 0802    REF   2  LAST  210   04,2222  4 4770 1              CS       NODOBIT         TURN OFF NODOFLAG
 0803    REF   4  LAST  210   04,2223  7 0076 1              MASK     FLAGWRD2
 0804    REF   5  LAST  212   04,2224  54 076 1              TS       FLAGWRD2

 0805    REF   3  LAST  209   04,2225  3 4773 0              CA       FIVE            SET 2.5 RESTART FOR STATEINT1
 0806    REF  14  LAST  204   04,2226  54 001 1              TS       L
 0807                         04,2227  4 0000 0              COM
 08075   REF   1              01,2036             2P5SPT1    =        2.5SPOT
 0808    REF   2  LAST  196   04,2230  53'160 0              DXCH     -PHASE2

 0809    REF   2  LAST  162   04,2231  3 4761 0              CA       IMUSEBIT        RESET IMUSE AND
 0810    REF   2  LAST  162   04,2232  6 4762 0              AD       RNDVZBIT        KILL P20
 0811                         04,2233  4 0000 0              COM
 0812    REF   8  LAST  203   04,2234  7 0074 0              MASK     FLAGWRD0
 0813    REF   9  LAST  212   04,2235  54 074 0              TS       FLAGWRD0                                    RENDFLG

 0814    REF   2  LAST  162   04,2236  4 4760 0              CS       UTBIT
 0815    REF   5  LAST  196   04,2237  7 0104 0              MASK     FLAGWRD8
 0816    REF   6  LAST  212   04,2240  54 104 0              TS       FLAGWRD8        CLEAR UT FLAG IN P00

 0817    REF   1              04,2241  3 4772 1              CAF      DNLADP00

 0818    REF   2 LAST  208 TO  211:   135    135*            COUNT*   $$/V37
 0819    REF   5  LAST  195   04,2242  54 332 1   SEUDOPOO   TS       DNLSTCOD        SET UP APPROPRIATE DOWNLIST.

A0820                                                                                   (OLD ONE WILL BE FINISHED FIRST)
 0821    REF   2  LAST  200   04,2243  3 4764 0              CA       TRACKBIT
 0822    REF   1              04,2244  6 4757 0              AD       TARG1BIT
 0823    REF   1              04,2245  6 4762 0              AD       UPDATBIT
 0824                         04,2246  4 0000 0              COM
 0825    REF   2  LAST  195   04,2247  55'275 1              TS       EBANKTEM
 0826    REF   9  LAST  210   04,2250  7 0075 1              MASK     FLAGWRD1
 0827    REF  10  LAST  212   04,2251  54 075 1              TS       FLAGWRD1

 0828    REF   1              04,2252  4 4767 1              CS       R67BIT          CLEAR R67FLAG. P20 WILL SET IT AGAIN
 0829    REF   7  LAST  212   04,2253  7 0104 0              MASK     FLAGWRD8        IF APPROPRIATE
 0830    REF   8  LAST  212   04,2254  54 104 0              TS       FLAGWRD8

 0831    REF  11  LAST  209   04,2255  0 4714 1   GROUPKIL   TC       IBNKCALL        KILL GROUPS 3,5,6
 0832    REF   1              04,2256   12550 1              CADR     V37KLEAN

 0833    REF   9  LAST  211   04,2257  11'200 0              CCS      MMNUMBER        IS IT P00H
 0834    REF   1              04,2260  1 2270 1              TCF      RENDVOO         NO
 0835    REF  12  LAST  212   04,2261  0 4714 1              TC       IBNKCALL
 0836    REF   1              04,2262   12542 1              CADR     POOKLEAN        REDUNDANT EXCEPT FOR GROUP 4.

 0837    REF   1              04,2263  0 3002 0              TC       INITSUBA
 0838    REF  10  LAST  212   04,2264  3 1200 1   GOMOD      CA       MMNUMBER
 0839    REF   3  LAST  201   04,2265  55'214 0              TS       MODREG
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0840    REF   5  LAST  210   04,2266  0 4655 0  GOGOPROG TC       POSTJUMP
0841    REF   1              04,2267   13015 1           CADR     GOPROG2

0842    REF  11  LAST  212   04,2270  4 1200 0  RENDVOO  CS       MMNUMBER          IS NEW PROG = 20
0843    REF   2  LAST  174   04,2271  6 4124 1           AD       OCT24             20
0844                         04,2272  0 0006 1           EXTEND
0845    REF   1              04,2273  1 2275 1           BZF      RENDNOO           YES
0846    REF   1              04,2274  1 2311 1           TCF      POOFIZZ

0847    REF  12  LAST  213   04,2275  4 1200 0  RENDNOO  CS       MMNUMBER
0848    REF   4  LAST  212   04,2276  6 1214 1           AD       MODREG
0849                         04,2277  0 0006 1           EXTEND
0850    REF   1              04,2300  1 2321 1           BZF      KILL20

0851    REF   9  LAST  212   04,2301  3 0104 1           CA       FLAGWRD8
0852    REF   3  LAST  212   04,2302  7 4760 0           MASK     UTBIT
0853    REF  51  LAST  210   04,2303  10 000 0           CCS      A
0854    REF   1              04,2304  1 2333 1           TCF      STATQUO1

0855    REF  10  LAST  212   04,2305  3 0074 1           CA       FLAGWRD0          IS RENDEZVOO FLAG SET
0856    REF   3  LAST  212   04,2306  7 4762 1           MASK     RNDVZBIT
0857    REF  52  LAST  213   04,2307  10 000 0           CCS      A
0858    REF   1              04,2310  1 2340 0           TCF      STATQUO

0859    REF  10  LAST  213   04,2311  3 0104 1  POOFIZZ  CA       FLAGWRD8
0860    REF   4  LAST  213   04,2312  7 4760 0           MASK     UTBIT
0861    REF  53  LAST  213   04,2313  10 000 0           CCS      A
0862    REF   2  LAST  213   04,2314  1 2325 0           TCF      KILL20 +4
0863    REF   4  LAST  213   04,2315  3 4762 0           CAF      RNDVZBIT
0864    REF  11  LAST  213   04,2316  7 0074 0           MASK     FLAGWRD0
0865    REF  54  LAST  213   04,2317  10 000 0           CCS      A
0866    REF   1              04,2320  1 2330 1           TCF      REV37
0867                         04,2321  0 0006 1  KILL20   EXTEND                     NO, KILL GROUPS 1 + 2
0868    REF  11  LAST  197   04,2322  3 4772 1           DCA      NEG0
0869    REF   3  LAST  200   04,2323  53'156 0           DXCH     -PHASE1

0870    REF   2  LAST  212   04,2324  0 3002 0           TC       INITSUBA
0871                         04,2325  0 0006 1     +4    EXTEND
0872    REF  12  LAST  213   04,2326  3 4772 1           DCA      NEG0
0873    REF   3  LAST  212   04,2327  53'160 0           DXCH     -PHASE2

0874    REF   1              04,2330  3 3052 0  REV37    CAF      V37QCAD           SET RESTART POINT
0875    REF   2  LAST  211   04,2331  54 373 1           TS       TEMPFLSH

0876    REF   1              04,2332  1 2266 0           TCF      GOGOPROG

0877    REF   4  LAST  212   04,2333  3 4773 0  STATQUO1 CAF      FIVE              SET 2.5 RESTART FOR STATEINT1
0878    REF  15  LAST  212   04,2334  54 001 1           TS       L
08785   REF   2  LAST  212   01,2036            2P5SPT2  =        2.5SPUT
0879                         04,2335  4 0000 0           COM
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 0880    REF   4  LAST  213    04,2336  53'160 0              DXCH    -PHASE2
 0881    REF   2  LAST  213    04,2337  1 2343 0              TCF     STATQUO +3
 0882    REF  11  LAST  212    04,2340  4 0075 1   STATQUO    CS      FLAGWRD1         SET TRACK FLAG AND UPDATE FLAG
 0883    REF   2  LAST  212    04,2341  7 4762 1              MASK    UPDATBIT
 0884    REF  12  LAST  214    04,2342  26 075 1              ADS     FLAGWRD1
 0885    REF  13  LAST  214    04,2343  4 0075 1   +3         CS      FLAGWRD1
 0886    REF   3  LAST  212    04,2344  7 4764 1              MASK    TRACKBIT
 0887    REF  14  LAST  214    04,2345  26 075 1              ADS     FLAGWRD1

 0888                          04,2346  0 0006 1              EXTEND                   KILL GROUP 4
 0889    REF  13  LAST  213    04,2347  3 4772 1              DCA     NEG0
 0890    REF   2  LAST  196    04,2350  53'164 1              DXCH    -PHASE4

 0891    REF   1               04,2351  1 2264 1              TCF     GOMOD

 0892    REF   5  LAST  213    04,2352  3 4762 0   NOUVEAU    CAF     RNDVZBIT
 0893    REF  12  LAST  213    04,2353  7 0074 0              MASK    FLAGWRD0
 0894    REF  55  LAST  213    04,2354  10 000 0              CCS     A
 0895                          04,2355  1 2364 0              TCF     +7
 0896    REF   5  LAST  213    04,2356  3 4760 1              CAF     UTBIT
 0897    REF  11  LAST  213    04,2357  7 0104 0              MASK    FLAGWRD8
 0898    REF  56  LAST  214    04,2360  10 000 0              CCS     A
 0899                          04,2361  1 2364 0              TCF     +3
 0900    REF   8  LAST  211    04,2362  0 5561 0              TC      DOWNFLAG         NO, RESET IMUSE FLAG.
 0901    REF   1               04,2363   00007 0              ADRES   IMUSE            BIT 8 FLAG 0
 0902    REF   2  LAST  210    04,2364  51'177 1   +3         INDEX   MINDEX
 0903    REF   2  LAST  210    04,2365  3 3124 0              CAF     PREMM1           EXTRACT DOWNLIST ADDRESS
 0904    REF   1               04,2366  54 022 0              TS      CYL              SHIFT BITS 15 - 13 TO BITS 3 - 1
 0905    REF   2  LAST  214    04,2367  4 0022 0              CS      CYL
 0906    REF   3  LAST  214    04,2370  4 0022 0              CS      CYL
 0907    REF   4  LAST  214    04,2371  56 022 1              XCH     CYL
 0908    REF   1               04,2372  7 4774 0              MASK    SEVEN            KEEP DOWNLIST CODE BITS
 0909                          04,2373  0 0004 0              INHINT
 0910    REF   1               04,2374  1 2242 0              TCF     SEUDOPUD

 0911    REF   1               04,2375  0 4362 1   V37NONO    TC      FALTON           COME HERE IF MM REQUESTED DOESNT EXIST

 0912    REF   1               04,2376  1 2127 0              TCF     V37BAD

 0913    REF   3  LAST  208    04,2000                        SETLOC  VERB37           MUST BE IN BANK 4 BECAUSE OF AUTOCHK
 0914                          04,2377                        BANK
 09145   REF   1                                              COUNT*  $$/MNKEY
 0915                          04,2377   00051 0   DEC41      DEC     41
 0916                          04,2400   00114 0   DEC76      DEC     76
 0917                          04,2401   00064 0   DEC52      DEC     52
 0918    REF   3  LAST  213       4124             DEC20      =       OCT24
 0919    REF   1                  4342             DEC31      =       LOW5
 0920    REF  19  LAST  174       4763             DEC32      =       BIT6
 0921    REF   1                  5004             DEC40      =       OCT50
 0922    REF   1                  5003             DEC33      =       33DEC
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L         FRESH START AND RESTART                                                            USER'S PAGE NO.  24       E6 S3

 0923   REF   1                   4260              DEC34      =       34DEC
 0924                          04,2402   00044 1  DEC36      DEC     36
 0925                          04,2403   00043 0  DEC35      DEC     35
 0926                          04,2404   00117 0  DEC79      DEC     79
 0927   REF   1                04,3770              NEG6       =       DEC-6
 0928                          04,2405   00126 1  DEC86      DEC     86
 0929                          04,2406   77741 0  NEG30      DEC     -30
 0930   REF   1                   5011              DEC50      =       OCT62
 0931   REF   1                   4777              CKLSTAUT   =       LOW4
 0932   REF   1                04,2407  6 2405 1  REND30S    AD      DEC86          CHANGE P3X TO P8X
 0933   REF   1                04,2410  55'113 1    +1       TS      TEMPMM               AND SAVE
 0934   REF   6  LAST  214     04,2411  3 4760 1             CAF     UTBIT
 0935   REF  12  LAST  214     04,2412  7 0104 0             MASK    FLAGWRD8
 0936                          04,2413  0 0006 1             EXTEND
 0937   REF   1                04,2414  1 2421 0             BZF     UTOFF

 0938   REF   9  LAST  214     04,2415  0 5561 0             TC      DOWNFLAG
 0939   REF   1                04,2416   00031 0             ADRES   TRACKFLG

 0940   REF  10  LAST  215     04,2417  0 5561 0             TC      DOWNFLAG
 0941   REF   1                04,2420   00176 1             ADRES   UTFLAG

 0942   REF  13  LAST  214     04,2421  4 0074 0  UTOFF      CS      FLAGWRD0       HAS P20 BEEN ON
 0943   REF   6  LAST  214     04,2422  7 4762 1             MASK    RNDVZBIT
 0944                          04,2423  0 0006 1             EXTEND
 0945   REF   1                04,2424  1 2431 1             BZF     NOP20          YES
 0946   REF   2  LAST  210     04,2425  0 5547 1             TC      UPFLAG
 0947   REF   3  LAST  208     04,2426   00236 0             ADRES   AUTOSEQ        SET TO CAUSE RETURN FROM P20

 0948   REF   1                04,2427  3 4124 1             CAF     DEC20          NO - TURN ON P20
 0949   REF   1                04,2430  0 2507 1             TC      AUTOSET
 0950   REF   2  LAST  215     04,2431  3 1113 0  NOP20      CA      TEMPMM
 0951   REF  13  LAST  213     04,2432  55'200 0  AUTOSETA   TS      MMNUMBER
 0952   REF   3  LAST  209     04,2433  0 2044 0             TC      AUTO37
 0953   REF  19  LAST  204     04,2434  3 0002 0  MINKDISP   CA      Q
 0954   REF   2  LAST  206     04,2435  55'012 1             TS      AUTPOINT
 0955   REF   1                04,2436  4 5011 0             CS      DEC50
 0956   REF  14  LAST  215     04,2437  6 1200 1             AD      MMNUMBER
 0957   REF   1                04,2440  0 5347 1             TC      NEWMODEA       CHANGE MAJOR MODE TO 30'S
 0958   REF   3  LAST  211     04,2441  0 4432 0             TC      RELDSP
 0959   REF   1                04,2442  3 4777 1             CAF     CKLSTAUT
 0960   REF   5  LAST  209     04,2443  0 4636 0             TC      BANKCALL
 0961   REF   1                04,2444   21067 0             CADR    GOPERF1
 0962   REF   2  LAST  201     04,2445  1 4103 0             TCF     GOTOPOOH
 0963   REF   1                04,2446  0 2452 0             TC      STARTAUT       PRO - DO MINKEY
 0964   REF  11  LAST  215     04,2447  0 5561 0             TC      DOWNFLAG       ENTER - NO MINKEY
 0965   REF   4  LAST  215     04,2450   00236 0             ADRES   AUTOSEQ
 0966   REF   3  LAST  215     04,2451  0 1012 0             TC      AUTPOINT
 0967   REF   2  LAST  196     04,2452  3 0107 1  STARTAUT   CA      FLGWRD11       INITIALIZE MINKEY
 0968   REF   1                04,2453  7 4761 1             MASK    AZIMBIT
 0969   REF  57  LAST  214   04,2454  10 000 0               CCS     A
 0970   REF   1              04,2455  1 2470 1               TCF     STRTAUT1
 0971   REF   3  LAST  215   04,2456  0 5547 1               TC      UPFLAG
 0972   REF   1              04,2457   00254 1               ADRES   AZIMFLAG
 0973                        04,2460  22 007 0               ZL
 0974   REF  10  LAST  206   04,2461  4 0106 1               CS      FLGWRD10
 0975   REF   2  LAST  196   04,2462  7 4756 0               MASK    HDSUPBIT
 0976                        04,2463  0 0006 1               EXTEND
 0977                        04,2464  1 2467 1               BZF     +3
 0978                        04,2465  0 0006 1               EXTEND
 0979   REF   3  LAST   34   04,2466  3 3760 0               DCA     XUNIT
 0980   REF   1              04,2467  53'353 1               DXCH    AZIMANGL
 0981   REF   6  LAST  209   04,2470  4 0101 0     STRTAUT1  CS      FLAGWRD5
 0982   REF   1              04,2471  7 4770 1               MASK    RENDWBIT
 0983                        04,2472  0 0006 1               EXTEND
 0984                        04,2473  1 2500 1               BZF     +5                   YES
 0985   REF   4  LAST  216   04,2474  0 5547 1               TC      UPFLAG               NO
 0986   REF   1              04,2475   00240 1               ADRES   MANEUFLG
 0987   REF   5  LAST  216   04,2476  0 5547 1               TC      UPFLAG
 0988   REF   1              04,2477   00241 0               ADRES   PTV93FLG
 0989   REF   6  LAST  216   04,2500  0 5547 1               TC      UPFLAG
 0990   REF   2  LAST  208   04,2501   00215 1               ADRES   VHFRFLAG             EQUIVALENT TO A V87

 0991   REF  12  LAST  215   04,2502  0 5561 0               TC      DOWNFLAG
 0992   REF   1              04,2503   00244 0               ADRES   PCFLAG
 0993   REF   7  LAST  216   04,2504  0 5547 1               TC      UPFLAG
 0994   REF   5  LAST  215   04,2505   00236 0               ADRES   AUTOSEQ

 0995   REF   4  LAST  215   04,2506  0 1012 0               TC      AUTPOINT
 0996                        04,2507  0 0006 1     AUTOSET   EXTEND
 0997   REF   1              04,2510  23'356 0               QXCH    AUTTEMP
 0998   REF  15  LAST  215   04,2511  55'200 0      +2       TS      MMNUMBER
 0999   REF   4  LAST  211   04,2512  0 5402 1               TC      PHASCHNG
 1000                        04,2513   04024 0               OCT     04024

 1001   REF   2  LAST  216   04,2514  3 1356 0               CA      AUTTEMP
 1002   REF   5  LAST  216   04,2515  55'012 1               TS      AUTPOINT

 1003   REF   4  LAST  215   04,2516  0 2044 0               TC      AUT037

 1004                        04,2517  0 0006 1     BURNHOW   EXTEND
 1005   REF   3  LAST  216   04,2520  23'356 0               QXCH    AUTTEMP
 1006   REF   2  LAST  211   04,2521  0 6006 1               TC      INTPRET
 1007                        04,2522   51575 1               VLOAD   ABVAL
 1008   REF   1              04,2523   03405 0                       DELVLVC
 1009                        04,2524   51025 1               DSU     BPL
 1010   REF   1              04,2525   10536 0                       DV40/41              THRESHHOLD DELTA V FOR SPS BURN
 1011   REF   1              04,2526   10532 1                       P40BURN
 1012                        04,2527   77776 1               EXIT
 1013   REF   1              04,2530  3 2377 0               CAF     DEC41                CALL P41
 1014   REF   2  LAST  215   04,2531  0 2511 0               TC       AUTOSET +2
 1015                        04,2532   77776 1  P40BURN      EXIT
 1016   REF   1              04,2533  3 5004 0               CAF      DEC40              CALL P40
 1017   REF   3  LAST  217   04,2534  0 2511 0               TC       AUTOSET +2
 1018                        04,2535   00002 0  DV40/41      2DEC     .021336 B-7        7 FPS IN M/CS B-7
 1018                        04,2536   27311 1
 1019   REF   1              04,2537  0 2434 0  P81          TC       MINKDISP
 1020   REF   1              04,2540  3 4342 0  P81CONT1     CAF      DEC31
 1021   REF   4  LAST  217   04,2541  0 2507 1               TC       AUTOSET
 1022   REF   1              04,2542  0 2517 0               TC       BURNHOW
 1023   REF   1              04,2543  0 2724 1               TC       AFTERBRN
 1024   REF   1              04,2544  1 2546 0               TCF      P82CONT1
 1025   REF   2  LAST  217   04,2545  0 2434 0  P82          TC       MINKDISP
 1026   REF  13  LAST  216   04,2546  0 5561 0  P82CONT1     TC       DOWNFLAG
 1027   REF   1              04,2547   00256 0               ADRES    CSISFLAG
 1028   REF   1              04,2550  3 4763 1  P82CONT2     CAF      DEC32
 1029   REF   5  LAST  217   04,2551  0 2507 1               TC       AUTOSET
 1030   REF   2  LAST  217   04,2552  0 2517 0               TC       BURNHOW
 1031   REF   2  LAST  217   04,2553  0 2724 1               TC       AFTERBRN
 1032   REF   3  LAST  131   E7,1765                         EBANK=   NN
 1033   REF   1              04,2554  3 5046 0               CAF      EBANK7
 1034   REF   5  LAST  203   04,2555  54 0003 0              TS       EBANK
 1035   REF   4  LAST  217   04,2556  3 1765 1               CA       NN
 1036   REF   1              04,2557  6 7701 0               AD       NEG2
 1037   REF   4  LAST  135   04,2560  55'414 0               TS       RTARG

 1038   REF   5  LAST  216   04,2561  0 5402 1               TC       PHASCHNG
 1039                        04,2562   04024 0               OCT      04024

 1040   REF   5  LAST  217   04,2563  3 1414 1               CA       RTARG
 1041   REF   5  LAST  217   04,2564  55'765 0               TS       NN
 1042   REF   2  LAST  217   04,2565  6 7701 0               AD       NEG2
 1043                        04,2566  4 0000 0               COM
 1044                        04,2567  0 0006 1               EXTEND
 1045                        04,2570  6 2572 0               BZMF     +2                 N = 2 OR GREATER
 1046   REF   1              04,2571  1 2607 0               TCF      P86CONT1           N = 1
 1047   REF   8  LAST  216   04,2572  0 5547 1               TC       UPFLAG
 1048   REF   2  LAST  217   04,2573   00256 0               ADRES    CSISFLAG
 1049   REF   3  LAST  216   04,2574  0 6006 1               TC       INTPRET
 1050                        04,2575   77745 1               DLOAD
 1051   REF   1              04,2576   02351 1                        TCSI2
 1052   REF   3  LAST  186   04,2577   02463 1               STORE    TCSI
 1053                        04,2600   77776 1               EXIT
 1054   REF   6  LAST  217   04,2601  3 1765 1               CA       NN
 1055   REF   3  LAST  217   04,2602  6 7701 0               AD       NEG2
 1056                        04,2603  0 0006 1               EXTEND
 1057   REF   1              04,2604  6 2540 1               BZMF     P81CONT1           N = 2 HAM
 1058   REF   2  LAST  217   04,2605  0 2546 1               TC       P82CONT1           MULTIPLE CSIS
 1059   REF   3  LAST  217   04,2606  0 2434 0  P86          TC       MINKDISP
 1060   REF   1              04,2607  3 2402 0  P86CONT1     CAF      DEC36
 1061   REF   6  LAST  217   04,2610  0 2507 1              TC      AUTOSET
 1062   REF   4  LAST  217   04,2611  0 6006 1              TC      INTPRET
 1063                        04,2612   51575 1              VLOAD   ABVAL
 1064   REF   2  LAST  216   04,2613   03405 0                      DELVLVC
 1065                        04,2614   77454 1              BZE     EXIT
 1066   REF   1              04,2615   10642 0                      NOPC
 1067   REF   1              04,2616  3 2401 0              CAF     DEC52
 1068   REF   7  LAST  218   04,2617  0 2507 1              TC      AUTOSET
 1069   REF  11  LAST  216   04,2620  4 0106 1              CS      FLGWRD10
 1070   REF   1              04,2621  7 4770 1              MASK    PCBIT
 1071                        04,2622  0 0006 1              EXTEND
 1072   REF   1              04,2623  1 2637 0              BZF     DOP41              PULSE TORQUING NOT DONE - CALL P41
 1073   REF   3  LAST  217   04,2624  0 2517 0              TC      BURNHOW            P40 OR P41
 1074   REF   3  LAST  217   04,2625  0 2724 1              TC      AFTERBRN
 1075   REF   9  LAST  217   04,2626  0 5547 1  P86CONT2    TC      UPFLAG
 1076   REF   2  LAST  208   04,2627   00226 1              ADRES   PCMANFLG
 1077   REF   2  LAST  215   04,2630  3 4124 1              CAF     DEC20              MANEUVER TO TRACK ATTITUDE
 1078   REF   8  LAST  218   04,2631  0 2507 1              TC      AUTOSET
 1079   REF  14  LAST  217   04,2632  0 5561 0              TC      DOWNFLAG
 1080   REF   3  LAST  218   04,2633   00226 1              ADRES   PCMANFLG
 1081   REF   2  LAST  218   04,2634  3 2401 0              CAF     DEC52
 1082   REF   9  LAST  218   04,2635  0 2507 1              TC      AUTOSET
 1083   REF   1              04,2636  0 2647 0              TC      P83CONT1
 1084   REF   2  LAST  216   04,2637  3 2377 0  DOP41       CAF     DEC41
 1085   REF  10  LAST  218   04,2640  0 2507 1              TC      AUTOSET
 1086   REF   1              04,2641  0 2644 0              TC      PCP76
 1087                        04,2642   77414 0  NOPC        SET     EXIT
 1088   REF   1              04,2643   05065 1                      BURNFLAG
 1089   REF   4  LAST  218   04,2644  0 2724 1  PCP76       TC      AFTERBRN
 1090   REF   2  LAST  218   04,2645  0 2647 0              TC      P83CONT1
 1091   REF   4  LAST  217   04,2646  0 2434 0  P83         TC      MINKDISP
 1092   REF   1              04,2647  3 5003 1  P83CONT1    CAF     DEC33
 1093   REF  11  LAST  218   04,2650  0 2507 1              TC      AUTOSET
 1094   REF   4  LAST  218   04,2651  0 2517 0              TC      BURNHOW
 1095   REF  10  LAST  218   04,2652  0 5547 1              TC      UPFLAG             SET TO INDICATE PASSIVE CDH
 1096   REF   1              04,2653   00050 1              ADRES   AVFLAG
 1097   REF   5  LAST  218   04,2654  0 2724 1              TC      AFTERBRN
 1098   REF   1              04,2655  1 2657 0              TCF     P84CONT1
 1099   REF   5  LAST  218   04,2656  0 2434 0  P84         TC      MINKDISP
 1100   REF   1              04,2657  3 4260 1  P84CONT1    CAF     DEC34
 1101   REF  12  LAST  218   04,2660  0 2507 1              TC      AUTOSET
 1102   REF   5  LAST  218   04,2661  0 2517 0              TC      BURNHOW
 1103   REF   6  LAST  218   04,2662  0 2724 1              TC      AFTERBRN
 1104   REF   1              04,2663  1 2665 1              TCF     P85CONT1
 1105   REF   6  LAST  218   04,2664  0 2434 0  P85         TC      MINKDISP
 1106   REF   1              04,2665  3 2403 1  P85CONT1    CAF     DEC35
 1107   REF  13  LAST  218   04,2666  0 2507 1              TC      AUTOSET
 1108   REF   6  LAST  218   04,2667  0 2517 0              TC      BURNHOW
 1109   REF   7  LAST  218   04,2670  0 2724 1              TC      AFTERBRN
 1110   REF   2  LAST  218   04,2671  3 2403 1  P89CONT1    CAF     DEC35
 1111   REF  14  LAST  218   04,2672  0 2507 1            TC       AUTOSET
 1112   REF   7  LAST  218   04,2673  0 2517 0            TC       BURNHOW
 1113   REF   8  LAST  218   04,2674  0 2724 1            TC       AFTERBRN
 1114   REF   1              04,2675  3 2404 0            CAF      DEC79
 1115   REF   1              04,2676  0 2432 0            TC       AUTOSETA
 11155  REF   1                                           COUNT*   $$/P79
 1116   REF  11  LAST  218   04,2677  0 5547 1  P79       TC       UPFLAG
 1117   REF   4  LAST  218   04,2700   00226 1            ADRES    PCMANFLG        FORCE P20 TO EXIT AFTER MANEUVER

 1120   REF  12  LAST  219   04,2701  0 5547 1            TC       UPFLAG
 1121   REF   2  LAST  215   04,2702   00031 0            ADRES    TRACKFLG

 1122   REF  21  LAST  211   04,2703  3 4772 1            CAF      ZERO
 1123   REF  16  LAST  213   04,2704  54 001 1            TS       L
 1124   REF   2  LAST  130   04,2705  53'740 1            DXCH     UTPIT

 11241  REF   1              04,2706  3 2715 0            CAF      P79LOCRT
 11242  REF   6  LAST  216   04,2707  55'012 1            TS       AUTPOINT
 11243  REF   2  LAST  215   04,2710  1 2452 1            TCF      STARTAUT
 1125   REF   1              04,2711  3 2714 1  P791      CAF      P79LOC
 1126   REF   7  LAST  219   04,2712  55'012 1            TS       AUTPOINT

 1127   REF   2  LAST  210   04,2713  0 5205 0            TC       ENDOFJOB
 1128   REF   1              04,2714   02716 0  P79LOC    ADRES    P79A

 11281  REF   1              04,2715   02711 1  P79LOCRT ADRES    P791

 1129   REF   2  LAST  211   04,2716  3 5047 1  P79A      CAF      PRIO5
 1130   REF   2  LAST  194   04,2717  0 5135 0            TC       FINDVAC
 1131   REF   2  LAST   96   E4,1760                      EBANK=   SUBEXIT
 1132   REF   1              04,2720   02564 1            2CADR    V83PERF
 1132   REF   1              04,2721   66104 1
 1133   REF   6  LAST  213   04,2722  0 4655 0            TC       POSTJUMP        RETURN TO P20 FOR TRACKING
 1134   REF   1              04,2723   74207 1            CADR     P20TRACK
 11345  REF   2 LAST  214 TO  219:    192    192*         COUNT*   $$/MNKEY
 1135                        04,2724  0 0006 1  AFTERBRN  EXTEND
 1136   REF   4  LAST  216   04,2725  23'356 0            QXCH     AUTTEMP
 1137  *REF   1              04,2726  3 5051 0            CAF      PRIO7
 1138   REF   3  LAST  219   04,2727  0 5135 0            TC       FINDVAC
 1139   REF   2  LAST  134   E7,1777                      EBANK=   WHOCARES
 1140   REF   1              04,2730   02000 0            2CADR    HARTBURN
 1140   REF   1              04,2731   56067 0
 1141   REF   3  LAST  219   04,2732  0 5205 0            TC       ENDOFJOB
 1142                        04,2733   77776 1  TIG76     EXIT
 1143   REF   1              04,2734  3 2400 1            CAF      DEC76           CALL P76
 1144   REF  15  LAST  219   04,2735  0 2511 0            TC       AUTOSET +2
 1145   REF   1              27,2000                      SETLOC   JANESUB
 1146                        27,2000                      BANK
 11465  REF   1                                           COUNT*   $$/MNKEY
 1147   REF   5  LAST  218   27,2000  0 6006 1  HARTBURN  TC       INTPRET
 1148                              27,2001   77201 1             SETPD  VLOAD
 1149                              27,2002   00001 0                    0
 1150     REF    2  LAST   34      27,2003   15336 0                    ZEROVECS
 1151                              27,2004   77614 1             BON
 1152     REF    2  LAST  218      27,2005   05305 1                    BURNFLAG
 1153     REF    1                 27,2006   56042 1                    GOP76
 1154                              27,2007   77214 0             BOFF   VLOAD
 1155     REF    1                 27,2010   05354 0                    TPIMNFLG
 1156     REF    1                 27,2011   56044 1                    NOTTPI
 1157     REF    2  LAST  126      27,2012   03554 0                    RPASS3
 1158     REF    2  LAST  105      27,2013   26561 1             STOVL  BURNTMP2
 1159     REF    4  LAST  133      27,2014   03540 0                    RACT3
 1160     REF    2  LAST  105      27,2015   26553 0             STOVL  BURNTMP1
 1161     REF    3  LAST  133      27,2016   03546 0                    VACT3
 1162     REF    2  LAST  105      27,2017   26567 1             STOVL  BURNTMP3
 1163     REF    2  LAST  126      27,2020   03562 0                    VPASS3
 1164     REF    1                 27,2021   02575 1             STORE  BURNTMP4
 1165                              27,2022   77776 1             EXIT
 1166     REF    6  LAST  217      27,2023 0 5402 1              TC     PHASCHNG
 1167                              27,2024   04024 0             OCT    04024

 1168     REF    6  LAST  219      27,2025 0 6006 1              TC     INTPRET
 1169                              27,2026   77775 1             VLOAD
 1170     REF    3  LAST  220      27,2027   02567 1                    BURNTMP3
 1171     REF    3  LAST  220      27,2030   27562 0             STOVL  VPASS3
 1172     REF    3  LAST  220      27,2031   02561 1                    BURNTMP2
 1173     REF    5  LAST  220      27,2032   27540 0             STOVL  RACT3
 1174     REF    3  LAST  220      27,2033   02553 0                    BURNTMP1
 1175     REF    3  LAST  220      27,2034   27554 0             STOVL  RPASS3
 1176     REF    2  LAST  220      27,2035   02575 1                    BURNTMP4
 1177     REF    4  LAST  220      27,2036   37546 1             STCALL VACT3
 1178     REF    1                 27,2037   74000 1                    S34/35.1
 1179                              27,2040   77624 1             CALL
 1180     REF    1                 27,2041   72561 0                    S34/35.2           COMPUTE DV(LV)
 1181     REF    3  LAST  131      27,2042   37540 1   GOP76     STCALL DELVOV
 1182     REF    1                 27,2043   10733 1                    TIG76
 1183                              27,2044   71214 0   NOTTPI    BOFF   DLOAD
 1184     REF    2  LAST  218      27,2045   01352 1                    AVFLAG
 1185     REF    1                 27,2046   56066 1                    NOTCDH
 1186     REF    2  LAST  121      27,2047   03450 0                    NOMTIG
 1187                              27,2050   77624 1             CALL
 1188     REF    1                 27,2051   76560 0                    ADVANCE
 1189                              27,2052   77624 1             CALL
 1190     REF    1                 27,2053   56674 1                    CDHMVR
 1191                              27,2054   77624 1             CALL
 1192     REF    1                 27,2055   32050 0                    S32/33.X
 1193                              27,2056   64375 1             VLOAD  MXV
 1194     REF    3  LAST  180      27,2057   03667 0                    DELVEET2
 1195                              27,2060   00001 0                    0D
 1196                              27,2061   77772 0             VSL1
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  1197   REF   4  LAST  220   27,2062   17540 0              STODL   DELVOV
  1198   REF   2  LAST   97   27,2063   02603 0                      CMYDOT
  1199                        27,2064   77650 1              GOTO
  1200   REF   1              27,2065   56072 1                      STORDV
  1201                        27,2066   57575 1  NOTCDH      VLOAD   VCOMP
  1202   REF   3  LAST  218   27,2067   03405 0                      DELVLVC
  1203   REF   5  LAST  221   27,2070   17540 0              STODL   DELVOV
  1204   REF   1              27,2071   02605 0                      LMYDOT
  1205   REF   6  LAST  221   27,2072   37542 0  STORDV      STCALL  DELVOV +2
  1206   REF   2  LAST  220   27,2073   10733 1                      TIG76
  1207   REF   2  LAST   34   30,2000                        SBANK=  LOWSUPER
  1208   REF   4  LAST  214   04,2000                        SETLOC  VERB37
  1209                        04,2736                        BANK

  12095  REF   3 LAST  212 TO  214:     93   228*            COUNT*  $$/V37
  1210   REF  18  LAST  199      4765            OCT00010    EQUALS  BIT4
  1211                        04,2736  0 0004 0  V37XEQ      INHINT
  1212   REF   1              04,2737  3 5052 0              CAF     PRIO13
  1213   REF   1              04,2740  55'266 0              TS      PHSPRDT4         PRESET GROUP4 RESTART PRIORITY
  1214   REF   1              04,2741  54 063 0  V37XEQ+3    TS      NEWPRIO          STORE PRIO FOR SPVAC
  1215   REF   3  LAST  214   04,2742  51'177 1              INDEX   MINDEX
  1216   REF   3  LAST  214   04,2743  3 3124 0              CAF     PREMM1
  1217   REF   1              04,2744  55'264 1              TS      MMTEMP           OBTAIN PRIORITY BITS 15 - 11
  1218                        04,2745  0 0006 1              EXTEND
  1219   REF  22  LAST  178   04,2746  7 4761 1              MP      BIT8
  1220   REF   1              04,2747  7 4774 0              MASK    LOW3
  1221   REF  17  LAST  219   04,2750  54 001 1              TS      L
  1222   REF   4  LAST  221   04,2751  51'177 1              INDEX   MINDEX
  1223   REF   1              04,2752  3 3055 1              CAF     FCADRMM1
  1224   REF   1              04,2753  55'265 0              TS      BASETEMP
  1225   REF   3  LAST  198   04,2754  7 4344 1              MASK    HI5
  1226   REF  18  LAST  221   04,2755  26 001 1              ADS     L

  1227   REF   2  LAST  221   04,2756  3 1265 1              CA      BASETEMP         OBTAIN GENADR PORTION OF 2CADR.
  1228   REF   2  LAST   35   04,2757  7 5041 0              MASK    LOW10
  1229   REF  14  LAST   85   04,2760  6 4756 1              AD      BIT11

  1230   REF   1              04,2761  0 5146 1              TC      SPVAC

  1231   REF   2  LAST  221   04,2762  3 1264 0  V37XEQC     CA      MMTEMP           UPON RETURN FROM FINDVAC PLACE THE
  1232   REF   2  LAST  210   04,2763  7 6043 1              MASK    LOW7             NEW MM IN MODREG (THE LOW 7 BITS OF
  1233   REF   2  LAST  215   04,2764  0 5347 1              TC      NEWMODEA         PHSBRDT1)

R 1234   FOR SUNDISK ONLY
  1235   REF   4  LAST  215   04,2765  0 4432 0              TC      RELDSP           RELEASE DISPLAY
  1236   REF   4  LAST  219   04,2766  0 5205 0              TC      ENDOFJOB         AND EXIT

  1237                        04,2767  0 0004 0  INITSUB     INHINT
  1238   REF   2  LAST  174   04,2770  3 4775 0              CAF     ELEVEN           CLEAR INDICATED FLAG BITS
  1239   REF  17  LAST  210   04,2771  54 154 0  RAKE        TS      MPAC             LOOP STARTS HERE
  1240   REF  18  LAST  221   04,2772  50 154 1            INDEX   MPAC
  1241   REF   1              04,2773  4 3032 1            CS      FLAGTABL
  1242   REF  19  LAST  222   04,2774  50 154 1            INDEX   MPAC
  1243   REF  14  LAST  215   04,2775  7 0074 0            MASK    FLAGWRD0
  1244   REF  20  LAST  222   04,2776  50 154 1            INDEX   MPAC           RESTORE REVISED FLAGWORD
  1245   REF  15  LAST  222   04,2777  54 074 0            TS      FLAGWRD0

  1246   REF  21  LAST  222   04,3000  10 154 0            CCS     MPAC
  1247   REF   1              04,3001  1 2771 0            TCF     BASE

  1248                        04,3002  0 0006 1  INITSUBA  EXTEND
  1249   REF  22  LAST  222   04,3003  22 155 0            QXCH    MPAC +1

  1250                        04,3004  0 0004 0            INHINT
  1251   REF   4  LAST  214   04,3005  3 4764 0            CAF     TRACKBIT       BYPASS IF TRACKFLG ON
  1252   REF  15  LAST  214   04,3006  7 0075 1            MASK    FLAGWRD1
  1253   REF  58  LAST  216   04,3007  10 000 0            CCS     A
  1254   REF   1              04,3010  1 3024 0            TCF     INITRET
  1255   REF   3  LAST  209   04,3011  0 4611 0            TC      E6SETTER       FOR DB CODE.. STARTSB2 WILL RESET.
  1256   REF   2  LAST  200   04,3012  0 4463 1            TC      STOPRATE

  1257   REF   1              04,3013  3 0105 0            CA      FLAGWRD9       RESTORE DEADBAND
  1258   REF   1              04,3014  7 4755 0            MASK    MAXDBBIT
  1259   REF  59  LAST  222   04,3015  10 000 0            CCS     A
  1260   REF   1              04,3016  1 3022 0            TCF     SETMAXER       MAX DB SELECTED
  1261   REF   6  LAST  215   04,3017  0 4636 0            TC      BANKCALL       MIN DB SELECTED
  1262   REF   1              04,3020    51203 1            CADR    SETMINDB
  1263   REF   2  LAST  222   04,3021  1 3024 0            TCF     INITRET

  1264   REF   7  LAST  222   04,3022  0 4636 0  SETMAXER  TC      BANKCALL
  1265   REF   1              04,3023    51217 1            CADR    SETMAXDB

  1266                        04,3024  0 0003 1  INITRET   RELINT
  1267   REF   4  LAST  208   04,3025  3 7702 0            CA      NEGONE
  1268   REF  15  LAST  195   04,3026  55'323 0            TS      OPTIND
  1269   REF  23  LAST  222   04,3027  0 0155 0            TC      MPAC +1        RETURN FROM INITSUB

  1270   REF   3  LAST  213   04,3030  0 3002 0  INITSUBB  TC      INITSUBA       ENTRANCE USED BY RTB CALL FROM V56
  1271   REF   1              04,3031  0 6030 1            TC      DANZIG

  1272                        04,3032    00001 0  FLAGTABL  OCT     1              P29FLAG
  1273                        04,3033    00040 0            OCT     40             IDLEFAIL
  1274                        04,3034    06400 0            OCT     06400          P21FLAG,STEERSW,IMPULSW
  1275                        04,3035    20400 1            OCT     20400          GLOKFAIL, POOFLAG
  1276                        04,3036    00000 1            OCT
  1277                        04,3037    05100 0            OCT     05100          V59FLAG,NEWTFLAG,ENGONFLG
  1278                        04,3040    10000 0            OCT     10000          STRULLSW
  1279                        04,3041    16000 0            OCT     16000          IGNFLAG,ASTNFLAG,TIMRFLAG
  1280                        04,3042    00000 1            OCT
  1281                        04,3043    42000 1            OCT     42000          SWTOVER, V94FLAG
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 1282                          04,3044   00000 1            OCT
 1283                          04,3045   00000 1            OCT

 1284   REF   1                20,2000                      SETLOC VACSLOC
 1285                          20,2000                      BANK
 12855  REF   1                                             COUNT* $$/START
 1286   REF  22  LAST  219     20,2000   3 4772 1  VAC5STOR CA     ZERO         INITIALIZE INDEX REGISTERS
 1287   REF   7  LAST  177     20,2001  54 061 1            TS     ITEMP1
 1288   REF   3  LAST   69     20,2002  54 062 1            TS     ITEMP2

 1289                          20,2003   0 0006 1  V5LOOP1  EXTEND              LOOP TO STORE LOCS, BANKSETS, AND PRIOS.
 1290   REF   8  LAST  223     20,2004   5 0061 0           INDEX  ITEMP1
 1291   REF   1                20,2005   3 0165 0           DCA    LOC
 1292   REF   4  LAST  223     20,2006  50 062 0            INDEX  ITEMP2
 1293   REF   2  LAST   76     20,2007  52 662 1            DXCH   VAC5

 1294   REF   9  LAST  223     20,2010  50 061 0            INDEX  ITEMP1
 1295   REF   8  LAST  203     20,2011   3 0167 1           CA     PRIORITY
 1296   REF   5  LAST  223     20,2012  50 062 0            INDEX  ITEMP2
 1297   REF   3  LAST  223     20,2013  54 663 0            TS     VAC5 +2

 1298   REF   6  LAST  223     20,2014   4 0062 1           CS     ITEMP2       HAVE WE STORED THEM ALL?
 1299   REF   1                20,2015   6 5000 1           AD     EIGHTEEN
 1300                          20,2016   0 0006 1           EXTEND
 1301   REF   1                20,2017   1 2025 0           BZF    V5OUT1       YES, GET PHASE INFORMATION.

 1302   REF   1                20,2020   3 5775 1           CA     TWELVE       NO, INCREMENT INDEXES AND LOOP.
 1303   REF  10  LAST  223     20,2021  26 061 1            ADS    ITEMP1
 1304   REF   3  LAST  141     20,2022   3 6214 0           CA     THREE
 1305   REF   7  LAST  223     20,2023  26 062 1            ADS    ITEMP2
 1306   REF   1                20,2024   1 2003 1           TCF    V5LOOP1

 1307   REF   1                E3,1436                      EBANK= PHSNAME1
 1308   REF   3  LAST  203     20,2025   3 5024 1  V5OUT1   CA     EBANK3       PHSNAME REGISTERS ARE IN EBANK3.
 1309   REF   6  LAST  217     20,2026  54 003 0            TS     EBANK

 1310   REF   3  LAST  221     20,2027   3 4775 0           CA     ELEVEN       GET PHASE 2CADRS.
 1311   REF   1                20,2030   0 5607 0           TC     GENTRAN
 1312   REF   2  LAST  223     20,2031    01436 1           ADRES  PHSNAME1
 1313   REF   4  LAST  223     20,2032    00706 0           ADRES  VAC5 +21D

 1314   REF  23  LAST  223     20,2033   3 4772 1           CA     ZERO         NOW INITIALIZE INDEXES AGAIN.
 1315   REF  11  LAST  223     20,2034  54 061 1            TS     ITEMP1
 1316   REF   8  LAST  223     20,2035  54 062 1            TS     ITEMP2

 1317   REF  12  LAST  223     20,2036  50 061 0   V5LOOP2  INDEX  ITEMP1       LOOP TO GET PHASE TABLES.
 1318   REF   2  LAST  201     20,2037   3 1156 1           CA     PHASE1
 1319   REF   9  LAST  223     20,2040  50 062 0            INDEX  ITEMP2
 1320   REF   5  LAST  223     20,2041  54 722 1            TS     VAC5 +33D
 1321   REF  10  LAST  223   20,2042  4 0062 1            CS      ITEMP2            DO WE HAVE THEM ALL?
 1322   REF   5  LAST  213   20,2043  6 4773 0            AD      FIVE
 1323                        20,2044  0 0006 1            EXTEND
 1324   REF   1              20,2045  1 2052 0            BZF     V5OUT2            YES, GO FINISH UP.

 1325   REF   1              20,2046  3 4767 0            CA      TWO               NO, INCREMENT INDEXES AND LOOP.
 1326   REF  13  LAST  223   20,2047  26 061 1            ADS     ITEMP1
 1327   REF  11  LAST  224   20,2050  24 062 0            INCR    ITEMP2
 1328   REF   1              20,2051  1 2036 1            TCF     V5LOOP2

 1329   REF  24  LAST  222   20,2052  3 0157 1  V5OUT2    CA      MPAC +3
 1330   REF   6  LAST  223   20,2053  54 730 1            TS      VAC5 +39D

 1331                        20,2054  0 0006 1            EXTEND
 1332   REF   1              20,2055  3 0066 1            DCA     NEWLOC
 1333   REF   7  LAST  224   20,2056  52 732 0            DXCH    VAC5 +40D

 1334   REF   2  LAST  203   20,2057  3 0067 0            CA      NEWJOB
 1335   REF   8  LAST  224   20,2060  54 707 0            TS      VAC5 +22D

 1336   REF   2  LAST  221   20,2061  3 0063 1            CA      NEWPRIO
 1337   REF   9  LAST  224   20,2062  54 713 0            TS      VAC5 +26D

 1338   REF   1              20,2063  0 4651 1            TC      SWRETURN

 1339   REF   1                  5000           EIGHTEEN  EQUALS  OCT22
 1340   REF   5  LAST  221   04,2000                      SETLOC  VERB37
 1341                        04,3046                      BANK

 13415  REF   4 LAST  221 TO  223:    72    300*          COUNT*  $$/V37
 1342   REF   1                  5736           NEG7      EQUALS  OCT77770

 1343                        04,3046   44571 1  OCT44571  OCT     44571             CONSTANTS TO CLEAR CHANNEL BITS IN V37
 1344                        04,3047   00600 1  OCT600    OCT     600
 1345                        04,3050   00300 1  BIT7-8    OCT     300
 1346                        04,3051   01120 0  OCT01120  OCT     01120

 1347   REF   1              04,3052   10741 1  V37QCAD   CADR    V37XEQ+3
 1348   REF   1              04,3053   10171 1  RODAD     CADR    DUMMYAD
 1349                        04,3054   37312 0  3,1SEC    OCT     37312             2.5 + 0.6 SEC
R1350   FOR VERB 37 TWO TABLES ARE MAINTAINED. EACH TABLE HAS AN ENTRY FOR EACH
R1351   MAJOR MODE THAT CAN BE STARTED FROM THE KEYBOARD. THE ENTRIES ARE PUT
R1352   INTO THE TABLE WITH THE ENTRY FOR THE HIGHEST MAJOR MODE COMING FIRST,

R1353   TO THE LOWEST MAJOR MODE WHICH IS THE LAST ENTRY IN EACH TABLE.

R1354           THE FCADRMM TABLE CONTAINS THE FCADR OF THE STARTING JOB OF
R1355   THE MAJOR MODE.    FOR EXAMPLE,

A1356                                           FCADRMM1  FCADR   P79               START OF P 79
```

```
A1357                                                           FCADR  PROG18          START OF P 18
A1358                                                           FCADR  P01             START OF P 01

 1359                        04,3055              FCADRMM1  EQUALS
 1360  REF   1               04,3055   10606 0              FCADR  P86
 1361  REF   1               04,3056   10664 1              FCADR  P85
 1362  REF   1               04,3057   10656 0              FCADR  P84
 1363  REF   1               04,3060   10646 1              FCADR  P83
 1364  REF   1               04,3061   10545 1              FCADR  P82
 1365  REF   1               04,3062   10537 1              FCADR  P81
 1366  REF   1               04,3063   10677 0              FCADR  P79
 1367  REF   1               04,3064   26071 0              FCADR  P76ER77
 1368  REF   2  LAST  225    04,3065   26071 0              FCADR  P76ER77
 1369  REF   1               04,3066   72212 0              FCADR  P75
 1370  REF   1               04,3067   72002 0              FCADR  P74
 1371  REF   1               04,3070   11575 0              FCADR  P73
 1372  REF   1               04,3071   11405 0              FCADR  P72
 1373  REF   1               04,3072   54321 0              FCADR  P62
 1374  REF   1               04,3073   54234 0              FCADR  P61
 1375  REF   1               04,3074   30002 0              FCADR  P54
 1376  REF   1               04,3075   31414 1              FCADR  P53
 1377  REF   1               04,3076   30002 0              FCADR  PROG52
 1378  REF   1               04,3077   31414 1              FCADR  P51
 1379  REF   1               04,3100   51662 1              FCADR  P47CSM
 1380  REF   1               04,3101   51563 0              FCADR  P41CSM
 1381  REF   1               04,3102   50214 0              FCADR  P40CSM
 1382  REF   1               04,3103   74476 1              FCADR  P37
 1383  REF   1               04,3104   45334 1              FCADR  P36
 1384  REF   1               04,3105   72206 0              FCADR  P35
 1385  REF   1               04,3106   72000 1              FCADR  P34
 1386  REF   1               04,3107   11573 0              FCADR  P33
 1387  REF   1               04,3110   11403 0              FCADR  P32
 1388  REF   1               04,3111   11303 1              FCADR  P31
 1389  REF   1               04,3112   73433 1              FCADR  P30
 1390  REF   1               04,3113   60000 1              FCADR  P29
 1391  REF   1               04,3114   26254 0              FCADR  PROG24
 1392  REF   1               04,3115   62444 1              FCADR  P23
 1393  REF   1               04,3116   60153 0              FCADR  PROG22
 1394  REF   1               04,3117   76000 0              FCADR  PROG21
 1395  REF   1               04,3120   74016 0              FCADR  PROG20
 1396  REF   1               04,3121   67455 1              FCADR  P15JOB
 1397  REF   1               04,3122   55654 0              FCADR  P06
 1398  REF   1               04,3123   66001 0              FCADR  GTSCPSS1        GYROCOMPASS STANDARD LEAD IN.

R1399               THE PREMM TABLE CONTAINS THE EBANK,MAGOR MODE AND DOWNLINK INFO
R1400          IT IS IN THE FOLLOWING FORMAT
R1401               DDD OOE EEM MMM MMM
R1402               WHERE THE 7 M BITS CONTAIN THE MAJOR MODE NUMBER
R1403                         3 E BITS CONTAIN THE E-BANK NUMBER
```

```
R1404                          3 D BITS CONTAIN THE DOWNLIST ID

R1405               COAST AND ALIGN LIST =  0
R1406               EUTRY LIST           =  1
R1407               RENDEZVOUS LIST      =  2
R1408               POWERED FLIGHT LIST  =  3
R1409               P22 LIST             =  4

R1410               FOR EXAMPLE,

A1411                                                       OCT     21137           DOWNLIST   = 2 (RENDEZVOUS)
A1412                                                                               EBANK      = 4
A1413                                                                               MAJOR MODE = 95

A1414                                                       OCT     11476           DOWNLIST   = 1 (ENTRY)
A1415                                                                               EBANK      = 6
A1416                                                                               MAFOR MODE = 62

 1417                          04,3124            PREMM1    EQUALS
 1418                          04,3124   21526 0            OCT     21526           MM 86  EBANK 6  DOWNLIST 2
 1419                          04,3125   21525 0            OCT     21525           MM 85  EBANK 6  DOWNLIST 2
 1420                          04,3126   21524 1            OCT     21524           MM 84  EBANK 6  DOWNLIST 2
 1421                          04,3127   21523 0            OCT     21523           MM 83  EBANK 6  DOWNLIST 2
 1422                          04,3130   21522 1            OCT     21522           MM 82  EBANK 6  DOWNLIST 2
 1423                          04,3131   21521 1            OCT     21521           MM 81  EBANK 6  DOWNLIST 2
 1424                          04,3132   21717 0            OCT     21717           MM 79  EBANK 7  DOWNLIST 2
 1425                          04,3133   21715 1            OCT     21715
 1426                          04,3134   21714 0            OCT     21714           MM 76  EBANK 7  DOWNLIST 2
 1427                          04,3135   21113 1            OCT     21113           MM 75  EBANK 4  DOWNLIST 2
 1428                          04,3136   21112 0            OCT     21112           MM 74  EBANK 4  DOWNLIST 2
 1429                          04,3137   21111 0            OCT     21111           MM 73  EBANK 4  DOWNLIST 2
 1430                          04,3140   21110 1            OCT     21110           MM 72  EBANK 4  DOWNLIST 2
 1431                          04,3141   11476 1            OCT     11476           MM 62  EBANK 6  DOWNLIST 1
 1432                          04,3142   31475 0            OCT     31475           MM 61  EBANK 6  DOWNLIST 3
 1433                          04,3143   01266 1            OCT     01266           MM 54  EBANK 5  DOWNLIST 0
 1434                          04,3144   01265 1            OCT     01265           MM 53  EBANK 5  DOWNLIST 0
 1435                          04,3145   01264 0            OCT     01264           MM 52  EBANK 5  DOWNLIST 0
 1436                          04,3146   01263 1            OCT     01263           MM 51  EBANK 5  DOWNLIST 0
 1437                          04,3147   31657 1            OCT     31657           MM 47  EBANK 7  DOWNLIST 3
 1438                          04,3150   31451 0            OCT     31451           MM 41  EBANK 6  DOWNLIST 3
 1439                          04,3151   31450 1            OCT     31450           MM 40  EBANK 6  DOWNLIST 3
 1440                          04,3152   21645 0            OCT     21645           MM 37  EBANK 7  DOWNLIST 2
 1441                          04,3153   21044 1            OCT     21044           MM 36  EBANK 4  DOWNLIST 2
 1442                          04,3154   21043 0            OCT     21043           MM 35  EBANK 4  DOWNLIST 2
 1443                          04,3155   21042 1            OCT     21042           MM 34  EBANK 4  DOWNLIST 2
 1444                          04,3156   21041 1            OCT     21041           MM 33  EBANK 4  DOWNLIST 2
 1445                          04,3157   21040 0            OCT     21040           MM 32  EBANK 4  DOWNLIST 2
 1446                          04,3160   21037 0            OCT     21037           MM 31  EBANK 4  DOWNLIST 2
 1447                          04,3161   21636 1            OCT     21636           MM 30  EBANK 7  DOWNLIST 2
 1448                          04,3162   21635 1            OCT     21635           MM 29  EBANK 7  DOWNLIST 2
 1449                         04,3163   41230 0           OCT     41230          MM 24  EBANK 5  DOWNLIST 4
 1450                         04,3164   21627 1           OCT     21627          MM 23  EBANK 7  DOWNLIST 2
 1451                         04,3165   41626 0           OCT     41626          MM 22  EBANK 7  DOWNLIST 4
 1452                         04,3166   21025 0           OCT     21025          MM 21  EBANK 4  DOWNLIST 2
 1453                         04,3167   21424 0           OCT     21424          MM 20  EBANK 6  DOWNLIST 2
 1454                         04,3170   31617 0           OCT     31617          MM 15 EBANK 7  DOWNLIST 3
 1455                         04,3171   01006 0           OCT     01006          MM 06  EBANK 4  DOWNLIST 0
 1456                         04,3172   01201 0           OCT     01201          MM 01  EBANK 5  DOWNLIST 0
R1457


R1458   NOTE,    THE FOLLOWING CONSTANT IS THE NUMBER OF ENTRIES IN EACH OF
R1459   ----     THE ABOVE LISTS-1(IE, THE NUMBER OF MAJOR MODES(EXCEPT P00)
R1460            THAT CAN BE CALLED FROM THE KEYBOARD MINUS ONE)

 1461                         04,3173             EPREMM1  EQUALS                 END OF PREMM1 TABLE
 1462   REF   4  LAST  221    04,3124                      SETLOC PREMM1          THIS CODING WILL AUTOMATICALLY CHANGE
 1463   REF   1                  0047             NO.MMS   =MINUS EPREMM1         THE 'NOV37MM' CONSTANT AS ENTRIES ARE
 1464   REF   6  LAST  224    04,2000                      SETLOC VERB37          INSERTED(IN) OR DELETED(FROM) THE
 1465                         04,3173                      BANK                   'PREMM1' TABLE.

 1466   REF   1               04,3173   00046 0   NOV37MM  ADRES  NO.MMS -1       ITEMS IN 'PREMM1'TABLE - 1. *DON'T MOVE*


 1467   REF  24  LAST  223       4772             DNLADP00 =      ZERO
R1468   ORBITAL INTEGRATION CONSTANTS

R1469   THESE CONSTANTS ARE USED IN COMPUTING THE SETTING OF MIDFLAG.
 1470                         04,3174   00465 0   RMM      2DEC   2538.09 E3 B-27 800 KM ABOVE LUNAR SURFACE
 1470                         04,3175   32324 0
 1471                         04,3176   00333 1   RME      2DEC   7178165 B-29    800 KM ABOVE EQ. RADIUS
 1471                         04,3177   01733 1
 1473   REF   1               13,2000                      SETLOC INTINIT
 1474                         13,2000                      BANK

 1475   REF   1                                            COUNT* $$/INTIN

 1476   REF   2  LAST   90    E3,1554                      EBANK= RRECTCSM

 1477                         13,2000   43014 0   STATEUP  SET    BOF             EXTRAPOLATE CM STATE VECTOR
 1478   REF   1               13,2001   01474 1                   VINTFLAG
 1479   REF   1               13,2002   01751 0                   ORBWFLAG        ALSO 6X6 W-MATRIX IF VALID
 1480                         13,2003   26006 0                   +3                   FOR ORBITAL NAVIGATION
 1481                         13,2004   77614 1            SET
 1482   REF   1               13,2005   01476 0                   DIM0FLAG
 1483                         13,2006   45014 0            CLEAR  CALL
 1484   REF   1               13,2007   01667 1                   PRECIFLG
 1485   REF   1               13,2010   27236 0                   INTEGRV
 1486                         13,2011   71214 0            BON    DLOAD
 1487   REF   1               13,2012   04307 1                   SURFFLAG
 1488   REF   1                13,2013   26031 1                    STATEND
 1489   REF   2  LAST    90    13,2014   01571 0                    TETCSM
 1490   REF   1                13,2015   34041 0           STCALL   TDEC1
 1491   REF   2  LAST   211    13,2016   27516 0                    INTSTALL
 1492                          13,2017   45014 0           CLEAR    CALL                EXTRAPOLATE LM STATE VECTOR
 1493   REF   2  LAST   227    13,2020   01674 0                    VINTFLAG
 1494   REF   1                13,2021   26744 1                    SETIFLGS                AND 6X6 W-MATRIX IF VALID
 1495                          13,2022   43014 0           BOF      SET
 1496   REF   1                13,2023   02756 1                    RENDWFLG                FOR RENDEZVOUS NAVIGATION
 1497                          13,2024   26026 1                    +2
 1498   REF   2  LAST   227    13,2025   01476 0                    DIM0FLAG
 1499                          13,2026   45014 0           SET      CALL
 1500   REF   2  LAST   227    13,2027   01467 0                    PRECIFLG
 1501   REF   2  LAST   227    13,2030   27236 0                    INTEGRV
 1502                          13,2031   77614 1  STATEND  CLRGO
 1503   REF   1                13,2032   01236 1                    NODOFLAG
 1504   REF   1                13,2033   26732 0                    ENDINT

R1505     THISVINT IS CALLED BY MIDTOAV1 AND2

 1506                          13,2034   43414 1  THISVINT SET      RVQ
 1507   REF   3  LAST   228    13,2035   01474 1                    VINTFLAG
```

```
L         RESTART TABLES                                                                         USER'S PAGE NO.  1      E0 53

P0001     RESTART TABLES

R0002     ------------------

R0003     THERE ARE TWO FORMS OF RESTART TABLES FOR EACH GROUP.  THEY ARE KNOWN AS THE EVEN RESTART TABLES AND THE ODD
R0005     RESTART TABLES.  THE ODD TABLES HAVE ONLY ONE ENTRY OF THREE LOCATIONS WHILE THE EVEN TABLES HAVE TWO ENTRIES
R0007     EACH USING THREE LOCATIONS. THE INFORMATION AS TO WHETHER IT IS A JOB, WAITLIST, OR A LONGCALL IS GIVEN BY THE
R0009     WAY THINGS ARE PUT INTO THE TABLES.
R0010          A JOB HAS ITS PRIORITY STORED IN PROTTAB OF THE CORRECT PHASE SPOT - A POSITIVE PRIORITY INDICATES A
R0012     FINDVAC JOB, A NEGATIVE PRIORITY A NOVAC.  THE 2CADR OF THE JOB IS STORED IN THE CADRTAB.
R0014     FOR EXAMPLE,

A0015                                             5.7SPOT  OCT    23000
A0016                                                      2CADR  SOMEJOB

R0017     A RESTART OF GROUP 5 WITH PHASE SEVEN WOULD THEN CAUSE SOMEJOB TO BE RESTARTED AS A FINDVAC WITH PRIORITY 23.

R0019     5.5SPOT  OCT    -23000
A0020                                                      2CADR  ANYJOB

R0021     HERE A RESTART OF GROUP 5 WITH PHASE 7 WOULD CAUSE ANYJOB TO BE RESTARTED AS A NOVAC WITH PRIORITY 23.
R0023     A LONGCALL HAS ITS GENADR OF ITS 2CADR STORED NEGATIVELY AND ITS BBCON STORED POSITIVELY.  IN ITS PROTTAB IS
R0025     PLACED THE LOCATION OF A DP REGISTER THAT CONTAINS THE DELTA TIME THAT LONGCALL HAD BEEN ORIGINALLY STARTED
R0027     WITH.  EXAMPLE,

A0028                                             3.6SPOT  GENADR DELTAT
A0029                                                     -GENADR LONGTASK
A0030                                                      BBCON  LONGTASK

A0031                                                      OCT    31000
A0032                                                      2CADR  JOBAGAIN

R0033     THIS WOULD START UP LONGTASK AT THE APPROPRIATE TIME, OR IMMEDIATELY IF THE TIME HAD ALREADY PASSED. IT SHOULD
R0035     BE NOTED THAT IF DELTAT IS IN A SWITCHED E BANK, THIS INFORMATOIN SHOULD BE IN THE BBCON OFTHE 2CADR OF THE
R0037     TASK.  FROM ABOVE, WE SEE THAT THE SECOND PART OF THIS PHASE WOULD BE STARTED AS A JOB WITH A PRIORITY OF 31.

R0039     WAITLIST CALLS ARE IDENTIFIED BY THE FACT THAT THEIR 2CADR IS STORED NEGATIVELY. IF PROTTAB OF THE PHASE SPOT
R0041     IS POSITIVE, THEN IT CONTAINS THE DELTA TIME, IF PROTTAB IS NEGATIVE THEN IT IS THE -GENADR OF AN ERASABLE
R0043     LOCATION CONTAINING THE DELTA TIME, THAT IS, THE TIME IS STORED INDIRECTLY.  IT SHOULD BE NOTED AS ABOVE, THAT
R0045     IF THE TIME IS STORED INDIRECTLY, THE BBCON MUST CONTAIN THE NECESSARY E BANK INFORMATION IF APPLICABLE.  WITH
R0047     WAITLIST WE HAVE ONE FURTHER OPTION, IF -0 IS STORED IN PROTTAB, IT WILL CAUSE AN IMMEDIATE RESTART OF THE
R0049     TASK.  EXAMPLES,

A0050                                                      OCT    77777           THIS WILL CAUSE AN IMMEDIATE RESTART
A0051                                                     -2CADR  ATASK           OF THE TASK :ATASK:

A0052                                                      DEC    200             IF THE TIME OF THE 2 SECONDS SINCE DUMMY
A0053                                                     -2CADR  DUMMY           WAS PUT ON WAITLIST IS UP, IT WILL BEGIN
A0054                                                                             IN 10 MS, OTHERWISE IT WILL BEGIN WHEN
A0055                                                                             IT NORMALLY WOULD HAVE BEGUN.
```

```
L        RESTART TABLES                                                                   USER'S PAGE NO.   2       EO S3

A0056                                                           -GENADR  DTIME            WHERE DTIME CONTAINS THE DELTA TIME
A0057                                                           -2CADR   TASKTASK         OTHERWISE THIS IS AS ABOVE

R0058    *****    NOW THE TABLES THEMSELVES *****

 0060    REF   1                01,2000                         SETLOC RESTART
 0061                           01,2000                         BANK

 0062    REF   1                                                COUNT* $$/RSTAB
 0063                           01,2000                PRDTTAB  EQUALS 12000              USED TO FIND THE PRIORITY OR DELTATIME
 0064                           01,2001                CADRTAB  EQUALS 12001              THIS AND THE NEXT RELATIVE LOC CONTAIN
A0065                                                                                     RESTART 2CADR

 0066    REF   1                01,2000  0 0044 1   SIZETAB  TC       1.2SPOT -12006
 0067    REF   1                01,2001  0 0010 0            TC       1.3SPOT -12004
 0068    REF   1                01,2002  0 0044 1            TC       2.2SPOT -12006
 0069    REF   1                01,2003  0 0027 1            TC       2.3SPOT -12004
 0070    REF   1                01,2004  0 0044 1            TC       3.2SPOT -12006
 0071    REF   1                01,2005  0 0054 0            TC       3.3SPOT -12004
 0072    REF   1                01,2006  0 0074 1            TC       4.2SPOT -12006
 0073    REF   1                01,2007  0 0120 1            TC       4.3SPOT -12004
 0074    REF   1                01,2010  0 0226 1            TC       5.2SPOT -12006
 0075    REF   1                01,2011  0 0244 0            TC       5.3SPOT -12004
 0076    REF   1                01,2012  0 0311 1            TC       6.2SPOT -12006
 0077    REF   1                01,2013  0 0321 1            TC       6.3SPOT -12004
 0078    REF   2  LAST  230     01,2052                1.2SPOT  EQUALS 3.2SPOT
R0079    ANY MORE GROUP 1.EVEN RESTART VALUES SHOULD GO HERE

 0080                           01,2014   00170 1   1.3SPOT  DEC      120                THIS NUMBER MUST EQUAL C(JTAGTIME)
 0081    REF   2  LAST  115     E6,1661                      EBANK=   ADG
 0082    REF   1                01,2015   75141 1           -2CADR    SETJTAG
 0082    REF   1                01,2016   45711 1
 0083                           01,2017   10000 0   1.5SPOT  OCT      10000
 0084    REF   7  LAST  209     E6,1465                      EBANK=   DAPDATR1
 0085    REF   1                01,2020   02502 1            2CADR    RED040.9
 0085    REF   1                01,2021   34066 0
 0086                           01,2022   10000 0   1.7SPOT  OCT      10000
 0087    REF   2  LAST  120     E6,1774                      EBANK=   R61CNTR
 0088    REF   1                01,2023   02170 0            2CADR    RELINUS
 0088    REF   1                01,2024   56066 1
 0089                           01,2025   10000 0   1.11SPOT OCT      10000
 0090    REF   3  LAST  230     E6,1774                      EBANK=   R61CNTR
 0091    REF   1                01,2026   02157 0            2CADR    PIKUP20
 0091    REF   1                01,2027   74066 1
 00911                          01,2030   10000 0   1.13SPOT OCT      10000
 00912   REF   4  LAST  230     E6,1774                      EBANK=   R61CNTR
 00913   REF   1                01,2031   02374 0            2CADR    R67RSTRT
 00913   REF   1                01,2032   74066 1
R0092    ANY MORE GROUP 1.ODD RESTART VALUES SHOULD GO HERE
```

```
 0093    REF   2  LAST  230   01,2052                 2.2SPOT   EQUALS 1.2SPOT
R0094    ANY MORE GROUP 2.EVEN RESTART VALUES SHOULD GO HERE

 0095    REF   1              01,2033   02730 1   2.3SPOT   GENADR 600SECS
 0096    REF   1              01,2034   75075 1            -GENADR STATEINT
 0097    REF   3  LAST  227   E3,1554                        EBANK= RRECTCSM
 0098    REF   2  LAST  231   01,2035   26063 0              BBCON  STATEINT

 0099                         01,2036   05000 1   2.5SPOT   OCT    05000
 0100    REF   4  LAST  231   E3,1554                        EBANK= RRECTCSM
 0101    REF   1              01,2037   02711 1              2CADR  STATINT1
 0101    REF   1              01,2040   26063 0
 0102                         01,2041   10000 0   2.7SPOT   OCT    10000
 0103    REF   5  LAST  208   E7,1722                        EBANK= MRKBUF1
 0104    REF   1              01,2042   02625 1              2CADR  R22
 0104    REF   1              01,2043   70067 1
 0105                         01,2044   14000 1   2.11SPOT  OCT    14000
 0106    REF   3  LAST  189   E7,1751                        EBANK= LANDMARK
 0107    REF   1              01,2045   03532 0              2CADR  V94NTR
 0107    REF   1              01,2046   62067 1
 0108                         01,2047   10000 0   2.13SPOT  OCT    10000
 0109    REF   6  LAST  231   E7,1722                        EBANK= MRKBUF1
 0110    REF   1              01,2050   02516 1              2CADR  REDOR22
 0110    REF   1              01,2051   56067 0
R0114    ANY MORE GROUP 2.ODD RESTART VALUES SHOULD GO HERE

 0115                         01,2052   77777 0   3.2SPOT   DEC    -0
 0116    REF   2  LAST  128   E7,1672                        EBANK= P40TMP
 0117    REF   1              01,2053   75456 1            -2CADR  T6CHNSET
 0117    REF   1              01,2054   37710 0

 0118                         01,2055   01750 1              DEC    1000
 0119    REF   3  LAST  231   E7,1672                        EBANK= P40TMP
 0120    REF   1              01,2056   75446 0            -2CADR  T6RESET
 0120    REF   1              01,2057   37710 0

R0121    ANY MORE GROUP 3 EVEN RESTART VALUES SHOULD GO HERE

 0122                         01,2060   20000 0   3.3SPOT   OCT    20000
 0123    REF   3  LAST  180   E7,1427                        EBANK= TGO
 0124    REF   1              01,2061   02534 1              2CADR  S40.13
 0124    REF   1              01,2062   34067 1
 0125    REF   4  LAST  231   01,2063   76347 0   3.5SPOT  -GENADR TGO +1
 0126    REF   5  LAST  231   E7,1427                        EBANK= TGO
 0127    REF   1              01,2064   74754 1            -2CADR  ENGINOFF
 0127    REF   1              01,2065   27710 1
 0128                         01,2066   22000 1   3.7SPOT   OCT    22000
 0129    REF   4  LAST  183   E5,1757                        EBANK= CGC
 0130    REF   1              01,2067   02115 0              2CADR  MATRXJOB
 0130    REF   1              01,2070   70065 0
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L         RESTART TABLES                                                                    USER'S PAGE NO.   4      EO S3

 0131                              01,2071   22000 1  3.11SPOT OCT      22000
 0132    REF    2  LAST   91       E3,1706                      EBANK=  TEPHEM
 0133    REF    1                  01,2072   02250 1            2CADR   REP11
 0133    REF    1                  01,2073   70063 0
 0134                              01,2074   22000 1  3.13SPOT OCT      22000
 0135    REF    3  LAST  232       E3,1706                      EBANK=  TEPHEM
 0136    REF    1                  01,2075   02024 0            2CADR   REP11A
 0136    REF    1                  01,2076   70063 0
 0137    REF    4  LAST  231       01,2077   01672 0  3.15SPOT GENADR  P40TMP
 0138    REF    1                  01,2100   75466 1           -GENADR  T6SET
 0139    REF    5  LAST  232       E7,1672                      EBANK=  P40TMP
 0140    REF    2  LAST  232       01,2101   40067 1            BBCON   T6SET

R0144    ANY MORE GROUP 3.ODD RESTART VALUES SHOULD GO HERE

 0145                              01,2102   77777 0  4.2SPOT   OCT     77777
 0146    REF    8  LAST  185       E7,1412                      EBANK=  TIG
 0147    REF    1                  01,2103   75152 0           -2CADR   PRECHECK
 0147    REF    1                  01,2104   27710 1
 0148                              01,2105   47777 0            OCT     47777              PRIO 30 NOVAC
 0149    REF    2  LAST  128       E7,1674                      EBANK=  DELVIMU
 0150    REF    1                  01,2106   03730 0            2CADR   P47BODY
 0150    REF    1                  01,2107   50067 0
 0151                              01,2110   77777 0  4.4SPOT   OCT     77777
 0152    REF    9  LAST  232       E7,1412                      EBANK=  TIG
 0153    REF    2  LAST  232       01,2111   75152 0           -2CADR   PRECHECK
 0153                              01,2112   27710 1
 0154                              01,2113   05664 0            DEC     2996
 0155    REF    8  LAST  230       E6,1465                      EBANK=  DAPDATR1
 0156    REF    1                  01,2114   74160 0           -2CADR   TTG/0
 0156    REF    1                  01,2115   27711 0
 0157                              01,2116   77777 0  4.6SPOT   OCT     77777
 0158    REF   10  LAST  232       E7,1412                      EBANK=  TIG
 0159    REF    3  LAST  232       01,2117   75152 0           -2CADR   PRECHECK
 0159                              01,2120   27710 1
 0160                              01,2121   04700 1            DEC     2496
 0161    REF   11  LAST  232       E7,1412                      EBANK=  TIG
 0162    REF    1                  01,2122   75143 0           -2CADR   TIG-5
 0162    REF    1                  01,2123   27710 1
R0163    ANY MORE GROUP 4.EVEN RESTART VALUES SHOULD GO HERE

 0164                              01,2124   00050 1  4.3SPOT   DEC     40
 0165    REF    4  LAST  183       E6,1423                      EBANK=  PACTOFF
 0166    REF    1                  01,2125   75053 0           -2CADR   DOTVCON
 0166    REF    1                  01,2126   27711 0
 0167                              01,2127   00240 1  4.5SPOT   DEC     160
 0168    REF    5  LAST  232       E6,1423                      EBANK=  PACTOFF
 0169    REF    1                  01,2130   75022 0           -2CADR   DOSTRULL
 0169    REF    1                  01,2131   27711 0
 0170                              01,2132   00764 1  4.7SPOT   DEC     500
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0171   REF   6  LAST  232   E6,1423                          EBANK= PACTOFF
0172   REF   1              01,2133   75126 0               -2CADR  TIG-0
0172   REF   1              01,2134   27711 0
0173                        01,2135   77777 0  4.11SPOT DEC      -0
0174   REF   7  LAST  233   E6,1423                          EBANK= PACTOFF
0175   REF   2  LAST  233   01,2136   75126 0               -2CADR  TIG-0
0175                        01,2137   27711 0
0176                        01,2140   47777 0  4.13SPOT OCT      47777              PRIO 30 NOVAC
0177   REF   3  LAST  188   E6,1473                          EBANK= CSMMASS
0178   REF   1              01,2141   03411 0                2CADR  V97PJOB
0178   REF   1              01,2142   50066 1
0179                        01,2143   16000 0  4.15SPOT OCT      16000               PRELAUNCH OPTICAL VERIFICATION
0180   REF   5  LAST  231   E5,1757                          EBANK= CGC
0181   REF   1              01,2144   02000 0                2CADR  COMPVER             CALLS FOR OPTICS DATA AGAIN (STD LEADIN)
0181   REF   1              01,2145   66065 1
0182                        01,2146   16000 0  4.17SPOT OCT      16000               PRELAUNCH AZIMUTH CHANGE
0183   REF   2  LAST   99   E5,1671                          EBANK= XSM
0184   REF   1              01,2147   03132 1                2CADR  AZMTHCG1
0184   REF   1              01,2150   66105 0
0185   REF   6  LAST  232   01,2151   01672 0  4.21SPOT GENADR P40TMP             DELTA TIME USED IN SETTING UP
0186   REF   1              01,2152   75212 1              -GENADR TIGBLNK            LONG CALL OF TIGBLNK  BY P40,P41
0187   REF   7  LAST  233   E7,1672                          EBANK= P40TMP
0188   REF   2  LAST  233   01,2153   50067 0                BBCON  TIGBLNK
0189                        01,2154   12000 1  4.23SPOT OCT      12000              PROTECT  P40S/SV BY P40 P41
0190   REF  12  LAST  232   E7,1412                          EBANK= TIG
0191   REF   1              01,2155   02523 1                2CADR  P40S/SV
0191   REF   1              01,2156   50067 0

0192                        01,2157   24000 1  4.25SPOT OCT      24000
0193   REF   4  LAST  183      0302                          EBANK= BESTI
0194   REF   2  LAST  225   01,2160   02002 1                2CADR  PROG52
0194                        01,2161   30060 1

0195                        01,2162   77777 0  4.27SPOT DEC      -0
0196   REF   3  LAST  233   E6,1423                          EBANK= PACTOFF
0197   REF   1              01,2163   75113 0               -2CADR  IGNITION
0197   REF   1              01,2164   27711 0
0198                        01,2165   13000 0  4.31SPOT OCT      13000
0199   REF   2  LAST   99   E5,1765                          EBANK= STAR
0200   REF   1              01,2166   02622 0                2CADR  R51
0200   REF   1              01,2167   30065 1
0201                        01,2170   04064 1  4.33SPOT DEC      2100               PROTECT CONTINUING JOB TO START P63
0202   REF   3  LAST  230   E6,1661                          EBANK= AOG
0203   REF   1              01,2171   75402 0               -2CADR  WAKEP62
0203   REF   1              01,2172   23711 1
0204                        01,2173   65777 0  4.35SPOT OCT      65777              PRIO 12 NOVAC
0205   REF   9  LAST  232   E6,1465                          EBANK= DAPDATR1
0206   REF   1              01,2174   03174 0                2CADR  POSTBURN
0206   REF   1              01,2175   50066 1
0207                        01,2176   00764 1  4.37SPOT DEC      500
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 0208    REF  13  LAST  233   E7,1412                           EBANK= TIG
 0209    REF   1              01,2177   75175 0              -2CADR  TIGAVEG
 0209    REF   1              01,2200   27710 1
 0210                         01,2201   17000 1  4.41SPOT OCT     17000              PROTECT DISPLAY JOB IN P67
 0211    REF   4  LAST  233   E6,1661                           EBANK= ADG
 0212    REF   1              01,2202   02511 0                 2CADR  P67.1
 0212    REF   1              01,2203   54066 0
 0213    REF   1              01,2204   76003 0  4.43SPOT-GENADR S61DT               PROTECT TASK TO START PREREAD,ENTRY
 0214    REF   2  LAST  234   E6,1774                           EBANK= S61DT         S61.1C WILL CHANGE EBANK=E67 FOR PREREAD
 0215    REF   1              01,2205   75210 0              -2CADR  S61.1C
 0215    REF   1              01,2206   23711 1
 0216                         01,2207   13000 0  4.45SPOT OCT     13000              PROTECT CONTINUING JOB S61.1
 0217    REF   5  LAST  234   E6,1661                           EBANK= ADG           (ENTRY IMU ALIGNMENT)
 0218    REF   1              01,2210   02604 1                 2CADR  S61.1A-1
 0218    REF   1              01,2211   54066 0
 0219                         01,2212   17000 1  4.47SPOT OCT     17000              PROTECT HUNTEST ITERATION.
 0220    REF   6  LAST  234   E6,1661                           EBANK= ADG
 0221    REF   1              01,2213   03013 0                 2CADR  PRE-HUNT
 0221    REF   1              01,2214   52066 0
 0222                         01,2215   77777 0  4.51SPOT OCT     77777              PROTECT FDAI ATTITUDE
 0223    REF   2  LAST  119   E6,1704                           EBANK= SPOLYARG
 0224    REF   1              01,2216   75462 0              -2CADR  ATERTASK
 0224    REF   1              01,2217   07711 1
 0225                         01,2220   47777 0  4.53SPOT OCT     47777              PRIO 30 NOVAC
 0226    REF   4  LAST  233   E6,1473                           EBANK= CSMMASS
 0227    REF   1              01,2221   03322 1                 2CADR  V97EJOB
 0227    REF   1              01,2222   50066 1
 0228                         01,2223   64777 1  4.55SPOT OCT     -13000             PROTECT P65 RESPONSIVE DISPLAY
 0229    REF   2  LAST  122   E7,1451                           EBANK= RTINIT
 0230    REF   1              01,2224   02456 1                 2CADR  P65.1
 0230    REF   1              01,2225   54067 1
 0231    REF   8  LAST  233   01,2226   76105 1  4.57SPOT-GENADR P40TMP
 0232    REF   9  LAST  234   E7,1672                           EBANK= P40TMP
 0233    REF   1              01,2227   74101 1              -2CADR  TIGON
 0233    REF   1              01,2230   27710 1
 02331   REF   2  LAST  128   01,2231   76317 0  4.61SPOT-GENADR AVEGDT +1
 02332   REF   6  LAST  231   E7,1427                           EBANK= TGO
 02333   REF   1              01,2232   74140 1              -2CADR  SIVBOFF
 02333   REF   1              01,2233   11710 1
R0234    ANY MORE GROUP 4.DDD RESTART VALUES SHOULD GO HERE

 0235                         01,2234   32000 0  5.2SPOT  OCT     32000
 0236    REF   2  LAST  121   E7,1425                           EBANK= DVTOTAL
 0237    REF   1              01,2235   03154 1                 2CADR  NORMLIZE
 0237    REF   1              01,2236   76067 1
 0238                         01,2237   00310 0                 DEC     200
 0239    REF   7  LAST  234   E6,1661                           EBANK= ADG
 0240    REF   1              01,2240   74555 1              -2CADR  REREADAC
 0240    REF   1              01,2241   01711 1
 0241                         01,2242   20000 0  5.4SPOT  OCT     20000
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L         RESTART TABLES                                                                              USER'S PAGE NO.  7       EL 55

 0242     REF   3  LAST  234   E7,1425                          EBANK=  DVTOTAL
 0243     REF   1              01,2243   03010 0                2CADR   SERVICER
 0243     REF   1              01,2244   76067 1
 0244                          01,2245   00310 0                DEC     200
 0245     REF   8  LAST  234   E6,1661                          EBANK=  ADG
 0246     REF   2  LAST  234   01,2246   74555 1               -2CADR   REREADAC
 0246                          01,2247   01711 1
R0247     ANY MORE GROUP 5,EVEN RESTART VALUES SHOULD GO HERE

 0248                          01,2250   00310 0   5.3SPOT      DEC     200
 0249     REF   9  LAST  235   E6,1661                          EBANK=  ADG
 0250     REF   3  LAST  235   01,2251   74555 1               -2CADR   REREADAC
 0250                          01,2252   01711 1
 0251                          01,2253   77777 0   5.5SPOT      OCT     77777
 0252     REF  10  LAST  235   E6,1661                          EBANK=  ADG
 0253     REF   1              01,2254   75120 0               -2CADR   REDO5.5
 0253     REF   1              01,2255   01711 1
 0254                          01,2256   20000 0   5.7SPOT      OCT     20000                   USED BY PRELAUNCH
 0255     REF   3  LAST  233   E5,1671                          EBANK=  XSM
 0256     REF   1              01,2257   02232 0                2CADR   RSTGTS1
 0256     REF   1              01,2260   66065 1
 0257                          01,2261   77777 0   5.11SPOT     OCT     77777
 0258     REF   4  LAST  235   E5,1671                          EBANK=  XSM
 0259     REF   1              01,2262   75421 1               -2CADR   ALLOOP1
 0259     REF   1              01,2263   11712 0
 0260                          01,2264   20000 0   5.13SPOT     OCT     20000
 0261     REF   5  LAST  235   E5,1671                          EBANK=  XSM
 0262     REF   1              01,2265   02303 0                2CADR   WTLISTNT
 0262     REF   1              01,2266   66065 1
 0263                          01,2267   20000 0   5.15SPOT     OCT     20000
 0264     REF   6  LAST  235   E5,1671                          EBANK=  XSM
 0265     REF   1              01,2270   03100 0                2CADR   RESTEST1
 0265     REF   1              01,2271   66065 1
 0266                          01,2272   77777 0   5.17SPOT     OCT     77777
 0267     REF   4  LAST  235   E7,1425                          EBANK=  DVTOTAL
 0268     REF   1              01,2273   75170 0               -2CADR   PREREAD
 0268     REF   1              01,2274   01710 0
 0269                          01,2275   22000 1   5.21SPOT     OCT     22000
 0270     REF   7  LAST  235   E5,1671                          EBANK=  XSM
 0271     REF   1              01,2276   02412 1                2CADR   ALFLT1
 0271     REF   1              01,2277   66065 1
 0272                          01,2300   77777 0   5.23SPOT     OCT     77777
 0273     REF   8  LAST  235   E5,1671                          EBANK=  XSM
 0274     REF   1              01,2301   75376 1               -2CADR   SPECSTS
 0274     REF   1              01,2302   11712 0
 0275                          01,2303   20000 0   5.25SPOT     OCT     20000
 0276     REF   9  LAST  235   E5,1671                          EBANK=  XSM
 0277     REF   1              01,2304   03111 0                2CADR   RESTEST3
 0277     REF   1              01,2305   66065 1
 0278                          01,2306   20000 0   5.27SPOT     OCT     20000
 0279   REF  10  LAST  235   E5,1671                          EBANK=  XSM
 0280   REF   1              01,2307   03057 0                2CADR   RESTAIER
 0280   REF   1              01,2310   66065 1
 0281                        01,2311   77777 0  5.31SPOT OCT     77777
 0282   REF  11  LAST  235   E6,1661                          EBANK=  AOG
 0283   REF   1              01,2312   75037 1               -2CADR   CHEKAVEG
 0283   REF   1              01,2313   01711 1
 0284                        01,2314   20000 0  5.33SPOT OCT     20000
 0285   REF  11  LAST  236   E5,1671                          EBANK=  XSM
 0286   REF   1              01,2315   03134 1                2CADR   RESCHNG
 0286   REF   1              01,2316   66065 1
R0287   ANY MORE GROUP 5.ODD RESTART VALUES SHOULD GO HERE

 0288                        01,2317   77777 0  6.2SPOT  OCT     77777          USED BY P40 AFTER GIMB DR TST TO REPOS'N
 0289   REF   5  LAST  181   E6,1476                          EBANK=     AK      ENGINE UNTIL TVCDAPON
 0290   REF   1              01,2320   75422 1               -2CADR   PRE40.6
 0290   REF   1              01,2321   37711 1

 0291                        01,2322   00144 0               DEC     100
 0292   REF   2  LAST  127   E7,1660                         EBANK=  TTOGO
 0293   REF   1              01,2323   74552 0              -2CADR   CLOKTASK
 0293   REF   1              01,2324   27710 1

R0294   ANY MORE 6.ODD RESTART VALUES SHOULD GO HERE

 0295                        01,2325   00144 0  6.3SPOT  DEC     100
 0296   REF  14  LAST  234   E7,1412                         EBANK=  TIG
 0297   REF   2  LAST  236   01,2326   74552 0              -2CADR   CLOKTASK
 0297                        01,2327   27710 1
 0298                        01,2330   30000 1  6.5SPOT  OCT     30000          PROTECT INCREMENTING OF TIME2,TIME1 BY
 0299   REF   4  LAST  232   E3,1706                         EBANK=  TEPHEM         P27NUPDATE PROGRAM)
 0300   REF   1              01,2331   03575 0               2CADR   TIMEDIOR
 0300   REF   1              01,2332   56063 1
 0301                        01,2333   50777 0  6.7SPOT  OCT     50777          PRIO 27 NOVAC
 0302   REF   5  LAST  234   E6,1473                         EBANK=  CSMMASS
 0303   REF   1              01,2334   03365 1               2CADR   V97TJOB
 0303   REF   1              01,2335   50066 1
 0304   REF   2  LAST  116   01,2336   76052 1  6.11SPOT-GENADR  CM/GYMDT       PROTECT TASK TO READ CDUS.
 0305   REF   3  LAST  236   E6,1725                         EBANK=  CM/GYMDT       FOR ENTRY DAP
 0306   REF   1              01,2337   75714 1              -2CADR   READGYMD
 0306   REF   1              01,2340   45711 1
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L        RESTART TABLES                                                              USER'S PAGE NO.  9      E0 S3

R0307    PROGRAM DESCRIPTION: NEWPHASE                                               DATE: 11 NOV 1966
R0309    MOD: 1                                                                      ASSEMBLY: SUNBURST REV
R0311    MOD BY: COPPS                                                               LOG SECTION: PHASE TABLE MAINTENANCE
R0313    FUNCTIONAL DESCRIPTION:
R0314                  NEWPHASE IS THE QUICK WAY TO MAKE A NON VARIABLE PHASE CHANGE. IT INCLUDES THE OPTION OF SETTING
R0316             TBASE OF THE GROUP. IF TBASE IS TO BE SET,  -C(TIME1) IS STORED IN THE TBASE TABLE AS FOLLOWS:

R0318                       (L-1) TBASE0
R0319                       (L)   TBASE1 (IF GROUP=1)
R0320                       (L+1)
R0321                       (L+2) TBASE2 (IF GROUP=2)
R0322                       -----
R0323                       (L+6) TBASE4 (IF GROUP=4)
R0324                       (L+7)
R0325                       (L+8) TBASE5 (IF GROUP=5)

R0326             IN ANY CASE, THE NEGATIVE OF THE PHASE, FOLLOWED (IN THE NEXT REGISTER)  BY THE PHASE, IS STORED IN THE
R0328             PHASE TABLE AS FOLLOWS:

R0329                       (L)   -PHASE1 (IF GROUP=1)
R0330                       (L+1) PHASE1
R0331                       (L+2) -PHASE2 (IF GROUP=2)
R0332                       (L+3) PHASE2
R0333                       -----
R0334                       (L+7) PHASE4
R0335                       (L+8) -PHASE5 (IF GROUP=5)
R0336                       (L+9) PHASE5

R0337    CALLING SEQUENCE:
R0338                 EXAMPLE IS FOR PLACING A PHASE OF FIVE INTO GROUP THREE:

R0339             1) IF TBASE IS NOT TO BE SET:
A0340                                         L-1      CA      FIVE
A0341                                         L        TC      NEWPHASE
A0342                                         L+1      OCT     00003

R0343             2) IF TBASE IS TO BE SET:
A0344                                         L-1      CS      FIVE
A0345                                         L        TC      NEWPHASE
A0346                                         L+1      OCT     00003

R0347    SUBROUTINES CALLED: NONE

R0348    NORMAL EXIT MODE: AT L+2 OF CALLING SEQUENCE

R0349    ALARM OR ABORT EXITS: NONE

R0350    OUTPUT: PHASE TABLE AND TBASE TABLE UPDATED

R0351    ERASABLE INITIALIZATION REQ,D: NONE
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L       RESTART TABLES                                                                   USER'S PAGE NO.  10      EO 53

R0352   DEBRIS: A,L,TEMPG

R0353   ***WARNING*** THIS PROGRAM IS TO BE PLACED IN FIXED-FIXED AND UNSWITCHED ERASABLE.

 0356   REF   1                 4000                           SETLOC FFTAG1
 0357                           4126                           BANK

 0358   REF   1                                                COUNT* $$/PHASE

 0359                           4126  0 0004 0   NEWPHASE INHINT

 0360   REF  19  LAST  221      4127  54 001 1                 TS      L                   SAVE FOR FURTHER USE

 0361   REF  20  LAST  215      4130  50 002 0                 NDX     Q                   OBTAIN THE GROUP NUMBER
 0362                           4131  3 0000 1                 CA      Q
 0363   REF  21  LAST  238      4132  24 002 0                 INCR    Q                   OBTAIN THE RETURN ADDRESS
 0364                           4133  6 0000 1                 DOUBLE                      SAVE THE GROUP IN A FORM USED FOR
 0365   REF   1                 4134  54 061 1                 TS      TEMPG               INDEXING

 0366   REF  20  LAST  238      4135  10 001 1                 CCS     L                   SEE IF WE ARE TO SET TBASE
 0367                           4136  1 4145 1                 TCF     +7                  NO, THE DELTA T WAS POSITIVE
 0368                           4137  1 4145 1                 TCF     +6

 0369   REF  60  LAST  222      4140  24 000 1   NUFAZ+10 INCR    A                   SET TBASE AND STORE PHASE CORRECTLY
 0370   REF  21  LAST  238      4141  54 001 1                 TS      L

 0371   REF   7  LAST  190      4142  4 0025 1                 CS      TIME1               SET TBASE
 0372   REF   2  LAST  238      4143  50 061 0                 NDX     TEMPG
 0373   REF   1                 4144  55'255 0                 TS      TBASE1 -2

 0374   REF  22  LAST  238      4145  4 0001 1                 CS      L                   NOW PUT THE PHASE IN THE RIGHT TABLE LOC
 0375   REF   3  LAST  238      4146  50 061 0                 NDX     TEMPG
 0376   REF   4  LAST  213      4147  53'154 1                 DXCH    -PHASE1 -2

 0377   REF   1                 4150  1 5642 0                 TCF     REQ                 NOW RETURN TO CALL
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L        SXTMARK                                                                              USER'S PAGE NO.   1      EU 53

R0001    PROGRAM NAME       -      SXTMARK

R0002     MOD. 1   8 AUG. 69     BY P.RYE


R0003    FUNCTIONAL DESCRIPTION

R0004               SXTMARK IS CALLED BY P03 AND BY P22, P23, P51, AND P52 VIA R53
R0005               THE REGISTER MARKINDX IS SET TO 5 IF THE CALLING PROGRAM IS P22, OR TO 1 FOR OTHER USERS.
R0007                  THIS REGISTER INDICATES THE NUMBER OF MARKS DESIRED.
R0008               THE REGISTER EXTVBACT IS CHECKED (SUBROUTINE TESTMARK) TO INSURE THAT THE MARK DISPLAY SYSTEM
R0010                  IS FREE.  IF NOT, BAILOUT (31211) IS DONE.
R0011               BIT 2 OF THE REGISTER EXTVBACT IS SET BY SXTMARK, RESERVING THE MARKING AND EXTENDED VERB SYSTEM.
R0013               SXTMARK DISPLAYS A FLASHING VERB 51, CALLING FOR MARKS.  A PROCEED RESPONSE TO THIS DISPLAY
R0015                  WILL RELEASE THE MARKING SYSTEM (SUBROUTINES MKRELEAS, CLEARMARK) AND RETURN TO THE
R0017                  CALLING PROGRAM.

R0018               WHEN SUFFICIENT MARKS HAVE BEEN MADE (MARKINDX = 0) A FLASHING V50N25, R1 = 16, IS DISPLAYED.
R0020                  A PROCEED RESPONSE TO THIS DISPLAY WILL RETURN TO THE CALLING PROGRAM AFTER RELEASING THE
R0022                  MARKING SYSTEM.


R0023               MARKS ARE PROCESSED BY THE ROUTINE MARKRUPT AS FOLLOWS:
R0024                      IF NO MARKS ARE CALLED FOR, ALARM CODE 114 IS SENT AND THE MARKRUPT ROUTINE EXITS.
R0026                      IF A MARK IS ACCEPTED, MARKFLG IS SET TO ENABLE A REJECT.
R0028                      IF R21(P20) IS RUNNING, DATA IS MOVED FROM STORAGE MRKBUF1 INTO MRKBUF2.  NEW MARK DATA
R0030                           IS STORED INTO MRKBUF1.
R0031                      IF P22 IS RUNNING, MARK DATA IS STORED INTO SVMRKDAT, USING THE REGISTER P22DEX AS AN
R0033                           INDEX AND THE REGISTER 8NN AS A COUNTER.  MARKINDX IS DECREMENTED.
R0035                      IF R57 IS RUNNING, MARK DATA IS STORED INTO MARKDOWN FOR DOWNLINK, THEN PROCESSED AS FOR
R0037                           R21.  MARKRUPT THEN CALLS MARKDISP (IN R57)
R0038                      FOR OTHER USERS, MARK DATA IS STORED INTO MRKBUF1 AND MARKINDX IS DECREMENTED.


R0040               MARK REJECTS ARE PROCESSED BY THE ROUTINE MARKRUPT AS FOLLOWS:
R0041                      IF MARKFLG IS CLEAR (I.E., NO MARK WAS TAKEN), ALARM CODE 110 IS SENT AND THE ROUTINE EXITS.
R0043                      OTHERWISE, MARKINDX IS INCREMENTED, THE P22 INDICATORS 8NN AND P22DEX ARE DECREMENTED
R0045                           (IF THE USER IS P22), AND THE V51FL DISPLAY IN SXTMARK IS REESTABLISHED.


R0047               IF THE ERASABLE REGISTER CDUCHKWD IS SET TO A NON-ZERO VALUE, VALIDITY OF THE MARKS IS CHECKED
R0049                  BY THE MARKRUPT ROUTINE AS FOLLOWS:
R0050                      IF THE CDU'S CHANGE BY MORE THAN 3 BITS OVER THE TIME PERIOD INDICATED BY THE VALUE OF
R0052                           CDUCHKWD, ALARM CODE 121 IS SENT AND THE ROUTINE EXITS.


R0054    CALLING SEQUENCE -

R0055               TC      BANKCALL
R0056               CADR    SXTMARK
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L        SXTMARK                                                                   USER'S PAGE NO.  2      EU 53

R0057   NORMAL EXIT MODE -

R0058            RETURN TO USER VIA BANKJUMP (RETURN ADDRESS IN OPTCADR)


R0059   ALARM OR ABORT EXIT MODES

R0060            1. ALARM 110 - MARK REJECT WITH NO MARK
R0061            2. ALARM 113 - NO INBITS
R0062            3. ALARM 121 - CDU'S NO GOOD AT MARK TIME
R0063            4. ALARM 114 - MARK MADE BUT NOT DESIRED
R0064            5. BAILOUT 31211 - MARK DISPLAY SYSTEM BUSY


R0065   ERASABLE INITIALIZATION REQUIRED -

R0066            NONE


R0067   OUTPUT -

R0068            FOR P22:
R0069               MARK DATA IN SVMRKDAT
R0070               MARKINDX DECREMENTED BY ONE FOR EACH MARK TAKEN
R0071               NO. OF MARKS IN 8NN
R0072            FOR R57:
R0073               MARK DATA IN MARKDOWN AND MRKBUF1
R0074            FOR OTHER USERS:
R0075               MARKINDX DECREMENTED TO ZERO IF A MARK WAS TAKEN
R0076               MARK DATA IN MRKBUF1


R0077   CONDITIONS AT EXIT -

R0078            MARKINDX = INITIAL VALUE - NO. MARKS TAKEN
R0079            MARKING SYSTEM IS RELEASED :
R0080                   EXTVBACT =0
R0081                   BIT 9 OPTMODES = 0
R0082                   OPTIND = -1
R0083                   BIT 2 CHAN12 = 0
R0084            MARKFLG = 0
R0085            OPTCADR CONTAINS CADR OF SXTMARK CALLER
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L          SXTMARK                                                                                         USER'S PAGE NO.  3      EQ S3

P0086
 0087    REF   1               07,2000                        SETLOC SXTMARKE
 0088                          07,2000                        BANK

 0089    REF   7  LAST  231    E7,1722                        EBANK=  MRKBUF1
 0090    REF   1                                              COUNT*  $$/SXTMK
 0091    REF   1               07,2000  0 2062 1  SXTMARK  TC       TESTMARK
 00912   REF   1               07,2001  0 5354 0           TC       CHECKMM          IS THIS P24
 00914                         07,2002   00030 1           MM       24
 00916                         07,2003  1 2005 1           TCF      +2               NO
 00918   REF   1               07,2004  1 2010 0           TCF      SXTMRKA          YES
 0092    REF   2  LAST  241    07,2005  0 5354 0           TC       CHECKMM
 0093                          07,2006   00026 0           MM       22
 0094    REF   1               07,2007  1 2015 0           TCF      SETMRK
 0095    REF  25  LAST  227    07,2010  3 4772 1  SXTMRKA  CAF      ZERO             INITIALIZE MARK COUNTER
 0096    REF   3  LAST  189    07,2011  55'747 0           TS       8NN

 0097    REF   2  LAST  134    07,2012  55'753 0           TS       P22DEX
 0098    REF   6  LAST  224    07,2013  3 4773 0           CAF      FIVE             5 MARKS FOR P22, ONE FOR ALL OTHERS
 0099    REF   2  LAST  241    07,2014  1 2016 0           TCF      SETMRK +1
 0100    REF   8  LAST  202    07,2015  3 4770 0  SETMRK   CAF      ONE
 0101    REF   3  LAST  204    07,2016  54 301 1           TS       MARKINDX

 0102    REF   1               07,2017  0 4665 0           TC       MAKECADR         STORE RETURN TO USER WHO CALLED
 0103    REF   1               07,2020  55'336 1           TS       OPTCADR             SXTMARK IN OPTCADR

 0104    REF   8  LAST  222    07,2021  0 4636 0  MKVB51   TC       BANKCALL         CLEAR DISPLAY FOR MARK VERB
 0105    REF   1               07,2022   20575 1           CADR     KLEENEX
 0106    REF   1               07,2023  3 2061 1  MKVBDSP  CAF      VB51             DISPLAY MARK VERB 51
 0107    REF   9  LAST  241    07,2024  0 4636 0    +1     TC       BANKCALL
 0108    REF   1               07,2025   20604 1           CADR     GOMARK4
 0109    REF   1               07,2026  1 2031 0           TCF      TERMSXT          V834-TERMINATE
 0110    REF   1               07,2027  1 2042 1           TCF      ENTANSWR         V33-PROCEED-MARKING DONE
 0111    REF   1               07,2030  1 2052 0           TCF      MKVB5X           ENTER-RECYCLE TO INITIAL MARK DISPLAY

 0112    REF   3  LAST  211    07,2031  0 5527 1  TERMSXT  TC       CLEARMRK         CLEAR MARK ACTIVITY.

 0113    REF   1               07,2032  0 2073 1           TC       MKRLEES

 0114    REF   3  LAST  241    07,2033  0 5354 0           TC       CHECKMM
 0115                          07,2034   00003 1           MM       03
 0116                          07,2035  1 2037 0           TCF      +2
 0117    REF   1               07,2036  0 2040 1           TC       TERMP03
 0118    REF   3  LAST  215    07,2037  0 4103 1           TC       GOTOPOOH

 0119    REF   7  LAST  219    07,2040  0 4655 0  TERMP03  TC       POSTJUMP
 0120    REF   1               07,2041   67370 1           CADR     GCOMP5

 0121    REF   1               07,2042  3 7645 1  ENTANSWR CAF      PRIO24
 01211   REF   1               07,2043  0 5121 0           TC       NOVAC
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01212  REF   3  LAST  219   E7,1777                          EBANK=  WHOCARES
01213  REF   1              07,2044    05524 1               2CADR   ENDEXT
01213  REF   1              07,2045    04067 1
01214  REF   2  LAST  221   07,2046  3 5052 0                CAF     PRIO13           ALLOW LEFTOVER SLEEPING JOB IF ANY
01215  REF   1              07,2047  0 5176 1                TC      PRIOCHNG

0123   REF   2  LAST  241   07,2050  3 1336 0  MKVRET        CA      OPTCADR          OPTCADR HAS RETURN CADR OF USER WHO
0124   REF   1              07,2051  0 4660 0                TC      BANKJUMP            CALLED SXTMARK

0125   REF   4  LAST  241   07,2052  10 301 1  MKVB5X        CCS     MARKINDX         REDISPLAY VB51 IF MORE MARKS WANTED
0126   REF   1              07,2053  1 2021 1                TCF     MKVB51
0127   REF   1              07,2054  3 4321 0  MKVB50        CAF     R1D1             OCT 16
0128   REF   2  LAST   82   07,2055  55'250 0                TS      DSPTEM1
0129   REF   1              07,2056  3 2060 0                CAF     V50N25           DISPLAY V50N25 IF MARKING DONE.
0130   REF   1              07,2057  1 2024 1                TCF     MKVBDSP +1
0131                        07,2060    14431 1  V50N25       VN      5025
0132                        07,2061    14600 1  VB51         VN      5100


0133   REF   7  LAST  199   07,2062  3 6211 0  TESTMARK CAF     SIX
0134   REF   3  LAST  204   07,2063  7 1247 0                MASK    EXTVBACT
0135   REF  61  LAST  238   07,2064  10 000 0                CCS     A
0136   REF   1              07,2065  1 2071 1                TCF     MKABORT
0137   REF  18  LAST  178   07,2066  3 4767 0                CAF     BIT2
0138   REF   4  LAST  242   07,2067  27'247 0                ADS     EXTVBACT
0139   REF  22  LAST  238   07,2070  0 0002 0                TC      Q

0140   REF   1              07,2071  0 7706 1  MKABORT       TC      BAILOUT
0141                        07,2072    31211 1               OCT     31211

0142   REF   2  LAST  241   07,2073                MKRELEAS EQUALS  MKRLEES

0143                        07,2073  0 0004 0  MKRLEES       INHINT
0147   REF   5  LAST  222   07,2074  3 7702 0                CA      NEGONE
0148   REF  16  LAST  222   07,2075  55'323 0                TS      OPTIND           KILL COARS OPTICS

0149   REF  26  LAST  241   07,2076  3 4772 1                CAF     ZERO
0150   REF   5  LAST  242   07,2077  54 301 1                TS      MARKINDX

0152   REF   2  LAST  202   07,2100  4 4765 0                CS      MARKBIT
01521  REF  16  LAST  222   07,2101  7 0075 1                MASK    FLAGWRD1
01522  REF  17  LAST  242   07,2102  54 075 1                TS      FLAGWRD1

0153                        07,2103  0 0003 1                RELINT

0154   REF  23  LAST  242   07,2104  0 0002 0                TC      Q
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P0155
 0156   REF   2  LAST  141   07,2105  54 016 1  MARKRUPT TS     BANKRUPT        STORE  CDUS AND OPTICS NOW
 0157   REF   5  LAST  182   07,2106  3 0035 1           CA     CDUT
 0158   REF   1              07,2107  54 361 1           TS     MKCDUT
 0159   REF   6  LAST  181   07,2110  3 0036 1           CA     CDUS
 0160   REF   1              07,2111  54 357 1           TS     MKCDUS
 0161   REF   2  LAST  182   07,2112  3 0033 1           CA     CDUY
 0162   REF   1              07,2113  54 356 0           TS     MKCDUY
 0163   REF   4  LAST  180   07,2114  3 0034 0           CA     CDUZ
 0164   REF   1              07,2115  54 360 0           TS     MKCDUZ
 0165   REF   3  LAST  181   07,2116  3 0032 0           CA     CDUX
 0166   REF   1              07,2117  54 362 1           TS     MKCDUX
 0167                        07,2120  0 0006 1           EXTEND
 0168   REF   7  LAST  189   07,2121  3 0025 0           DCA    TIME2           GET TIME
 0169   REF   1              07,2122  52 355 0           DXCH   MKT2T1
 0170                        07,2123  0 0006 1           EXTEND
 0171   REF   2  LAST  243   07,2124  3 0355 1           DCA    MKT2T1
 0172   REF   1              07,2125  52 014 0           DXCH   SAMPTIME        RUPT TIME FOR NOUN 65.

 0173   REF  24  LAST  242   07,2126  56 002 0           XCH    Q
 0174   REF   2  LAST  141   07,2127  54 012 0           TS     QRUPT

 0175   REF  20  LAST  214   07,2130  3 4763 1           CAF    BIT6            SEE IF MARK OR MKREJECT
 0176                        07,2131  0 0006 1           EXTEND
 0177   REF   3  LAST  202   07,2132  02 016 1           RAND   NAVKEYIN
 0178   REF  62  LAST  242   07,2133  10 000 0           CCS    A
 0179   REF   1              07,2134  0 2154 0           TC     MARKIT          ITS A MARK

 0180   REF  17  LAST  201   07,2135  3 4762 0           CAF    BIT7            NOT A MARK, SEE IF MKREJECT
 0181                        07,2136  0 0006 1           EXTEND
 0182   REF   4  LAST  243   07,2137  02 016 1           RAND   NAVKEYIN
 0183   REF  63  LAST  243   07,2140  10 000 0           CCS    A
 0184   REF   1              07,2141  0 2344 0           TC     MKREJECT        ITS A MARK REJECT

 0185   REF   2  LAST  202   07,2142  3 4342 0  KEYCALL  CAF    OCT37           NOT MARK OR MKREJECT, SEE IF KEYCODE
 0186                        07,2143  0 0006 1           EXTEND
 0187   REF   5  LAST  243   07,2144  02 016 1           RAND   NAVKEYIN
 0188                        07,2145  0 0006 1           EXTEND
 0189                        07,2146  1 2151 1           BZF    +3              IF NO INBITS
 0190   REF   8  LAST  241   07,2147  0 4655 0           TC     POSTJUMP
 0191   REF   1              07,2150   17675 0           CADR   KEYCOM          IT,S A KEY CODE, NOT A MARK.

 0192   REF  12  LAST  210   07,2151  0 5671 1  +3       TC     ALARM           ALARM IF NO INBITS
 0193                        07,2152   00113 1           OCT    113
 0194   REF  13  LAST  178   07,2153  0 5323 0           TC     RESUME
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L       SXTMARK                                                                                   USER'S PAGE NO.   6      E7 S3

R0195   PROGRAM NAME - MARKIT                                             DATE- 19 SEPT 1967

R0196   CALLING SEQUENCE
R0197      FROM MARKRUPT IF CHAN 16 BIT 6 = 1

R0198   EXIT
R0199      RESUME

R0200   INPUT
R0201      CDUCHKWD. ALSO ALL INITIALIZATION FOR MARKCONT

R0202   OUTPUT
R0203      MKT2T1,MKCDUX,MKCDUY,MKCDUZ,MKCDUS,MKCDUT

R0204   ALARM EXIT
R0205      NONE

 0206   REF   1                07,2154  11'341 1  MARKIT    CCS     CCUCHKWD
 0207                          07,2155  1 2160 0            TCF     +3                  DELAY OF CDUCHKWD CS IF PNZ
 0208                          07,2156  1 2160 0            TCF     +2
 0209   REF  27  LAST  242     07,2157  3 4772 1            CAF     ZERO
 0210   REF   9  LAST  241     07,2160  6 4770 0            AD      ONE                 10 MS IF NC CHECK
 0211   REF   6  LAST  200     07,2161  0 5233 0            TC      WAITLIST
 0212   REF   8  LAST  241     E7,1722                      EBANK=  MRKBUF1
 0213   REF   1                07,2162   02165 1            2CADR   MARKDIF
 0213   REF   1                07,2163   16067 1
 0214   REF  14  LAST  243     07,2164  1 5323 1            TCF     RESUME

 0215   REF   1                07,2165  3 4753 1  MARKDIF   CAF     P24BIT              IS THIS P24
02152   REF   2  LAST  222     07,2166  7 0105 1            MASK    FLAGWRD9
02153   REF  64  LAST  243     07,2167  10 000 0            CCS     A
02154   REF   1                07,2170  1 2204 1            TCF     MARKCONT            YES ACCEPT MARK
02156   REF   2  LAST  244     07,2171  3 1341 0            CA      CDUCHKWD            IF DELAY CHECK IS ZERO OR NEG,ACP MARK
 0216                          07,2172  0 0006 1            EXTEND
 0217   REF   2  LAST  244     07,2173  6 2204 0            BZMF    MARKCONT
 0218   REF  19  LAST  172     07,2174  4 4770 1            CS      BIT1
 0219   REF   1                07,2175  54 353 0            TS      MKNDX               SET INDEX -1
 0220   REF   2  LAST  243     07,2176  3 0362 0            CA      MKCDUX
 0221   REF   1                07,2177  0 2325 1            TC      DIFCHK              SEE IF VEHICLE RATE  TO MUCH AT MARK
 0222   REF   2  LAST  243     07,2200  3 0356 1            CA      MKCDUY
 0223   REF   2  LAST  244     07,2201  0 2325 1            TC      DIFCHK
 0224   REF   2  LAST  243     07,2202  3 0360 1            CA      MKCDUZ
 0225   REF   3  LAST  244     07,2203  0 2325 1            TC      DIFCHK

 0226   REF   2  LAST  202     07,2204  3 4753 1  MARKCONT  CAF     R21BIT              R21 MARKING
 0227   REF   6  LAST  212     07,2205  7 0076 1            MASK    FLAGWRD2
 0228   REF  65  LAST  244     07,2206  10 000 0            CCS     A
 0229   REF   1                07,2207  1 2314 1            TCF     PUTMARK             YES

 0230   REF   1                07,2210  3 4755 1            CAF     V59FLBIT
 0231    REF   7  LAST  216   07,2211  7 0101 0            MASK    FLAGWRD5       V59FLAG
 0232    REF  66  LAST  244   07,2212  10 000 0            CCS     A
 0233    REF   1              07,2213  1 2304 0            TCF     DOWNMRK

 0234    REF   6  LAST  242   07,2214  10 301 1            CCS     MARKINDX       MARKS CALLED FOR
 0235    REF   1              07,2215  1 2221 0            TCF     MARK2          YES

 0236    REF  13  LAST  243   07,2216  0 5671 1  114ALM    TC      ALARM
 0237                         07,2217   00114 0            OCT     114            MARKS NOT CALLED FOR
 0238    REF   5  LAST  174   07,2220  0 5314 1            TC      TASKOVER

 0239    REF   7  LAST  245   07,2221  54 301 1  MARK2     TS      MARKINDX       DECREMENT NO. MARKS WANTED

 0240    REF  13  LAST  219   07,2222  0 5547 1            TC      UPFLAG
 0241    REF   1              07,2223   00032 0            ADRES   MARKFLG        SET FLAG TO ENABLE REJECT

 02411   REF   4  LAST  241   07,2224  0 5354 0            TC      CHECKMM        IS THIS P24
 02412                        07,2225   00030 1            MM      24
 02413   REF   1              07,2226  1 2235 0            TCF     MRKCHK22       NO
 02414   REF   8  LAST  245   07,2227  24 301 0            INCR    MARKINDX       RESTORE THIS REGISTER
 02415   REF  14  LAST  245   07,2230  0 5547 1            TC      UPFLAG
 02416   REF   1              07,2231   00061 0            ADRES   P22MKFLG       DOWNLINK CONTAINS P24 MARKS
 02417   REF  15  LAST  245   07,2232  0 5547 1            TC      UPFLAG
 02418   REF   1              07,2233   00052 0            ADRES   P24MKFLG       NEW P24MARK TAKEN
 02419   REF   1              07,2234  1 2240 1            TCF     VACSTOR -1
 0242    REF   5  LAST  245   07,2235  0 5354 0  MRKCHK22  TC      CHECKMM
 0243                         07,2236   00026 0            MM      22
 0244    REF   2  LAST  244   07,2237  1 2314 1            TCF     PUTMARK
 0245    REF   4  LAST  241   07,2240  25'747 1    -1      INCR    8NN            NO. MARKS TAKEN.
 0246                         07,2241  0 0006 1  VACSTOR   EXTEND
 0247    REF   3  LAST  243   07,2242  3 0355 1            DCA     MKT2T1
 0248    REF   3  LAST  241   07,2243  51'753 1            INDEX   P22DEX
 0249    REF  20  LAST  190   07,2244  53'540 0            DXCH    SVMRKDAT
 0250                         07,2245  0 0006 1            EXTEND
 0251    REF   3  LAST  244   07,2246  3 0357 0            DCA     MKCDUY
 0252    REF   4  LAST  245   07,2247  51'753 1            INDEX   P22DEX
 0253    REF  21  LAST  245   07,2250  53'542 1            DXCH    SVMRKDAT +2
 0254                         07,2251  0 0006 1            EXTEND
 0255    REF   3  LAST  244   07,2252  3 0361 0            DCA     MKCDUZ
 0256    REF   5  LAST  245   07,2253  51'753 1            INDEX   P22DEX
 0257    REF  22  LAST  245   07,2254  53'544 1            DXCH    SVMRKDAT +4
 0258    REF   3  LAST  244   07,2255  3 0362 0            CA      MKCDUX
 0259    REF   6  LAST  245   07,2256  51'753 1            INDEX   P22DEX
 0260    REF  23  LAST  245   07,2257  55'545 0            TS      SVMRKDAT +6

 026005  REF   6  LAST  245   07,2260  0 5354 0            TC      CHECKMM        IS THIS P24
 02601                        07,2261   00030 1            MM      24
 026015  REF   1              07,2262  1 2273 1            TCF     INDINC         NO
 02602   REF   1              07,2263  4 4172 0            CS      OCT34          YES DEC 28
 026025  REF   7  LAST  245   07,2264  6 1753 1            AD      P22DEX
 02603                           07,2265   0 0006 1            EXTEND                  ARE THERE ANY MORE LOC LEFT IN MARK
 026035                          07,2266   1 2270 1            BZF      +2             DOWNLINK BUFFER
 026045 REF    2  LAST  245      07,2267   1 2273 1            TCF      INDINC         YES
 02605  REF   28  LAST  244      07,2270   3 4772 1            CA       ZERO           REINITIALIZE INDEX FOR
 026055 REF    8  LAST  245      07,2271   55'753 0            TS       P22DEX         BEGINNING OF BUFFE?
 02606  REF    1                 07,2272   1 2275 1            TCF      MARKDONE
 0261   REF    2  LAST  214      07,2273   3 4774 1  INDINC    CAF      SEVEN
 0262   REF    9  LAST  246      07,2274   27'753 0            ADS      P22DEX
 0263   REF    9  LAST  245      07,2275   10 301 1  MARKDONE  CCS      MARKINDX       ANY MORE MARKS TO BE TAKEN
 02631  REF    6  LAST  245      07,2276   1 5314 0            TCF      TASKOVER
 02632  REF    1                 07,2277   3 7644 0            CAF      PRIO22
 0264   REF    4  LAST  219      07,2300   0 5135 0            TC       FINDVAC
 0265   REF    9  LAST  244      E7,1722                       EBANK=   MRKBUF1
 0266   REF    2  LAST  241      07,2301    02052 1            2CADR    MKVB5X
 0266                            07,2302    16067 1
 0267   REF    7  LAST  246      07,2303   1 5314 0            TCF      TASKOVER

 0268   REF    8  LAST  242      07,2304   3 6211 0  DOWNMRK   CAF      SIX            FOR CALIBRATION MARK
 0269   REF    2  LAST  223      07,2305   0 5607 0            TC       GENTRAN
 0270   REF    4  LAST  245      07,2306    00354 0            ADRES    MKT2T1
 0271   REF    5  LAST  185      07,2307    01674 0            ADRES    MARKDOWN

 0272   REF    3  LAST  219      07,2310   3 5047 1            CAF      PRIO5
 0273   REF    2  LAST  241      07,2311   0 5121 0            TC       NOVAC
 0274   REF   10  LAST  246      E7,1722                       EBANK=   MRKBUF1
 0275   REF    1                 07,2312    02230 1            2CADR    MARKDISP
 0275   REF    1                 07,2313    76067 1

 0280   REF    9  LAST  246      07,2314   3 6211 0  PUTMARK   CAF      SIX
 0281   REF    3  LAST  246      07,2315   0 5607 0            TC       GENTRAN
 0282   REF    5  LAST  246      07,2316    00354 0            ADRES    MKT2T1
 0283   REF   11  LAST  246      07,2317    01722 1            ADRES    MRKBUF1

 0284   REF    3  LAST  244      07,2320   3 4753 1            CAF      R21BIT         DONT CALL V850 DISPLAY FOR R21
 0285   REF    7  LAST  244      07,2321   7 0076 1            MASK     FLAGWRD2
 0286   REF   67  LAST  245      07,2322   10 000 0            CCS      A
 0287   REF    8  LAST  246      07,2323   1 5314 0            TCF      TASKOVER

 0288   REF    2  LAST  246      07,2324   1 2275 1            TCF      MARKDONE

 0289   REF    2  LAST  244      07,2325   24 353 1  DIFCHK    INCR     MKNDX          INCREMENT INDEX

 0290                            07,2326   0 0006 1            EXTEND
 0291   REF    3  LAST  246      07,2327   5 0353 1            INDEX    MKNDX
 0292   REF    4  LAST  243      07,2330   20 032 1            MSU      CDUX           GET MARK(ICDU) - CURRENT(ICDU)
 0293   REF   68  LAST  246      07,2331   10 000 0            CCS      A
 0294                            07,2332   1 2336 1            TCF      +4
 0295   REF   25  LAST  243      07,2333   0 0002 0            TC       Q
 0296                            07,2334   1 2336 1            TCF      +2
 0297   REF   26  LAST  246      07,2335   0 0002 0            TC       Q
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L         SXTMARK                                                                    USER'S PAGE NO.   9      E7 S3

 0298   REF  4  LAST  217   07,2336  6 7701 0            AD       NEG2          SEE IF DIFFERENCE GREATER THAN 3 BITS
 0299                       07,2337  0 0006 1            EXTEND
 0300                       07,2340  6 2335 0            BZMF     -3            NOT GREATER

 0301   REF 14  LAST  245   07,2341  0 5671 1            TC       ALARM         COUPLED WITH PROGRAM ALARM
 0302                       07,2342   00121 0            OCT      00121

 0303   REF  9  LAST  246   07,2343  1 5314 0            TCF      TASKOVER      DO NOT ACCEPT

 0304   REF  4  LAST  246   07,2344  3 4753 1  MKREJECT  CAF      R21BIT
 0305   REF  8  LAST  246   07,2345  7 0076 1            MASK     FLAGWRD2      R21 MARK (SPECIAL MARKING FOR R21)
 0306                       07,2346  0 0006 1            EXTEND
 0307   REF  1              07,2347  1 2367 0            BZF      MRKREJCT      NOT SET THEREFORE REGULAR REJECT
 03071  REF 12  LAST  246   07,2350  3 1722 1            CA       MRKBUF1       IS THERE A MARK IN THE BUFFER?
 03072                      07,2351  0 0006 1            EXTEND
 03073                      07,2352  1 2355 1            BZF      +3            YES - REJECT MARK IN BUFFER

 03074                      07,2353  0 0006 1            EXTEND
 03075  REF  1              07,2354  6 2360 0            BZMF     REJCTR22      NO,SET FLAG TO REJECT MARK PROCESSED-R22

 0308   REF  6  LAST  242   07,2355  3 7702 0            CA       NEGONE        -1 (FOR R22)
 0309   REF 13  LAST  247   07,2356  55'722 0            TS       MRKBUF1       -1 IN TIME IS FLAG TO R22 SIGNIFYING A
 0310   REF 15  LAST  244   07,2357  0 5323 0            TC       RESUME

 03101  REF  1              07,2360  3 4762 0  REJCTR22  CAF      R22CABIT      IS R22 PROCESSING A MARK?
 03102  REF  3  LAST  244   07,2361  7 0105 1            MASK     FLAGWRD9
 03103                      07,2362  0 0006 1            EXTEND
 03104  REF 16  LAST  247   07,2363  1 5323 1            BZF      RESUME        NO IGNORE MARK REJECT

 03105  REF 16  LAST  245   07,2364  0 5547 1            TC       UPFLAG
 03106  REF  1              07,2365   00231 1            ADRES    REJCTFLG      YES - SET FLAG FOR R22
 03107  REF 17  LAST  247   07,2366  0 5323 0            TC       RESUME

 0311   REF  3  LAST  242   07,2367  3 4765 1  MRKREJCT  CAF      MARKBIT
 0312   REF 18  LAST  242   07,2370  7 0075 1            MASK     FLAGWRD1
 0313   REF 69  LAST  246   07,2371  10 000 0            CCS      A
 0314   REF  1              07,2372  0 2376 1            TC       REJECT3

 0315   REF 15  LAST  247   07,2373  0 5671 1            TC       ALARM         DONT ACCEPT TWO REJECTS TOGETHER
 0316                       07,2374   00110 1            OCT      110
 0317   REF 18  LAST  247   07,2375  0 5323 0            TC       RESUME

 0318   REF 15  LAST  218   07,2376  0 5561 0  REJECT3   TC       DOWNFLAG
 0319   REF  2  LAST  245   07,2377   00032 0            ADRES    MARKFLG

 031905 REF  7  LAST  245   07,2400  0 5354 0            TC       CHECKMM       IS THIS P24
 03191                      07,2401   00030 1            MM       24
 031915 REF  1              07,2402  1 2422 0            TCF      REJECT4       NO
 03192  REF 16  LAST  247   07,2403  0 5561 0            TC       DOWNFLAG      YES
 031925 REF  2  LAST  245   07,2404   00052 0            ADRES    P24MKFLG
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L         SXTMARK                                                                          USER'S PAGE NO. 10       E7 S3

031926 REF  10  LAST  246   07,2405  11'753 0              CCS     P22DEX          IS MARK TO BE REJ, THE LAST MARK IN BUF
031927                      07,2406  1 2411 0              TCF     +3              NO
031928 REF   2  LAST  245   07,2407  3 4172 1              CA      OCT34           YES
031929                      07,2410  1 2413 1              TCF     +3
03193  REF   3  LAST  246   07,2411  4 4774 0              CS      SEVEN
031935 REF  11  LAST  248   07,2412  6 1753 1              AD      P22DEX
03194  REF  15  LAST  169   07,2413  54 070 1   REJECT5    TS      RUPTREG1
031945                      07,2414  0 0006 1              EXTEND
03195  REF  16  LAST  248   07,2415  5 0070 0              INDEX   RUPTREG1
031955 REF  24  LAST  245   07,2416  4 1540 0              DCS     SVMRKDAT
03196  REF  17  LAST  248   07,2417  50 070 0              INDEX   RUPTREG1
031965 REF  25  LAST  248   07,2420  53'540 0              DXCH    SVMRKDAT
03197  REF   1              07,2421  1 2433 0              TCF     REJEXIT
0320   REF  10  LAST  246   07,2422  24 301 0   REJECT4    INCR    MARKINDX        CALL FOR ANOTHER MARK
0321   REF   8  LAST  247   07,2423  0 5354 0              TC      CHECKMM
0322                        07,2424   00026 0              MM      22
0323   REF   2  LAST  248   07,2425  1 2433 0              TCF     REJEXIT

0324   REF  10  LAST  244   07,2426  4 4770 1              CS      ONE             FOR P22
0325   REF   5  LAST  245   07,2427  27'747 0              ADS     BNN
0326   REF   4  LAST  248   07,2430  4 4774 0              CS      SEVEN
0327   REF  12  LAST  248   07,2431  27'753 0              ADS     P22DEX          DECREMENT P22 INDEX

03271  REF   1              07,2432  1 2413 1              TCF     REJECT5

0328   REF   2  LAST  246   07,2433  3 7644 0   REJEXIT    CAF     PRIO22
0329   REF   5  LAST  246   07,2434  0 5135 0              TC      FINDVAC
0330   REF  14  LAST  247   E7,1722                        EBANK=  MRKBUF1
0331   REF   2  LAST  242   07,2435   02023 1              2CADR   MKVBDSP
0331                        07,2436   16067 1
0332   REF  19  LAST  247   07,2437  1 5323 1              TCF     RESUME
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L        EXTENDED VERBS                                                                    USER'S PAGE NO.   1      E0 53

  0002   REF   1                 43,2000                          SETLOC  EXTVERBS
  0003                           43,2000                          BANK

  0004   REF   6  LAST  233      E5,1757                          EBANK=  0GC

  0005   REF   1                                                  COUNT*  $$/EXTVB
R 0006   FAN-OUT

  0007   REF  25  LAST  224      43,2000  50 154 1   GOEXTVB      INDEX   MPAC         VERB-40 IS IN MPAC
  0008   REF   1                 43,2001  0 2002 1                TC      LST2FAN      FAN AS BEFORE.

  0009   REF   1                 43,2002  0 2121 1   LST2FAN      TC      VBZERO       VB40 ZERO (USED WITH NOUN 20 ONLY).
  0010   REF   1                 43,2003  0 2133 1                TC      VBCOARK      VB41 COARSE ALIGN (USED WITH NOUN 20 OR
A 0011                                                                                                                 91 ONLY)
  0012   REF   1                 43,2004  0 2227 1                TC      IMUFINEK     VB42 FINE ALIGN IMU
  0013   REF   1                 43,2005  0 2364 1                TC      IMUATTCK     VB43  LOAD IMU ATTITUDE ERROR METERS.
  0014   REF   1                 43,2006  0 3064 0                TC      SETSURF      VB44 SET SURFACE FLAG
  0015   REF   1                 43,2007  0 3062 0                TC      RESTSRF      VB45 RESET SURFACE FLAG
  0016   REF   1                 43,2010  0 2451 0                TC      STABLISH     VB46 ESTABLISH G+C CONTROL.
  0017   REF   1                 43,2011  0 3001 0                TC      LMTOCMSV     VB47 MOVE LM STATE VECTOR INTO CM
  0018   REF   1                 43,2012  0 2544 0                TC      DAPDISP      VB48 LOAD A/P DATA.
  0019   REF   1                 43,2013  1 2535 1                TCF     CREWMANU     VB 49  START AUTOMATIC ATTITUDE MANEUVER
  0020   REF   1                 43,2014  0 2265 1                TC      GOLOADLV     VB50 PLEASE PERFORM
  0021   REF   2  LAST  249      43,2015  0 2265 1                TC      GOLOADLV     VB51 PLEASE MARK
  0022   REF   1                 43,2016  0 3037 0                TC      V52          VB52 SET OFFSET NO. FOR P22
  0023   REF   3  LAST  249      43,2017  0 2265 1                TC      GOLOADLV     VB 53 PLEASE PERFORM COAS MARK
  0024   REF   1                 43,2020  0 2600 0                TC      GOTOR23      V54 START R23 (R21-BACKUP)
  0025   REF   1                 43,2021  0 2312 0                TC      ALINTIME     VB55 ALIGN TIME
  0026   REF   1                 43,2022  0 2641 0                TC      TRACKTRM     VB56 TERMINATE TRACKING (P20 +P25)
  0027   REF   1                 43,2023  0 3102 1                TC      V57CALL      V57  FULTKFLG SETTING OPTION
  0028   REF   1                 43,2024  0 2445 0                TC      ENATMA       VB58 ENABLE AUTOMATIC ATTITUDE MANEUVER
  0029   REF   4  LAST  249      43,2025  0 2265 1                TC      GOLOADLV     VB59 PLEASE CALIBRATE
  0030   REF   1                 43,2026  0 2273 0                TC      V60          VB60 SET CPHIX (N17) EQUAL TO CDU
  0031   REF   1                 43,2027  0 2301 1                TC      V61          VB61 SELECT MODE I
  0032   REF   1                 43,2030  0 2304 1                TC      V62          VB62 SELECT MODE II, ERROR WRT N22
  0033   REF   1                 43,2031  0 2307 1                TC      V63          VB63 SELECT MODE III, ERROR WRT N17
  0034   REF   1                 43,2032  0 2437 0                TC      VB64         VB64 CALCULATE,DISPLAY S-BAND ANT ANGLES
  0035   REF   1                 43,2033  0 2342 0                TC      CKOPTVB      V 65 E OPTICAL VERIFICATION FOR PRELAUNC
  0036   REF   1                 43,2034  0 2774 1                TC      ATTACHED     VB 66 ATTACHED. MOVE THIS TO OTHER STATE
  0037   REF   1                 43,2035  0 3054 0                TC      V67          VB67 WMATRIX MONITOR
  0038   REF   1                 43,2036  0 2116 0                TC      ALM/END      VB68 SPARE
  0039   REF   1                 43,2037  0 2037 1   VERB69       TC      VERB69       VB 69 CAUSE RESTART
  0040   REF   1                 43,2040  0 3656 1                TC      V70UPDAT     VB70 UPDATE LIFTOFF TIME.
  0041   REF   1                 43,2041  0 3660 1                TC      V71UPDAT     VB71 UNIVERSAL UPDATE - BLOCK ADDRESS.
  0042   REF   1                 43,2042  0 3662 0                TC      V72UPDAT     VB72 UNIVERSAL UPDATE - SINGLE ADDRESS.
  0043   REF   1                 43,2043  0 3664 0                TC      V73UPDAT     VB73 UPDATE AGC TIME (OCTAL).
  0044   REF   1                 43,2044  0 2706 1                TC      DNEDUMP      VB74 INITIALIZE DOWN-TELEMETRY PROGRAM
A 0045                                                                                           FOR ERASABLE DUMP.
  0046   REF   1                 43,2045  0 2713 0                TC      LFTFLGON     VB75 SET LIFTOFF FLAG.
  0047   REF   2  LAST  249      43,2046  0 2116 0                TC      ALM/END      VB76 SPARE
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L          EXTENDED VERBS                                                                          USER'S PAGE NO.   2       E5 54

  0048    REF   3  LAST  249    43,2047  0 2116 0              TC       ALM/END          VB77 SPARE
  0049    REF   1               43,2050  0 2352 1              TC       CHAZFUGC         CHANGE GYROCOMPASS LAUNCH AZIMUTH V78
  0050    REF   4  LAST  250    43,2051  0 2116 0              TC       ALM/END          VB79 SPARE
  0051    REF   1               43,2052  0 2703 1              TC       LEMVEC           VB80 UPDATE LEM STATE VECTOR
  0052    REF   1               43,2053  0 2705 1              TC       CSMVEC           VB81 UPDATE CSM STATE VECTOR
  0053    REF   1               43,2054  0 2557 1              TC       V82PERF          VB82 REQUEST ORBIT PARAM DISPLAY (R30)
  0054    REF   2  LAST  219    43,2055  0 2564 1              TC       V83PERF          VB83 RANGE, RANGE RATE, +X AXIS  (R31)
  0055    REF   5  LAST  250    43,2056  0 2116 0              TC       ALM/END          V84 SPARE
  0056    REF   1               43,2057  0 2574 0              TC       V85PERF          VB85 RANGE, RANGE RATE, SLOS     (R34)
  0057    REF   1               43,2060  0 2621 0              TC       V86PERF          VB86 BACKUP MARK REJECT
  0058    REF   1               43,2061  0 2773 0              TC       SETVHFLG         VB87 SET VHF RANGE FLAG
  0059    REF   1               43,2062  0 2770 0              TC       RESETVHF         VB88 RESET VHF RANGE FLAG
  0060    REF   1               43,2063  0 2722 1              TC       V89PERF          V89-ALIGN X OR PRF CSM AXIS TO LOS (R63)
  0061    REF   1               43,2064  0 3022 1              TC       V90PERF          VB90-OUT OF PLANE PARAMETERS %R36"
  0062    REF   1               43,2065  0 2735 1              TC       GOSHOSUM         VB91 TEMP FOR HYBRID AND STG.
  0063    REF   6  LAST  250    43,2066  0 2116 0              TC       ALM/END          VB92 SPARE
  0064    REF   1               43,2067  0 2731 0              TC       WMATRXNG         VB93 CLEAR RENDWFLG
  0065    REF   1               43,2070  0 3006 1              TC       VERB94           VB94 DO R64
  0066    REF   7  LAST  250    43,2071  0 2116 0              TC       ALM/END          VB95 SPARE
  0067    REF   1               43,2072  1 3030 0              TCF      VERB96           VB96 SET QUITFLAG TO STOP INTEGRATION
  0068    REF   5  LAST  249    43,2073  0 2265 1              TC       GOLOADLV         V97 PLEASE PERFORM ENGINE-FAIL (R41)
  0069    REF   8  LAST  250    43,2074  0 2116 0              TC       ALM/END          VB98 SPARE
  0070    REF   6  LAST  250    43,2075  0 2265 1              TC       GOLOADLV         VB99 PLEASE ENABLE ENGINE

 R0071    END OF EXTENDED VERB FAN


  0072    REF   5  LAST  242    43,2076  11'247 0  TESTXACT CCS      EXTVBACT
  0073    REF   9  LAST  250    43,2077  0 2116 0              TC       ALM/END          YES. TURN ON OPERATOR ERROR LIGHT
  00731   REF   2  LAST  204    43,2100  3 0100 0              CA       FLAGWRD4         ARE PRIOS USING DSKY
  00732   REF   1               43,2101  7 7646 0              MASK     14,12,7
  00733   REF  70  LAST  247    43,2102  10 000 0              CCS      A
  00734   REF  10  LAST  250    43,2103  0 2116 0              TC       ALM/END

  0074    REF   4  LAST  214    43,2104  3 4124 1              CAF      OCT24            SET BITS 3 AND 5
  0075    REF   6  LAST  250    43,2105  55'247 0  SETXTACT TS       EXTVBACT         NO. SET FLAG TO SHOW EXT VERB DISPLAY
 A0076                                                                                   SYSTEM BUSY

  0077    REF  27  LAST  246    43,2106  3 0002 0              CA       Q
  0078    REF  26  LAST  249    43,2107  54 155 1              TS       MPAC +1

  0083    REF   2  LAST  224    43,2110  4 4767 1              CS       TWO              BLANK EVERYTHING EXCEPT MM AND VERB
  0084    REF   1               43,2111  0 4202 0              TC       NVSUB
  0085                          43,2112  0 2113 0              TC       +1
  00851   REF   3  LAST  224    43,2113  10 067 1              CCS      NEWJOB           ALLOW POSSIBLE WAITING DISPLAY (FROM
  00852   REF   1               43,2114  0 5152 1              TC       CHANG1              RELDSP) TO COME UP.

  0086    REF  27  LAST  250    43,2115  0 0155 0              TC       MPAC +1

  0089    REF   2  LAST  242      5524             TERMEXTV EQUALS   ENDEXT
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L       EXTENDED VERBS                                                              USER'S PAGE NO.  3     E5 S4

 0090   REF   3  LAST  250        5524            ENDEXTV8 EQUALS ENDEXT

 0093   REF   2  LAST  214   43,2116  0 4362 1  ALM/END   TC      FALTON          TURN ON OPERATOR ERROR LIGHT
 0094   REF   9  LAST  243   43,2117  0 4655 0  GOPIN     TC      POSTJUMP
 0095   REF   2  LAST  210   43,2120    21275 1           CADR    PINBRNCH
```

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L       EXTENDED VERBS                                                                              USER'S PAGE NO.   4      E5 54

P0096               VBZERO          VERB 40             DESCRIPTION
 0110    REF    3  LAST    85    43,2121  3 1335 0  VBZERO    CA      MODECADR          KEYBOARD REQUEST FOR ISS CDU ZERO
 011002                          43,2122  0 0006 1            EXTEND
 011004                          43,2123  1 2125 1            BZF     +2
 011006 REF   11  LAST   250    43,2124  0 2116 0            TC      ALM/END
 01101  REF   10  LAST   241    43,2125  0 4636 0            TC      BANKCALL
 0111   REF    1                 43,2126   16627 0            CADR    IMUZERO

 0112   REF   11  LAST   252    43,2127  0 4636 0            TC      BANKCALL          STALL
 0113   REF    1                 43,2130   17644 1            CADR    IMUSTALL
 0114                            43,2131  0 2132 0            TC      +1

 0115   REF    1                 43,2132  0 2117 1            TC      GOPIN
```

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P0126              VBCOARK      VERB 41              DESCRIPTION
R0127                   COURSE ALIGN IMU OR OPTICS
R0128                   1. REQUIRE NOUN 20 OR NOUN 91 OR TURN ON OPERATOR ERROR
R0129                   2. REQUIRE EXT VERB DISPLAY SYS AVAILABLE OR TURN ON OPERATOR ERROR LIGHT AND GO TO PINBRNCH.
R0131                   CASE 1      NOUN 20      (ICDU ANGLES)
R0132                   3. SET EXT VERB DISPLAY ACTIVE FLAG.
R0133                   4. DISPLAY FLASHING V25,N22 (LOAD NEW ICDU ANGLES).
R0134                      RESPONSES
R0135                        A. TERMINATE
R0136                           1. RELEASE EXT VERB DISPLAY SYSTEM
R0137                        B. PROCEED
R0138                           1. DISPLAY FLASHING V25,N23 (LOAD DELTA ICDU ANGLES).
R0140                               RESPONSES
R0141                                 A. TERMINATE
R0142                                    1. RELEASE EXT VERB DISPLAY SYSTEM.
R0143                                 B. PROCEED
R0144                                    1. EXECUTE ICORK2.
R0145                                 C. ENTER
R0146                                    1. INCREMENT CDU ANGLES
R0147                                    2. EXECUTE ICORK2.
R0148                        C. ENTER
R0149                           1. EXECUTE ICORK2.
R0150                   ICORK2
R0151                      1. RE-DISPLAY VERB 41.
R0152                      2. EXECUTE IMUCOARS (IMU COARSE ALIGN).
R0153                      3. EXECUTE IMUSTALL (ALLOW TIME FOR DATA TRANSFER).
R0154                      4. RELEASE EXT VERB DISPLAY SYSTEM.
R0155                   CASE 2      NOUN 91      (OCDU ANGLES)
R0156                   5. (REQUIRE OPTICS SWITCH TO BE AT COMPUTER OR TURN ON OPERATOR ERROR AND ALARM 115) AND (REQUIRE
R0158                      OPTICS AVAILABLE AND DISPLAY FLASHING V24,N92....LOAD NEW OPTICS ANGLES....OR TURN ON ALARM 117
R0160                      AND RELEASE EXT VERB DISPLAY SYSTEM).
R0161                   6. RESPONSES TO V29,N92.
R0162                      A. TERMINATE
R0163                         RELEASE EXT VERB DISPLAY SYSTEM
R0164                      B. PROCEED OR ENTER
R0165                         RE-DISPLAY V41,    SET SWITCH TO INDICATE COURSE ALIGN OPTICS WORKING.
R0167                         RELEASE EXT VERB DISPLAY SYSTEM.

 0168    REF   5  LAST  250   43,2133  4 4124 0  VBCOARK  CS      OCT24
 01683   REF   2  LAST  204   43,2134  6 1205 1           AD      NOUNREG
 01685                        43,2135  0 0006 1           EXTEND
 01687   REF   1              43,2136  1 2143 1           BZF     IMUCOARK          NOUN 20

 0169    REF   1              43,2137  6 2165 1           AD      OPIMDIFF          -71
 01695                        43,2140  0 0006 1           EXTEND
 0170    REF   1              43,2141  1 2166 0           BZF     OPTCOARK          NOUN 91

 0171    REF  12  LAST  252   43,2142  0 2116 0           TC      ALM/END           WRONG NOUN

 0172    REF   1              43,2143  0 2076 1  IMUCOARK TC      TESTXACT          COARSE ALIGN FROM KEYBOARD
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L       EXTENDED VERBS                                                                 USER'S PAGE NO.  6    E5 S4

 0173   REF   1             43,2144  3 2163 1              CAF     VNLODCDU       CALL FOR THETAD LOAD
 0174   REF  12  LAST  252  43,2145  0 4636 0              TC      BANKCALL
 0175   REF   1             43,2146   20576 1              CADR    GOXDSPF
 0176   REF   1             43,2147  0 5524 1              TC      TERMEXTV
 0177                       43,2150  1 2151 1              TCF     +1

 0178   REF   1             43,2151  3 2164 0  ICORK2      CAF     IMUCOARV       RE-DISPLAY COARSE ALIGN VERB.
 0179   REF  13  LAST  254  43,2152  0 4636 0              TC      BANKCALL
 0180   REF   1             43,2153   21064 0              CADR    EXDSPRET

 01805  REF   1             43,2154  0 2260 1              TC      CKMODCAD
 0181   REF  14  LAST  254  43,2155  0 4636 0              TC      BANKCALL       CALL MODE SWITCHING PROG
 0182   REF   1             43,2156   16724 1              CADR    IMUCOARS

 0183   REF  15  LAST  254  43,2157  0 4636 0              TC      BANKCALL       STALL
 0184   REF   2  LAST  252  43,2160   17644 1              CADR    IMUSTALL
 0185   REF   1             43,2161  0 5524 1              TC      ENDEXTVB
 0186   REF   2  LAST  254  43,2162  0 5524 1              TC      ENDEXTVB

 0187                       43,2163   06226 1  VNLODCDU VN         2522
 0188                       43,2164   12200 0  IMUCOARV VN         4100
 01881                      43,2165   77670 0  OPIMDIFF DEC        -71
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L         EXTENDED VERBS                                                                          USER'S PAGE NO.   7      E5 S4

P0189   TEMPORARY ROUTINE TO RUN THE OPTICS CDUS FROM THE KEYBOARD

 01895  REF    1              43,2166  0 2714 1  OPTCOARK TC      CHKPOOH        ENSURE IN P00
 0190   REF    2  LAST  253   43,2167  0 2076 1           TC      TESTXACT
 01901  REF    1              43,2170  3 5043 0           CAF     EBANK5
 01902  REF    7  LAST  223   43,2171  54 003 0           TS      EBANK

 0191   REF    9  LAST  177   43,2172  11'354 0           CCS     SWSAMPLE       SEE IF SWITCH AT COMPUTER
 0192                         43,2173  0 2200 1           TC      +5             SWITCH AT COMPUTER
 0193                         43,2174  0 2175 0           TC      +1             NOT ON COMPUTER
 0194   REF    3  LAST  251   43,2175  0 4362 1           TC      FALTON         TURN ON OPERATOR ERR
 0195   REF   16  LAST  247   43,2176  0 5671 1           TC      ALARM          AND ALARM
 0196                         43,2177   00115 1           OCT     00115

 0197   REF   17  LAST  242   43,2200  11'323 0           CCS     OPTIND         SEE IF OPTICS AVAILABLE
 0198   REF    1              43,2201  0 2207 0           TC      OPTC1          IN USE
 0199   REF    2  LAST  255   43,2202  0 2207 0           TC      OPTC1          IN USE
 0200   REF    3  LAST  255   43,2203  0 2207 0           TC      OPTC1          IN USE

 0201   REF   17  LAST  255   43,2204  0 5671 1           TC      ALARM          OPTICS RESERVED (OPTIND=-0)
 0202                         43,2205   00117 0           OCT     00117
 0203   REF    4  LAST  251   43,2206  0 5524 1           TC      ENDEXT

 0204   REF    1              43,2207  3 2226 0  OPTC1    CAF     VNLD0CDU       VERB-NOUN TO LOAD OPTICS CDUS
 0205   REF   16  LAST  254   43,2210  0 4636 0           TC      BANKCALL
 0206   REF    2  LAST  254   43,2211   20576 1           CADR    GOXDSPF
 0207   REF    2  LAST  254   43,2212  0 5524 1           TC      TERMEXTV
 0208                         43,2213  0 2214 1           TC      +1             PROCEED

 02082  REF    2  LAST   99   43,2214  3 1773 0           CA      SAC
 02084  REF    2  LAST  176   43,2215  55'313 0           TS      DESOPTS
 02086  REF    2  LAST   99   43,2216  3 1775 0           CA      PAC
 02088  REF    3  LAST  177   43,2217  55'312 1           TS      DESOPTT
 0209   REF    1              43,2220  3 2164 0           CAF     OPTCOARV       RE-DISPLAY OUR OWN VERB
 0210   REF   17  LAST  255   43,2221  0 4636 0           TC      BANKCALL
 0211   REF    2  LAST  254   43,2222   21064 0           CADR    EXDSPRET

 0212   REF   11  LAST  248   43,2223  3 4770 0           CAF     ONE
 0213   REF   18  LAST  255   43,2224  55'323 0           TS      OPTIND         SET COARS WORKING

 0215   REF    3  LAST  254   43,2225  0 5524 1           TC      ENDEXTVB

 0216                         43,2226   06134 1  VNLD0CDU VN      2492
 0217   REF    2  LAST  254   43,2164            OPTCOARV EQUALS  IMUCOARV       DIFFERENT NOUNS.
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L        EXTENDED VERBS                                                                USER'S PAGE NO.   8       E5 S4

R0218              IMUFINEK      VERB 42            DESCRIPTION
R0219                   FINE ALIGN IMU
R0220                   1. REQUIRE EXT VERB DISPLAY AVAILABLE AND SET BUSY FLAG OR TURN ON OPER ERROR AND GO TO PINBRNCH.
R0222                   2. DISPLAY FLASHING V25,N93.....LOAD DELTA GYRO ANGLES....
R0223                      RESPONSES
R0224                      A. TERMINATE
R0225                         1. RELEASE EXT VERB DISPLAY SYSTEM.
R0226                      B. PROCEED OR ENTER
R0227                         1. RE-DISPLAY VERB 42
R0228                         2. EXECUTE IMUFINE (IMU FIVE ALIGN MODE SWITCHING).
R0229                         3. EXECUTE IMUSTALL (ALLOW FOR DATA TRANSFER)
R0230                            A. FAILED
R0231                               1. RELEASE EXT VERB DISPLAY SYSTEM.
R0232                            B. GOOD
R0233                               1. EXECUTE IMUPULSE (TORQUE IRIGS).
R0234                               2. EXECUTE IMUSTALL AND RELEASE EXT VERB DISPLAY SYSTEM.

 0236   REF   3  LAST  255   43,2227  0 2076 1  IMUFINEK TC      TESTXACT        FINE ALIGN WITH GYRO TORQUING
 0237   REF   1              43,2230  3 2256 1           CAF     VNLODGYR        CALL FOR LOAD OF GYRO COMMANDS
 0238   REF  18  LAST  255   43,2231  0 4636 0           TC      BANKCALL
 0239   REF   3  LAST  255   43,2232   20576 1           CADR    GOXDSPF
 0240   REF   3  LAST  255   43,2233  0 5524 1           TC      TERMEXTV
 0241                        43,2234  0 2235 1           TC      +1              PROCEED WITHOUT A LOAD

 0242   REF   1              43,2235  3 2257 0           CAF     IMUFINEV        RE-DISPLAY OUR OWN VERB
 0243   REF  19  LAST  256   43,2236  0 4636 0           TC      BANKCALL
 0244   REF   3  LAST  255   43,2237   21064 0           CADR    EXDSPRET

 02445  REF   2  LAST  254   43,2240  0 2260 1           TC      CKMODCAD
 0245   REF  20  LAST  256   43,2241  0 4636 0           TC      BANKCALL        CALL MODE SWITCH PROG
 0246   REF   1              43,2242   17133 0           CADR    IMUFINE

 0247   REF  21  LAST  256   43,2243  0 4636 0           TC      BANKCALL        HIBERNATION
 0248   REF   3  LAST  254   43,2244   17644 1           CADR    IMUSTALL
 0249   REF   4  LAST  255   43,2245  0 5524 1           TC      ENDEXTVB

 0250   REF   1              43,2246  3 2255 1  FINEK2   CAF     LGYROBIN        PINBALL LEFT COMMANDS IN OGC REGISTSRS
 0251   REF  22  LAST  256   43,2247  0 4636 0           TC      BANKCALL
 0252   REF   1              43,2250   17244 0           CADR    IMUPULSE

 0253   REF  23  LAST  256   43,2251  0 4636 0           TC      BANKCALL        WAIT FOR PULSES TO GET OUT.
 0254   REF   4  LAST  256   43,2252   17644 1           CADR    IMUSTALL
 0255   REF   5  LAST  256   43,2253  0 5524 1           TC      ENDEXTVB
 0256   REF   6  LAST  256   43,2254  0 5524 1           TC      ENDEXTVB

 0257   REF   7  LAST  249   43,2255   02757 0  LGYROBIN ECADR   OGC
 0258                        43,2256   06335 1  VNLODGYR VN      2593
 0259                        43,2257   12400 0  IMUFINEV VN      4200            FINE ALIGN VERB

 02591  REF   4  LAST  252   43,2260  3 1335 0  CKMODCAD CA      MODECADR
 02592                     43,2261  0 0006 1            EXTEND
 02593  REF   3  LAST  206  43,2262  1 6711 1            BZF     TCQ
 02594  REF   4  LAST  255  43,2263  0 4362 1            TC      FALTON
 02595  REF   7  LAST  256  43,2264  0 5524 1            TC      ENDEXTVB

R0260            GOLOADLV      VERB 50              DESCRIPTION
R0261                           AND OTHER PLEASE
R0262                           DO SOMETHING VERBS
R0263                   PLEASE PERFORM, MARK, CALIBRATE, ETC.
R0264                   1. PRESSING ENTER ON DSKY INDICATES REQUESTED ACTION HAS BEEN  PERFORMED, AND THE PROGRAM DOES THE
R0266                      SAME RECALL AS A COMPLETED LOAD.
R0267                   2. THE EXECUTION OF A VERB 33 (PROCEED WITHOUT DATA) INDICATES THE REQUESTED ACTION IS NOT DESIRED.

 0269   REF   1             43,2265  0 4417 1  GOLOADLV TC      FLASHOFF
 0270   REF   1             43,2266  3 4223 0           CAF     PINSUPBT
 0271                       43,2267  0 0006 1           EXTEND
 0272   REF   2  LAST  198  43,2270  01 007 1           WRITE   SUPERBNK             TURN ON FE7
 0273   REF  10  LAST  251  43,2271  0 4655 0           TC      POSTJUMP
 0274   REF   1             40,2000                     SBANK=  PINSUPER
 0275   REF   1             43,2272   63001 0           CADR    LOADLV1
R0276            V60      VERB 60

 0277                       43,2273  0 0006 1  V60      EXTEND                       SET ASTRONAUT TOTAL ATTITUDE (N17) EQUAL
 0278   REF   5  LAST  246  43,2274  3 0033 1           DCA     CDUX                 TO PRESENT ATTITUDE
 0279   REF   1             43,2275  53'014 1           DXCH    CPHIX
 0280   REF   5  LAST  243  43,2276  3 0034 0           CA      CDUZ
 0281   REF   2  LAST  257  43,2277  55'015 0           TS      CPHIX +2
 0282   REF   2  LAST  252  43,2300  0 2117 1           TC      GOPIN


R0283            V61      VERB 61

 0284   REF   1             43,2301  0 3065 1  V61      TC      DOWNX                CLEAR NEEDLFLG, PHASE
 0285   REF   1             43,2302   00006 1           ADRES   NEEDLFLG             PLANE A/P FOLLOWING ERROR DISPLAYED
 0286   REF   1             43,2303  0 3071 1  SETNEEDL TC      UPX                  SET NEEDLFLG, TOTAL ATT ERR DISPLAYED


R0287            V62      VERB 62

 0290   REF  17  LAST  247  43,2304  0 5547 1  V62      TC      UPFLAG
 02902  REF   1             43,2305   00220 1           ADRES   N22ORN17             COMPUTE TOTAL ATTITUDE ERROR WRT N22
 02904  REF   1             43,2306  0 2303 0           TC      SETNEEDL


R02905           V63     VERB 63

 02908  REF  17  LAST  247  43,2307  0 5561 0  V63      TC      DOWNFLAG
 02909  REF   2  LAST  257  43,2310   00220 1           ADRES   N22ORN17             COMPUTE TOTAL ASTRONAUT ATTITUDE ERROR
 029093 REF   2  LAST  257  43,2311  0 2303 0           TC      SETNEEDL
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R0291              ALINTIME      VERB 55              DESCRIPTION
R0292                   1. SET EXT VERB DISPLAY BUSY FLAG.
R0293                   2. DISPLAY FLASHING V25,N24 (LOAD DELTA TIME FOR AGC CLOCK.
R0294                   3. REQUIRE EXECUTION OF VERB 23.
R0295                   4. ADD DELTA TIME, RECEIVED FROM INPUT REGISTER, TO THE COMPUTER TIME.
R0297                   5. RELEASE EXT VERB DISPLAY SYSTEM

 0298   REF   1                                          COUNT* $$/R33
 0299   REF   4  LAST  256  43,2312  0 2076 1  ALINTIME TC      TESTXACT

 0300   REF   1             43,2313  3 2341 0           CAF     VNLODDT
 0301   REF  24  LAST  256  43,2314  0 4636 0           TC      BANKCALL
 0302   REF   1             43,2315   20576 1           CADR    GOMARKF
 0303   REF   5  LAST  255  43,2316  0 5524 1           TC      ENDEXT              TERMINATE
 0304   REF   6  LAST  258  43,2317  0 5524 1           TC      ENDEXT              PROCEED
 0305   REF   1             43,2320  4 4615 0           CS      DEC23               DATA IN OR RESEQUENCE(UNLIKELY)
 0306   REF  28  LAST  250  43,2321  6 0154 1           AD      MPAC                RECALL LEFT VERB IN MPAC
 0307                       43,2322  0 0006 1           EXTEND
 0308   REF   1             43,2323  1 2325 0           BZF     UPDATIME            GO AHEAD WITH UPDATE ONLY IF RECALL
 0309   REF   7  LAST  258  43,2324  0 5524 1           TC      ENDEXT               WITH V23 (DATA IN).
 0310                       43,2325  0 0004 0  UPDATIME INHINT                      DELTA TIME IS IN DSPTEM1, +1.
 0311   REF  29  LAST  246  43,2326  3 4772 1           CAF     ZERO
 0313   REF  23  LAST  238  43,2327  54 001 1           TS      L                   ZERO T1 & 2 WHILE ALIGNING.
 0314   REF   8  LAST  243  43,2330  52 025 1           DXCH    TIME2
 0315   REF  29  LAST  258  43,2331  52 155 1           DXCH    MPAC
 0316   REF   2  LAST   82  43,2332  53'255 0           DXCH    DSPTEM2 +1          INCREMENT
 0317   REF  30  LAST  258  43,2333  20 155 1           DAS     MPAC

 0318   REF   1             43,2334  0 7224 1           TC      DPAGREE             FORCE SIGN AGREEMENT
 0319   REF  31  LAST  258  43,2335  52 155 1           DXCH    MPAC                NEW CLOCK.
 0320   REF   9  LAST  258  43,2336  20 025 1           DAS     TIME2
 0321                       43,2337  0 0003 1           RELINT
 0322   REF   3  LAST  258  43,2340  0 5524 1  UPDTMEND TC      ENDEXT
 0324                       43,2341   06230 0  VNLODDT  VN      2524                V25N24 FOR LOAD DELTA TIME

R0347   REDO AND TSELECT ARE NOW IN SYSTEM TEST.

 0348   REF   2 LAST  249 TO  258:   202   202*          COUNT* $$/EXTVB
R0349              CKOPTVB       VERB 65              DESCRIPTION
R0350                   OPTICAL VERIFICATION FOR PRELAUNCH.
R0351                   1. SCHEDULE GCOMPVER, OPTICAL VERIFICATION SUBPROGRAM, WITH PRIORITY 17.

 0353   REF   9  LAST  248  43,2342  0 5354 0  CKOPTVB  TC      CHECKMM
 0354                       43,2343   00002 0           MM      02                  I WONDER IF PRELAUNCH IS RUNNING
 0355   REF  13  LAST  253  43,2344  0 2116 0           TC      ALM/END             NOT RUNNING OPERATOR ERROR
 0357   REF   3  LAST  205  43,2345  3 5055 1           CAF     PRIO16               PRELAUNCH OPTICAL VERIFICATION
 0358   REF   6  LAST  248  43,2346  0 5135 0           TC      FINDVAC
 0359   REF   1             E5,1425                     EBANK=  QPLACE
 0360   REF   2  LAST  233  43,2347   02000 0           2CADR   COMPVER             STANDARD LEADIN TO GCOMPVER.
 0360                       43,2350   66065 1
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L        EXTENDED VERBS                                                                          USER'S PAGE NO. 11      E5 S4

 0361   REF   3  LAST  257   43,2351  0 2117 1             TC       GOPIN

R0362   V 78....            TO CHANGE GYROCOMPASS AZIMUTH

 0363   REF  10  LAST  258   43,2352  0 5354 0  CHAZFOGC TC       CHECKMM             IS IT PRELAUNCH
 03631                       43,2353   00002 0           MM       02
 03632  REF  14  LAST  258   43,2354  0 2116 0           TC       ALM/END             NO - OPERA TOR ERROR

 0364   REF   4  LAST  258   43,2355  3 5055 1           CAF      PRIO16               PRELAUNCH AZIMUTH CHANGE
 0365   REF   7  LAST  258   43,2356  0 5135 0           TC       FINDVAC
 0366   REF  12  LAST  236   E5,1671                     EBANK=   XSM
 0367   REF   2  LAST  233   43,2357   03132 1           2CADR    AZMTHCG1
 0367                        43,2360   66105 0
 0368   REF   7  LAST  220   43,2361  0 5402 1           TC       PHASCHNG
 0369                        43,2362   00174 0           OCT      00174
 03695  REF   1              01,2146            4P17SPT1 =        4.17SPOT
 0370   REF   4  LAST  259   43,2363  0 2117 1           TC       GOPIN
```

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P0371              IMUATTCK      VERB 43               DESCRIPTION
R0372                     LOAD IMU ATTITUDE ERROR METERS
R0373                     1. REQUIRE PROGRAM 00 ACTIVE, COARSE ALIGN ENABLE BIT OFF  AND ZERO ICDU BIT OFF.
R0375                     2. IF GUID REF RELEASE OR LIFTOFF HAS OCCURRED  REQUIRE EXT VERB DISPLAY AVAILABLE AND SET BUSY
R0377                        FLAG, OTHERWISE ALLOW CURRENT EXT VERB DISPLAY TO BE OVER-RIDDEN.
R0379                     3.  REMOVE COARSE ALIGN ENABLE AND IMU ERROR COUNTER ENABLE
R0380                     4. DISPLAY FLASHING V25,N22 (LOAD NEW ICDU ANGLES).
R0381                     5. UPON PROCEED OR ENTER RESPONSE, INITIALIZE CURRENT DAC AND COMMAND VALUES, ENABLE ERROR COUNTERS
R0383                        TRANSFER LOADED VALUES TO REGISTERS, AND SEND COMMANDS.
R0384                     6. IF BUSY FLAG SET, RESET IT TO RELEASE EXT VERB DISPLAY.

 0385   REF   2  LAST  255   43,2364  0 2714 1  IMUATTCK TC      CHKPOOH

 0386   REF   5  LAST  205   43,2365  3 5001 0           CAF     BITS4&5           CHECK IF IMU ZERO AND IMU COARSE ARE ON
 0387                        43,2366  0 0006 1           EXTEND
 0388   REF  24  LAST  195   43,2367  02 012 0           RAND    CHAN12
 0389   REF  71  LAST  250   43,2370  10 000 0           CCS     A
 0390   REF  15  LAST  259   43,2371  1 2116 1           TCF     ALM/END           NOT ALLOWED IF IMU COARSE OR IMU ZERO ON

 0391   REF   1              43,2372  0 2427 1           TC      CKLFTBTS          IS IT BEFORE OR AFTER LIFTOFF
 0392   REF   5  LAST  258   43,2373  0 2076 1           TC      TESTXACT          AFTER
 0393   REF   2  LAST  214   43,2374  4 5004 1           CS      OCT50             REMOVE COARSE AND ECTR ENABLE.
 0394                        43,2375  0 0006 1           EXTEND
 0395   REF  25  LAST  260   43,2376  03 012 1           WAND    CHAN12

 0396   REF   2  LAST  254   43,2377  3 2163 1           CAF     VNLODCDU
 0397   REF  25  LAST  258   43,2400  0 4636 0           TC      BANKCALL
 0398   REF   4  LAST  256   43,2401   20576 1           CADR    GOXDSPF
 0399   REF   1              43,2402  1 2414 0           TCF     TRMATTCK
 0400                        43,2403  0 2404 0           TC      +1
 0401   REF   4  LAST  222   43,2404  0 4611 0           TC      EGSETTER          FOR NEEDLES.

 0403   REF   6  LAST  236   E6,1476                     EBANK=  AK

 0404   REF  26  LAST  260   43,2405  0 4636 0           TC      BANKCALL          INITIALIZE CURRENT DAC AND
 0405   REF   1              43,2406   42450 0           CADR    NEEDLER1          COMMAND VALUES

 0406   REF  27  LAST  260   43,2407  0 4636 0           TC      BANKCALL          ENABLE ERROR COUNTERS.
 0407   REF   1              43,2410   42467 1           CADR    NEEDLER2

 0408   REF   3  LAST  250   43,2411  3 4767 0           CAF     TWO               4 MS MIN.
 0410   REF   4  LAST  171   43,2412  0 5223 1           TC      TWIDDLE
 0411   REF   1              43,2413   02417 1           ADRES   ATTCK1
 0413   REF   2  LAST  260   43,2414  0 2427 1  TRMATTCK TC      CKLFTBTS          IS IT BEFORE OR AFRER LIFTOFF
 0414   REF   9  LAST  258   43,2415  1 5524 0           TCF     ENDEXT            AFTER
 0415   REF   5  LAST  259   43,2416  0 2117 1           TC      GOPIN


 0416                        43,2417  0 0006 1  ATTCK1   EXTEND                    TRANSFER LOADED VALUES TO DESIRED REGS.
 0417   REF  11  LAST  182   43,2420  3 1310 1           DCA     THETAD
 0418   REF   7  LAST  260    43,2421  53'477 0            DXCH    AK
 0419   REF  12  LAST  260    43,2422  31'311 0            CAE     THETAD +2
 0420   REF   8  LAST  261    43,2423  55'500 1            TS      AK +2

 0421   REF  13  LAST  212    43,2424  0 4714 1            TC      IBNKCALL         SENDS COMMANDS LIMITED TO +,- 384 PULSES
 0422   REF   1               43,2425   42503 1            CADR    NEEDLES          AND LEAVES ERROR COUNTERS ENABLED.

 0423   REF  10  LAST  247    43,2426  0 5314 1            TC      TASKOVER

 0424   REF   1               43,2427  3 4764 0  CKLFTBTS  CAF     GRRBKBIT         HAS LIFTOFF OCCURRED
 0425   REF   8  LAST  245    43,2430  7 0101 0            MASK    FLAGWRD5
 0426   REF  72  LAST  260    43,2431  10 000 0            CCS     A
 0427   REF  28  LAST  250    43,2432  0 0002 0  XACTOQ    TC      Q                YES
 0428   REF  15  LAST  152    43,2433  3 4764 0            CAF     BITS
 0429                         43,2434  0 0006 1            EXTEND
 0430   REF   4  LAST  173    43,2435  02 030 0            RAND    CHAN30
 0431   REF   3  LAST  170    43,2436  1 5651 1            TCF     INCRQCK
 0436   REF   6  LAST  260    43,2437  0 2076 1  VB64      TC      TESTXACT
 0438   REF   1               43,2440  3 4755 1            CAF     PRIO4
 0439   REF   8  LAST  259    43,2441  0 5135 0            TC      FINDVAC
 0440   REF   2  LAST   94    E4,1711                      EBANK=  RHOSB
 0441   REF   1               43,2442   03504 0            2CADR   SBANDANT         CALC.,DISPLAY S-BAND ANTENNA ANGLES.
 0441   REF   1               43,2443   64104 0
 0442   REF   5  LAST  221    43,2444  0 5205 0            TC      ENDOFJOB

R0443               ENATMA     VERB 58              DESCRIPTION
R0444                   ENABLE AUTOMATIC ATTITUDE MANEUVER

R0445          VERB58 RESETS STIKFLAG TO ENABLE R61 TO PERFORM AUTOMATIC TRACKING MANEUVERS, AFTER INTERUPTIONS BY RHC ACT-
R0447          IVITY.

 0448   REF  18  LAST  257    43,2445  0 5547 1  ENATMA    TC      UPFLAG           SET FLAG TO ENABLE R60 MANEUVER
 0449   REF   2  LAST  210    43,2446   00055 1            ADRES   V50N18FL
 04491  REF   2  LAST  257    43,2447  0 3065 1            TC      DOWNX            RESET STIKFLAG
 0450   REF   2  LAST  211    43,2450   00020 0            ADRES   STIKFLAG


R0467               STABLISH     VERB 46              DESCRIPTION
R0468                   ESTABLISH G & N AUTOPILOT CONTROL
R0469                   1. SETS UP EITHER RCS, ENTRY, OR SATURN
R0470                   2. IF TVC IS ON, SETS UP CSM/LM SWITCH-OVER
R0471                           FROM HIGH BW TO LOW BW


 0473   REF   5  LAST  260    43,2451  0 4611 0  STABLISH  TC      E6SETTER

 0475   REF   5  LAST  209    43,2452  4 0102 0            CS      FLAGWRD6              TEST FOR TVC
 0476   REF   5  LAST  209    43,2453  7 4076 0            MASK    DPCONFIG
 0477                         43,2454  0 0006 1            EXTEND
 0478   REF   1               43,2455  6 2465 1            BZMF    DAPFIG
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L       EXTENDED VERBS                                                                        USER'S PAGE NO. 14      E6 54

 04781  REF  10  LAST  233    43,2456  31'465 1            CAE     DAPDATR1              TEST FOR CSM/LM
 04782  REF  20  LAST  198    43,2457  7 4753 0            MASK    BIT14
 04783                        43,2460  0 0006 1            EXTEND
 04784  REF  16  LAST  260    43,2461  6 2116 0            BZMF    ALM/END          CSM, SO ALARM AND EXIT

 0479   REF  28  LAST  260    43,2462  0 4636 0            TC      BANKCALL         CSM/LM, SO PERFORM HB TO LB SWITCH-OVER
 04795  REF   1               43,2463   36344 1            CADR    SWICHOVR

 0480   REF   6  LAST  260    43,2464  0 2117 1            TC      GOPIN

 0487   REF  15  LAST  145    43,2465  4 4760 0  DAPFIG    CS      BIT9             TURN OFF SIVB TAKEOVER
 0488                         43,2466  0 0006 1            EXTEND
 0489   REF  26  LAST  260    43,2467  03 012 1            WAND    CHAN12
 0490   REF  11  LAST  262    43,2470  31'465 1            CAE     DAPDATR1         DETERMINE VEHICLE CONFIGURATION
 0491                         43,2471  0 0006 1            EXTEND
 04915  REF  15  LAST  199    43,2472  7 4766 0            MP      BIT3             RIGHT SHIFT 4 OCTAL DIGITS
 0492   REF   4  LAST  223    43,2473  7 6214 1            MASK    THREE            (IN CASE BIT 15 IS USED)
 0493                         43,2474  0 0004 0            INHINT
 0494   REF  73  LAST  261    43,2475  50 000 1            INDEX   A
 0495                         43,2476  1 2477 0            TCF     +1               BRANCH BASED ON CONFIG
 0496   REF   1               43,2477  1 2522 1            TCF     NODAPUP          CM.. ACTIVATE NODAP
 0497   REF   1               43,2500  1 2517 1            TCF     RCSDAPUP         CSM..ACTIVATE RCSDAP
 0498   REF   2  LAST  262    43,2501  1 2517 1            TCF     RCSDAPUP         CSM/LM ACTIVATE RCSDAP
 0499                         43,2502  0 0006 1  SATSTKON  EXTEND
 0500   REF   1               43,2503  3 2516 1            DCA     2REDOSAT
 0501   REF   4  LAST  199    43,2504  52 113 0            DXCH    T5LOC
 0502   REF   6  LAST  202    43,2505  3 4750 1            CAF     POSMAX
 0503   REF   3  LAST  202    43,2506  54 030 0            TS      TIME5
 0504   REF   6  LAST  261    43,2507  4 0102 0            CS      FLAGWRD6         TURN ON BITS 15,14 OF FLAGWRD6
 0505   REF   6  LAST  261    43,2510  7 4076 0            MASK    DPCONFIG
 0506   REF   7  LAST  262    43,2511  26 102 0            ADS     FLAGWRD6         SATSTICK CONTROL OF T5
 0507   REF  14  LAST  261    43,2512  0 4714 1            TC      IBNKCALL         ZERO JET CHANNELS IN 14MS AND THEN
 0508   REF   1               43,2513   42642 1            CADR    ZEROJET          LEAVE THE T6 CLOCK DISABLED
 0509   REF   7  LAST  262    43,2514  0 2117 1            TC      GOPIN            EXIT THUS BECAUSE WE CAME VIA V46

 0510   REF   3  LAST  234    E6,1704                      EBANK=  SPOLYARG
 0511   REF   2  LAST  205    43,2515   02000 0  2REDOSAT  2CADR   REDOSAT
 0511                         43,2516   54106 1

 0512   REF  15  LAST  262    43,2517  0 4714 1  RCSDAPUP  TC      IBNKCALL
 0513   REF   2  LAST  209    43,2520   42042 1            CADR    RCSDAPON
 0514   REF   8  LAST  262    43,2521  1 2117 0            TCF     GOPIN

 0515   REF  16  LAST  262    43,2522  0 4714 1  NODAPUP   TC      IBNKCALL         ZERO JET CHANNELS IN 14 MS. AND THEN
 0516   REF   2  LAST  262    43,2523   42642 1            CADR    ZEROJET          LEAVE THE T6 CLOCK DISABLED.
 0517   REF  20  LAST  244    43,2524  3 4770 0            CAF     BIT1
 0518   REF   3  LAST  188    43,2525  55'340 0            TS      HOLDFLAG         KILL KALCMANU JOB

 0519                         43,2526  0 0006 1  EXDAPOFF  EXTEND
 0520   REF   1               43,2527  3 2721 1            DCA     IDLECADR         SET T5 TO IDLE
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L          EXTENDED VERBS                                                              USER'S PAGE NO. 15       E6 S4

 0521   REF   5  LAST  262   43,2530  52 113 0          DXCH   T5LOC
 0522   REF   7  LAST  262   43,2531   4 4076 0         CS     DPCONFIG
 0523   REF   8  LAST  262   43,2532   7 0102 0         MASK   FLAGWRD6
 0524   REF   9  LAST  263   43,2533  54 102 0          TS     FLAGWRD6

 0525   REF   9  LAST  262   43,2534   0 2117 1         TC     GOPIN
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R0526             CREWMANU     VERB 49            DESCRIPTION
R0527                 START AUTOMATIC ATTITUDE MANEUVER
R0528                 1. REQUIRE PROGRAM 00 ACTIVE.
R0529                 2. SET EXT VERB DISPLAY BUSY FLAG.
R0530                 3. SCHEDULE R62DISP WITH PRIORITY 10.
R0531                 4. RELEASE EXT VERB DISPLAY.

R0532               R62DISP
R0533                 1. DISPLAY FLASHING V06,N22 (DECIMAL DISPLAY NEW ICDU ANGLES). UPON IMMEDIATE RETURN, SET-UP GROUP
R0535                    4 FOR RESTART OF DISPLAY SEQUENCE.
R0536                    RESPONSES
R0537                    A. TERMINATE
R0538                       1. GO TO GOTOPOOH.
R0539                    B. PROCEED
R0540                       1. SET 3AXISFLG TO INDICATE MANEUVER IS SPECIFIED BY 3 AXIS.
R0542                       2. EXECUTE R60CSM (ATTITUDE MANEUVER).
R0543                       3. ZERO GROUP 4 (END R62).
R0544                    C. ENTER
R0545                       1. REPEAT FLASHING V06,N22.

 0546  REF  3 LAST  260   43,2535  0 2714 1  CREWMANU TC       CHKPOOH          DEMAND POO

 0547  REF  7 LAST  261   43,2536  0 2076 1           TC       TESTXACT

 0548  REF  1             43,2537  3 4754 0           CAF      PRIO10
 0549  REF  9 LAST  261   43,2540  0 5135 0           TC       FINDVAC
 0550  REF  5 LAST  230   E6,1774                     EBANK=   R61CNTR
 0551  REF  1             43,2541   02427 1           2CADR    R62DISP
 0551  REF  1             43,2542   56106 0
 0552  REF  6 LAST  261   43,2543  0 5205 0           TC       ENDOFJOB
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R0553               DAPDISP      VERB 48                 DESCRIPTION
R0554                        LOAD AUTOPILOT DATA (ROUTINE R03)
R0555                        0. CHECKFAIL AND RETURN IF TVC.
R0556                        1. REQUIRE EXT VERB DISPLAY AVAILABLE AND SET BUSY FLAG.
R0557                        2. LOWER PRIORITY TO 10.
R0558                        3. DISPLAY FLASHING V04,N46 (DISPLAY AUTOPILOT CONFIGURATION)
R0560                        4. UPON PROCEED RESPONSE, EXECUTE S41.2.
R0561                        5. DISPLAY FLASHING V06,N47 (DISPLAY CSM WGT., LEM WGT.)
R0562                        6. UPON PROCEED RESPONSE EXECUTE S40.14.
R0563                        7. DISPLAY FLASHING V06,N48 (DISPLAY PITCH TRIM, YAW TRIM)
R0564                        8. UPON PROCEED RESPONSE, RELEASE EXTENDED VERB DESPLAY SYSTEM
 0566    REF   3 LAST  258 TO  265:    130    532*             COUNT*  $$/EXTVB
 0567    REF  10  LAST  263    43,2544  4 0102 0   DAPDISP  CS      FLAGWRD6
 0568    REF   8  LAST  263    43,2545  7 4076 0            MASK    DPCONFIG
 0569                          43,2546  0 0006 1            EXTEND
 0570                          43,2547  6 2551 1            BZMF    +2                TVC = 10, CS YIELDS 01, BZMF TO CONTINUE
 0571    REF  17  LAST  262    43,2550  0 2116 0            TC      ALM/END           RETURN IF TVC

 0572    REF   8  LAST  264    43,2551  0 2076 1            TC      TESTXACT
 0573    REF   2  LAST  264    43,2552  3 4754 0            CAF     PRIO10
 0574    REF   3  LAST  246    43,2553  0 5121 0            TC      NOVAC
 0575    REF  12  LAST  262    E6,1465                      EBANK=  DAPDATR1
 0576    REF   1               43,2554    02000 0           2CADR   DONOUN46
 0576    REF   1               43,2555    64106 1

 0577    REF   7  LAST  264    43,2556  0 5205 0            TC      ENDOFJOB

 0579    REF   1               42,2000                      SETLOC  EXTVBS
 0580                          42,2000                      BANK
 0581    REF   1                                            COUNT*  $$/R03
 0582    REF   1               42,2000  3 2055 0  DONOUN46 CAF     V04N46               R1            R2
 0583    REF  29  LAST  262    42,2001  0 4636 0            TC      BANKCALL          DAPDATR1     DAPDATR2
 0584    REF   5  LAST  260    42,2002    20576 1           CADR    GOXDSPF           GOXDSP ROUTINES USED FOR EXTENDED VERBS.

 0585    REF  10  LAST  260    42,2003  0 5524 1            TC      ENDEXT            EXT. VBS GO TO ENDEXT, NOT ENDOFJOB.
 0586                          42,2004  0 2006 0            TC      +2
 0587    REF   2  LAST  265    42,2005  0 2000 0            TC      DONOUN46

 0588    REF  13  LAST  265    42,2006  3 1465 1            CA      DAPDATR1
 0589    REF  19  LAST  221    42,2007  7 4765 0            MASK    BIT4
 0590    REF  74  LAST  262    42,2010  1 0000 0            CCS     A
 0591    REF   1               42,2011  1 2050 1            TCF     MAXIN
 0592    REF  18  LAST  257    42,2012  0 5561 0            TC      DOWNFLAG
 0593    REF   1               42,2013    00212 0           ADRES   MAXDBFLG
 0594    REF  30  LAST  265    42,2014  0 4636 0   MAXOUT   TC      BANKCALL
 0595    REF   1               42,2015    40463 1           CADR    S41.2

 0596    REF   1               42,2016  3 2054 1  DONOUN47 CAF     V06N47               R1            R2            R3
 0597    REF  31  LAST  265    42,2017  0 4636 0            TC      BANKCALL          CSM WGT.     LEM WGT.       BLANK
 0598    REF   6  LAST  265    42,2020    20576 1           CADR    GOXDSPF
```

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0599   REF  11  LAST  265   42,2021  0 5524 1            TC      ENDEXT
0600                        42,2022  0 2024 0            TC      +2
0601   REF   1              42,2023  0 2016 1            TC      DONOUN47
0602   REF  14  LAST  265   42,2024  31'465 1            CAE     DAPDATR1       DO MASS PROPERTIES CALCULATION ONLY IF
0603   REF   5  LAST  209   42,2025  7 4346 0            MASK    PRIO30         CONFIG = 1(CSM), 2(CSM/LM), 6(CSM/LMA)
0604                        42,2026  0 0006 1            EXTEND
0605   REF   1              42,2027  1 2042 1            BZF     DONOUN48       SKIP IF 0, 4
0606                        42,2030  4 0000 0            COM
0607   REF   6  LAST  266   42,2031  7 4346 0            MASK    PRIO30
0608                        42,2032  0 0006 1            EXTEND
0609   REF   2  LAST  266   42,2033  1 2042 1            BZF     DONOUN48       SKIP IF 3, 7
0610                        42,2034  0 0004 0            INHINT
0611   REF  17  LAST  262   42,2035  0 4714 1            TC      IBNKCALL
0612   REF   2  LAST  209   42,2036   13313 1            CADR    MASSPROP       UPDATE IXX, IAVG, IAVG/TLX

0613                        42,2037  0 0003 1            RELINT
0614   REF  32  LAST  265   42,2040  0 4636 0            TC      BANKCALL
0615   REF   1              42,2041   40614 0            CADR    S40.14         COMPUTE RCS DAP STUFF

0616   REF   1              42,2042  3 2053 0  DONOUN48  CAF     V0648            R1          R2          R3
0617   REF  33  LAST  266   42,2043  0 4636 0            TC      BANKCALL        PTRIM       YTRIM       BLANK
0618   REF   7  LAST  265   42,2044   20576 1            CADR    GOXDSPF

0619   REF  12  LAST  266   42,2045  0 5524 1            TC      ENDEXT
0620   REF  13  LAST  266   42,2046  0 5524 1            TC      ENDEXT
0621   REF   3  LAST  266   42,2047  0 2042 0            TC      DONOUN48

0622   REF  19  LAST  261   42,2050  0 5547 1  MAXIN     TC      UPFLAG
0623   REF   2  LAST  265   42,2051   00212 0            ADRES   MAXDBFLG
0624   REF   1              42,2052  0 2014 0            TC      MAXOUT

0625                        42,2053   01460 1  V0648     VN      0648
0626                        42,2054   01457 0  V06N47    VN      0647
0627                        42,2055   01056 0  V04N46    VN      0446
0629   REF   2  LAST  249   43,2000                      SETLOC  EXTVERBS
0630                        43,2557                      BANK

0631   REF   4 LAST  265 TO  265:    11   343*           COUNT*  $$/EXTVB
R0632            V82PERF       VERB 82             DESCRIPTION
R0633                  REQUEST ORBIT PARAMETERS DISPLAY (R30)
R0634   1. IF AVERAGE G IS OFF:
R0635             FLASH DISPLAY V04N06. R2 INDICATES WHICH SHIP'S STATE VECTOR IS
R0636              TO BE UPDATED. INITIAL CHOICE IS THIS SHIP (R2=1). ASTRONAUT
R0637              CAN CHANGE TO OTHER SHIP BY V22EXE, WHERE X NOT EQ 1.
R0638             SELECTED STATE VECTOR UPDATED BY THISPREC (OTHPREC).
R0639             CALLS SR30.1 (WHICH CALLS TFFCONMU + TFFRP/RA) TO CALCULATE
R0640              RPER (PERIGEE RADIUS), RAPO (APOGEE RADIUS), HPER (PERIGEE
R0641              HEIGHT ABOVE LAUNCH PAD OR LUNAR LANDING SITE), HAPO (APOGEE
R0642              HEIGHT AS ABOVE), TPER (TIME TO PERIGEE), TFF (TIME TO
R0643              INTERSECT 300 KFT ABOVE PAD OR 35KFT ABOVE LANDING SITE).
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R0644              FLASH MONITOR V16N44 (HAPO, HPER, TFF).TFF IS -59M59S IF IT WAS
R0645               NOT COMPUTABLE, OTHERWISE IT INCREMENTS ONCE PER SECOND.
R0646               ASTRONAUT HAS OPTION TO MONITOR TPER BY KEYING IN N 32 E.
R0647               DISPLAY IS IN HMS, IS NEGATIVE (AS WAS TFF), AND INCREMENTS
R0648               ONCE PER SECOND ONLY IF TFF DISPLAY WAS -59M59S.

R0649    2. IF AVERAGE G IS ON:
R0650              CALLS SR30.1 APPROX EVERY TWO SECS.  STATE VECTOR IS ALWAYS
R0651               FOR THIS VEHICLE. V82 DOES NOT DISTURB STATE VECTOR.  RESULTS
R0652               OF SR30.1 ARE RAPO, RPER, HAPO, HPER, TPER, TFF.
R0653              FLASH MONITOR V16N44 (HAPO, HPER, TFF).
R0654              IF MODE IS P11, THEN CALL DELRSPL SO ASTRONAUT CAN MONITOR
R0655               RESULTS BY N50E. SPLASH COMPUTATION DONE ONCE PER TWO SECS.


R0656    ADDENDUM: HAPO AND HPER SHOULD BE CHANGED TO READ HAPOX AND HPERX IN THE
R0657               ABOVE REMARKS.
 0658    REF   9  LAST  265   43,2557  0 2076 1  V82PERF   TC       TESTXACT
 0659    REF   2  LAST  219   43,2560  3 5051 0            CAF      PRIO7
 0660    REF   2  LAST  242   43,2561  0 5176 1            TC       PRIOCHNG
 0661    REF  11  LAST  257   43,2562  0 4655 0            TC       POSTJUMP
 0662    REF   1              43,2563   46330 0            CADR     V82CALL            ***** V82CALL MUST NOT BE A FINDVAC JOB.


R0663              V83PERF     VERB 83              DESCRIPTION
R0664                  REQUEST RENDEZVOUS PARAMETER DISPLAY (R31)
R0665                  1. SET EXT VERB DISPLAY BUSY FLAG.
R0666                  2. SCHEDULE V83CALL WITH PRIORITY 10.
R0667                     A. DISPLAY
R0668                         R1  RANGE
R0669                         R2  RANGE RATE
R0670                         R3  THETA

 0671    REF  10  LAST  267   43,2564  0 2076 1  V83PERF   TC       TESTXACT
 0672    REF  20  LAST  266   43,2565  0 5547 1            TC       UPFLAG
 0673    REF   1              43,2566   00222 0            ADRES    R31FLAG
 0674    REF   4  LAST  246   43,2567  3 5047 1    +3      CAF      PRIO5
 0675    REF   4  LAST  265   43,2570  0 5121 0            TC       NOVAC
 0676    REF   3  LAST  219   E4,1760                      EBANK=   SUBEXIT
 0677    REF   1              43,2571   02000 0            2CADR    R31CALL
 0677    REF   1              43,2572   62064 1
 0678    REF   8  LAST  265   43,2573  0 5205 0            TC       ENDOFJOB


 0679    REF  11  LAST  267   43,2574  0 2076 1  V85PERF   TC       TESTXACT
 0680    REF  19  LAST  265   43,2575  0 5561 0            TC       DOWNFLAG           RESET R31 FLAG TO INDICATE R34
 0681    REF   2  LAST  267   43,2576   00222 0            ADRES    R31FLAG
 0682    REF   3  LAST  250   43,2577  0 2567 1            TC       V83PERF +3
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P0683              GOTOR23 VERB 54 DESCRIPTION

R0684          SET UP MARKING FOR R22(REND TRACK DATA PROC)
R0685          1. SET EXT VERB DISPLAY BUSY FLAG
R0686          2. IF REND (P20 RUNNING) + TRACK (TRACKING ALLOWED) FLAGS ARE SET,
R0687               SCHEDULE R23 WITH PRIORITY 16, OTHERWISE TURN ON ALARM 406


R0688          3. RELEASE EXT VERB DISPLAY SYSTEM
  0691   REF  12  LAST  267    43,2600  0 2076 1  GOTOR23  TC       TESTXACT
  0692   REF  16  LAST  222    43,2601  3 0074 1           CA       FLAGWRD0          V54 UNACCEPTABLE UNLESS BOTH
  0693   REF   7  LAST  215    43,2602  7 4762 1           MASK     RNDVZBIT               RENDEZVOUS AND TRACK FLAGS ON
  0694                         43,2603  0 0006 1           EXTEND
  0695   REF   1               43,2604  1 2616 0           BZF      R22ALARM

  0696   REF  19  LAST  247    43,2605  3 0075 0           CA       FLAGWRD1
  0697   REF   5  LAST  222    43,2606  7 4764 1           MASK     TRACKBIT
  0698                         43,2607  0 0006 1           EXTEND
  0699   REF   2  LAST  268    43,2610  1 2616 0           BZF      R22ALARM

  0704   REF   5  LAST  259    43,2611  3 5055 1           CAF      PRIO16            LOWER THAN R22
  0705   REF   5  LAST  267    43,2612  0 5121 0           TC       NOVAC
  0706   REF  15  LAST  248    E7,1722                     EBANK=   MRKBUF1
  0707   REF   1               43,2613   02263 1           2CADR    R23CSM
  0707   REF   1               43,2614   76067 1
  0708   REF   9  LAST  267    43,2615  0 5205 0           TC       ENDOFJOB
  0709   REF  18  LAST  255    43,2616  0 5671 1  R22ALARM TC       ALARM             VERB 57 WAS SELECTED AND NEITHER REND
  0710                         43,2617   00406 0           OCT      00406               NOR TRACK FLAG WERE ON.
  0711   REF  14  LAST  266    43,2620  0 5524 1           TC       ENDEXT
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P0712                       VERB 86     DESCRIPTION
R0713                          V86 IS TO R23 AS MARK REJECT IS TO R21
R0714                          V86 IS THE MARK REJECT FOR R23(THE BACKUP MARKING ROUTINE)
 0715    REF  16  LAST  268    E7,1722                              EBANK=  MRKBUF1
 0716    REF   2  LAST  208    43,2621   3 4606 0   V86PERF    TC      E7SETTER          BACKUP MARK REJ.
 0717    REF  17  LAST  269    43,2622   3 1722 1              CA      MRKBUF1
 0718                          43,2623   0 0006 1              EXTEND
 0719                          43,2624   1 2627 1              BZF     +3
 0720                          43,2625   0 0006 1              EXTEND
 0721    REF   1               43,2626   6 2632 1              BZMF    BKRJCT

 0722    REF   7  LAST  247    43,2627   3 7702 0              CA      NEGONE
 0723    REF  18  LAST  269    43,2630  55'722 0               TS      MRKBUF1
 0724    REF  10  LAST  263    43,2631   0 2117 1              TC      GOPIN
 0725    REF   2  LAST  247    43,2632   3 4762 0   BKRJCT     CAF     R22CABIT
 0726    REF   4  LAST  247    43,2633   7 0105 1              MASK    FLAGWRD9
 0727                          43,2634   0 0006 1              EXTEND
 0728    REF  11  LAST  269    43,2635   1 2117 0              BZF     GOPIN

 0729    REF  21  LAST  267    43,2636   0 5547 1              TC      UPFLAG
 0730    REF   2  LAST  247    43,2637    00231 1              ADRES   REJCTFLG
 0731    REF  12  LAST  269    43,2640   1 2117 0              TCF     GOPIN
```

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R0732              TRACKTRM     VERB 56                 DESCRIPTION
R0733                   TERMINATE TRACKING (P20)
R0734                   1. KNOCK DOWN RENDEZVOUS, TRACK, AND UPDATE FLAGS.
R0735                   2. REQUIRE P20 NOT RUNNING ALONE OR GO TO GOTOPOOH (REQUEST PROGRAM 00).
R0737                   3. REQUIRE R22 RUNNING OR GO TO PINBRNCH.
R0738                   4. IF INTEGRATION RUNNING, STALL UNTIL IT IS COMPLETED, THEN ZERO GROUPS 2 AND 3 TO KILL R21 + R22.
R0740                   3. KNOCK DOWN RENDEZVOUS, R22, R21, TRACK, UPDATE, AND TARG1 FLAGS.
R0742                   4. GO TO ENEMA (SOFTWARE RESTART).
R0743                   REFERENCE
R0744                      P20 RENDEZVOUS  NAVIGATION.
R0745                      R21 RENDEZVOUS  TRACKING SIGHTING MARK.
R0746                      R22 RENDEZVOUS  TRACKING DATA PROCESSING.

 0747    REF    7  LAST  220    43,2641  0 6006 1  TRACKTRM TC      INTPRET
 0748                           43,2642   43014 0           CLEAR   BON
 0749    REF    1               43,2643   04275 0                   R67FLAG
 0750    REF    2  LAST  215    43,2644   04306 0                   UTFLAG
 0751    REF    1               43,2645   66655 1                   TRACKCHK
 0752                           43,2646   43014 0           BOFF    CLEAR
 0753    REF    1               43,2647   00350 1                   RNDVZFLG
 0754    REF    1               43,2650   66701 1                   EXPIN1
 0755    REF    6  LAST  216    43,2651   05270 1                   AUTOSEQ
 0756                           43,2652   43014 0           CLEAR   CLEAR
 0757    REF    2  LAST  211    43,2653   01261 0                   R21MARK
 0758    REF    1               43,2654   00670 0                   UPDATFLG
 0759                           43,2655   43014 0  TRACKCHK BOFCLR  CLEAR
 0760    REF    3  LAST  219    43,2656   00652 0                   TRACKFLG
 0761    REF    1               43,2657   66676 0                   EXPIN
 0762    REF    2  LAST  214    43,2660   00267 1                   IMUSE
 0763                           43,2661   43014 0           CLEAR   CLEAR
 0764    REF    2  LAST  270    43,2662   00270 1                   RNDVZFLG
 0765    REF    3  LAST  270    43,2663   04266 1                   UTFLAG
 0766                           43,2664   45034 1           RTB     CALL
 0767    REF    1               43,2665   11030 1                   INITSUBB         DO STOPRATE AND RESTORDB
 0768    REF    3  LAST  228    43,2666   27516 0                   INTSTALL         DONT INTERRUPT INTEGRATION
 0769                           43,2667   77776 1           EXIT

 0770    REF    1               43,2670  0 5362 0           TC      2PHSCHNG
 0771                           43,2671   00002 0           OCT     2                KILL GROUP 2 TO HALT P20 ACTIVITY
 0772                           43,2672   00001 0           OCT     1                ALSO KILL GROUP 1

 0773                           43,2673  0 0004 0  CLEANOUT INHINT
 0774    REF   12  LAST  267    43,2674  0 4655 0           TC      POSTJUMP
 0775    REF    1               43,2675   12712 0           CADR    ENEMA            CAUSE RESTART


 0776                           43,2676   43014 0  EXPIN    CLEAR   CLEAR
 0777    REF    3  LAST  270    43,2677   00270 1                   RNDVZFLG
 0778    REF    4  LAST  270    43,2700   04266 1                   UTFLAG
 0779                           43,2701   77776 1  EXPIN1   EXIT
 0780   REF  13  LAST  269   43,2702  0 2117 1            TC     GOPIN

R0781            LEMVEC      VERB 80               DESCRIPTION
R0782                UPDATE LEM STATE VECTOR
R0783                   RESET VEHUPFLG TO 0

 0784   REF   3  LAST  261   43,2703  0 3065 1  LEMVEC    TC     DOWNX
 0785   REF   1              43,2704   00026 0            ADRES  VEHUPFLG          VEHUPFLG DOWN INDICATES LEM

 0786   REF   2  LAST  257   43,2705  0 3071 1  CSMVEC    TC     UPX               VEHUPFLG UP INDICATES CM.

R0787            CSMVEC      VERB 81               DESCRIPTION
R0788                UPDATE CSM STATE VECTOR
R0789                   SET   VEHUPFLG TO 1

R0790            DNEDUMP      VERB 74              DESCRIPTION
R0791                INITIALIZE DOWN-TELEMETRY PROGRAM FOR ERASABLE MEMORY DUMP.
R0792                2. REPLACE CURRENT DOWNLIST WITH ERASABLE MEMORY.
R0793                3. RELEASE EXT VERB DISPLAY.

 0794   REF   1              43,2706  3 2711 1  DNEDUMP   CAF    LDNDUMPI
 0795   REF   2  LAST  202   43,2707  54 334 1            TS     DNTMGOTO
 0796   REF  14  LAST  271   43,2710  0 2117 1            TC     GOPIN

 0797   REF   2  LAST  249   43,2706             V74      EQUALS DNEDUMP
 0798   REF   1              43,2711   03643 0  LDNDUMPI REMADR DNDUMPI

R0799            LFTFLGON      VERB 75             DESCRIPTION
R0800                SET LIFT-OFF FLAG
R0801                1. SETUP GGRBKFLG, GUIDANCE REFERENCE RELEASE BACK-UP FLAG.
R0802                2. RETURN VIA PINBRNCH

 0803   REF   1              43,2712   00125 1            ADRES  GRRBKFLG          MUST PRECEDE LFTFLGON
 0804   REF   3  LAST  271   43,2713  0 3071 1  LFTFLGON TC     UPX

 0805   REF   5  LAST  213   43,2714  3 1214 1  CHKPOOH   CA     MODREG
 0806                        43,2715  0 0006 1            EXTEND
 0807   REF   4  LAST  257   43,2716  1 6711 1            BZF    TCQ
 0808   REF  16  LAST  265   43,2717  1 2116 1            TCF    ALM/END

 0809   REF   9  LAST  233   E6,1423                      EBANK= PACTOFF
 0810   REF   2  LAST  205   43,2720   03226 1  IDLECADR 2CADR  T5IDLOC
 0810                        43,2721   12106 0
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L        EXTENDED VERBS                                                              USER'S PAGE NO.  24

R0811    VERB 89 DESCRIPTION      RENDEZVOUS FINAL ATTITUDE ROUTINE (R63)

R0812    CALLED BY VERB 89 ENTER DURING P00. PRIO 10 USED. CALCULATES AND
R0813    DISPLAYS FINAL GIMBAL ANGLES TO POINT CSM +X AXIS OR PREFERRED AXIS
R0814    (UNIT(Z)COS55 DEG + UNIT(X)SIN55 DEG) AT LM.

R0815    1. KEY IN V 89 E ONLY IF IN PROG 00. IF NOT IN P00, OPERATOR ERROR AND
R0816    EXIT R63, OTHERWISE CONTINUE.

R0817    2. IF IN P00, DO IMU STATUS CHECK (R02BOTH). IF IMU ON AND ITS
R0818    ORIENTATION KNOWN TO CGC, CONTINUE.

R0819    3. FLASH DISPLAY V 04 N 06. R2 INDICATES WHICH SPACECRAFT AXIS IS TO
R0820    BE POINTED AT LM.  INITIAL CHOICE IS PREFERRED AXIS. (R2=1).
R0821    ASTRONAUT CAN CHANGE TO (+X) AXIS (R2 NOT= 1) BY V 22 E 2 E. CONTINUE
R0822    AFTER KEYING IN PROCEED.

R0823    4. SET PREFERRED ATTITUDE FLAG ACCORDING TO OPTION DESIRED. SET FLAG
R0824    FOR PREFERRED AXIS. RESET FLAG FOR X AXIS.

R0825    5. CURRENT TIME IS STORED AND R63COMP IS CALLED

R0826         R63COMP JOB:

R0827              UPDATES CSM AND LM STATE VECTORS USING CONIC EQUATIONS

R0828              CALCULATES BOTH PREFERRED AND X AXIS TRACKING ATT FROM CSM TO LM.

R0829              DESIRED GIMBAL ANGLES AS INDICATED BY PREFERRED ATTITUDE FLAG
R0830              ARE STORED FOR LATER R60CSM CALL.

R0831    6. FLASH DISPLAY V 06 N18 AND AWAIT RESPONSE.

R0832    7. RECYCLE- RETURN TO STEP 5.
R0833       TERMINATE- EXIT R63 ROUTINE
R0834       PROCEED- RESET 3AXISFLG AND CALL R60CSM FOR ATTITUDE MANEUVER.


 0835    REF   4  LAST  264    43,2722  0 2714 1  V89PERF  TC       CHKPOOH           DEMAND P
 0836    REF  13  LAST  268    43,2723  0 2076 1           TC       TESTXACT
 0837    REF   3  LAST  265    43,2724  3 4754 0           CAF      PRIO10
 0838    REF  10  LAST  264    43,2725  0 5135 0           TC       FINDVAC
 0839    REF   6  LAST  264    E6,1774                     EBANK=   R61CNTR
 0840    REF   1               43,2726   02377 0           2CADR    V89CALL
 0840    REF   1               43,2727   62066 0
 0841    REF  10  LAST  268    43,2730  1 5205 1           TCF      ENDOFJOB

 0842    REF  20  LAST  267    43,2731  0 5561 0  WMATRXNG TC       DOWNFLAG          RESET RENDWFLG
 0843    REF   2  LAST  228    43,2732   00131 1           ADRES    RENDWFLG
 0844    REF   4  LAST  271    43,2733  0 3065 1           TC       DOWNX
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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971  DIOGENES.064  PAGE  273

L        EXTENDED VERBS                                                                         USER'S PAGE NO.  25        E7 S4

 0845    REF   2  LAST  227    43,2734   00066 1              ADRES   CHBWFLAG
R0846

 0847    REF   1               43,2735              GOSHOSUM EQUALS SHOWSUM

 0848    REF   5  LAST  272    43,2735  0 2714 1   SHOWSUM  TC      CHKPOOH
 0849    REF  14  LAST  272    43,2736  0 2076 1            TC      TESTXACT           *
 0850    REF   1               43,2737  3 4770 0            CAF     S+1                *
 0851    REF   2  LAST   87    43,2740  55'376 0            TS      SKEEP6             * SHOWSUM OPTION
 0852    REF   1               43,2741  3 4772 1            CAF     S+ZERO             *
 0853    REF   3  LAST  194    43,2742  55'362 0            TS      SMODE              * TURN OFF SELF-CHECK
 0854    REF   1               43,2743  3 3177 0            CA      SELFADRS           *
 0855    REF   3  LAST  204    43,2744  55'361 0            TS      SELFRET            *
 0856    REF   1               43,2745  0 3454 1            TC      STSHOSUM           * ENTER ROPECHK

 0857    REF   2  LAST   87    43,2746  23'372 0   SDISPLAY LXCH    SKEEP2             * BNK NO FOR DSP
 0858    REF   2  LAST   87    43,2747  23'373 1            LXCH    SKEEP3             * BUGGER WORD FOR DSP
 0859    REF   1               43,2750  3 3176 1   NOKILL   CA      ADRS1              *
 0860    REF  32  LAST  258    43,2751  54 156 1            TS      MPAC +2            *
 0861    REF   1               43,2752  3 2763 1            CA      VNCON              * 0501
 0862    REF  34  LAST  266    43,2753  0 4636 0            TC      BANKCALL           *
 0863    REF   8  LAST  266    43,2754   20576 1            CADR    GOXDSPF            *
 0864                          43,2755  0 2760 1            TC      +3                 *
 0865    REF   1               43,2756  0 3565 1            TC      NXTBNK             *
 0866    REF   1               43,2757  0 2750 1            TC      NOKILL             *
 0867    REF   2  LAST  273    43,2760  3 3177 0            CA      SELFADRS
 0868    REF   2  LAST   87    43,2761  55'371 1            TS      SKEEP1

 0869    REF  15  LAST  268    43,2762  0 5524 1            TC      ENDEXT             *

 0870                          43,2763   01201 0   VNCON    VN      501                *

 0871    REF   3  LAST  273    43,2764  3 1376 1   ENDSUMS  CA      SKEEP6             *
 0872                          43,2765  0 0006 1            EXTEND                     *
 0873    REF   2  LAST  205    43,2766  1 3270 0            BZF     SELFCHK            * ROPECHK, START SELFCHK AGAIN.
 0874    REF   2  LAST  273    43,2767  0 3454 1            TC      STSHOSUM           * START SHOWSUM AGAIN.

R0875              VB 87  SET VHF RANGE FLAG - ALLOWS R22 TO ACCEPT RANGE DATA.

R0876              VB 88  RESET VHF RANGE FLAG - STOPS ACCEPTANCE OF RANGE DATA.

 0877    REF   1               43,2770  0 5632 0   RESETVHF TC      TRFAILOF           TRACKER FAIL LIGHT
 0878    REF   5  LAST  272    43,2771  0 3065 1            TC      DOWNX
 0879    REF   3  LAST  216    43,2772   00215 1            ADRES   VHFRFLAG
 0880    REF   4  LAST  271    43,2773  0 3071 1   SETVHFLG TC      UPX                V87 SET VHF RANGE FLAG

R0881    VERB 66.  VEHICLES ARE ATTACHED.- MOVE THIS VEHICLE STATE VECTOR TO
R0882              OTHER VEHICLE STATE VECTOR.
```

```
R0883         USE SUBROUTINE GENTRAN.

 0884   REF   1                E3,1554                             EBANK= RRECTHIS
 0885   REF   4  LAST  272     43,2774   3 4754 0  ATTACHED CAF    PRIO10
 0886   REF  11  LAST  272     43,2775   0 5135 0           TC     FINDVAC
 0887   REF   2  LAST  274     E3,1554                      EBANK= RRECTHIS
 0888   REF   1                43,2776    02000 0           2CADR  ATTACHIT
 0888   REF   1                43,2777    36103 0
 0889   REF  11  LAST  272     43,3000   0 5205 0           TC     ENDOFJOB

 0890   REF   1                17,2000                      SETLOC EXTVRBS1
 0891                          17,2000                      BANK
 08915  REF   1                                             COUNT* $$/EXTVB
 0892   REF   8  LAST  270     17,2000   0 6006 1  ATTACHIT TC     INTPRET
 0893                          17,2001    77624 1           CALL
 0894   REF   4  LAST  270     17,2002    27516 0                  INTSTALL
 0895                          17,2003    43014 0           SET    BON
 0896   REF   1                17,2004    04064 1                  MOONOTH
 0897   REF   1                17,2005    04303 0                  MOONTHIS
 0898   REF   1                17,2006    36011 1                  CMMOVE
 0899                          17,2007    77614 1           CLEAR
 0900   REF   2  LAST  274     17,2010    04264 0                  MOONOTH
 0901                          17,2011    77776 1  CMMOVE   EXIT
 0902   REF   1                17,2012   3 2032 1           CAF    OCT51
 0903   REF   4  LAST  246     17,2013   0 5607 0           TC     GENTRAN
 0904   REF   3  LAST  274     17,2014    01554 1           ADRES  RRECTHIS          OUR STATE VECTOR INTO OTHER VIA GENTRAN
 0905   REF   1                17,2015    01626 1           ADRES  RRECTOTH

 0906   REF   9  LAST  274     17,2016   0 6006 1  TACHEXIT TC     INTPRET
 0907                          17,2017    77624 1           CALL                     UPDATE RN, VN, R-OTHER, V-OTHER
 0908   REF   1                17,2020    27005 1                  PTOACSM
 0909                          17,2021    45154 0           LXA,2  CALL
 0910   REF   2  LAST   93     17,2022    02150 1                  PBODY
 0911   REF   1                17,2023    20240 0                  SVDWN1
 0912                          17,2024    77624 1           CALL
 0913   REF   1                17,2025    20264 0                  SVDWN2
 0914                          17,2026    77624 1           CALL
 0915   REF   1                17,2027    27525 0                  INTWAKE0
 0916                          17,2030    77634 0  TCPIN    RTB
 0917   REF   3  LAST  251     17,2031    21275 1                  PINBRNCH

 0918                          17,2032    00051 0  OCT51    OCT    51
R0919
 0920   REF   3  LAST  266     43,2000                      SETLOC EXTVERBS
 0921                          43,3001                      BANK
 09215  REF   5 LAST  266 TO  274:   146   489*             COUNT* $$/EXTVB
R0922   VERB 47  MOVE LM STATE VECTOR INTO CM STATE VECTOR.

 0923   REF   5  LAST  274     43,3001   3 4754 0  LMTOCMSV CAF    PRIO10
 0924   REF  12  LAST  274     43,3002   0 5135 0           TC     FINDVAC
 0925    REF   4  LAST  274   E3,1554                          EBANK=  RRECTHIS
 0926    REF   1              43,3003   02033 0                2CADR   LMTOCM
 0926    REF   1              43,3004   36103 0
 0927    REF  12  LAST  274   43,3005  0 5205 0                TC      ENDOFJOB

 0928    REF   2  LAST  274   17,2000                          SETLOC  EXTVRBS1
 0929                         17,2033                          BANK

 09295   REF   2 LAST  274 TO  274:     27     27*             COUNT*  $$/EXTVB
 0930    REF  10  LAST  274   17,2033  0 6006 1  LMTOCM        TC      INTPRET
 0931                         17,2034   77624 1                CALL
 0932    REF   5  LAST  274   17,2035   27516 0                        INTSTALL
 0933                         17,2036   43014 0                SET     BON
 0934    REF   2  LAST  274   17,2037   04063 0                        MOONTHIS
 0935    REF   3  LAST  274   17,2040   04304 1                        MOONOTH
 0936    REF   1              17,2041   36044 1                        LMMOVE
 0937                         17,2042   77614 1                CLEAR
 0938    REF   3  LAST  275   17,2043   04263 1                        MOONTHIS
 0939                         17,2044   77776 1  LMMOVE        EXIT
 0940    REF   2  LAST  274   17,2045  3 2032 1                CAF     OCT51
 0941    REF   5  LAST  274   17,2046  0 5607 0                TC      GENTRAN
 0942    REF   2  LAST  274   17,2047   01626 1                ADRES   RRECTOTH        LM STATE VECTOR INTO CM VIA GENTRAN
 0943    REF   5  LAST  275   17,2050   01554 1                ADRES   RRECTHIS

 0944    REF   1              17,2051  1 2016 0                TCF     TACHEXIT

R0945    VERB 94  DO R64 VIA ENEMA TO PICK UP IN P23.

 0946    REF   4  LAST  274   43,2000                          SETLOC  EXTVERBS
 0947                         43,3006                          BANK
 09475   REF   6 LAST  274 TO  275:      5    494*             COUNT*  $$/EXTVB
 0948    REF   1              43,3006  3 4756 1  VERB94        CAF     V94FLBIT
 0949    REF   5  LAST  269   43,3007  7 0105 1                MASK    FLAGWRD9        IS V94FLAG SET
 0950                         43,3010  0 0006 1                EXTEND
 0951    REF  19  LAST  271   43,3011  1 2116 1                BZF     ALM/END         NO - OPERATOR ERROR

 0952    REF  21  LAST  272   43,3012  0 5561 0                TC      DOWNFLAG
 0953    REF   1              43,3013   00213 1                ADRES   V94FLAG

 0954    REF  11  LAST  259   43,3014  0 5354 0                TC      CHECKMM         IS IT P23
 0955                         43,3015   00027 1                MM      23
 0956    REF  20  LAST  275   43,3016  0 2116 0                TC      ALM/END         NO - OPERATOR ERROR
 0957    REF   8  LAST  259   43,3017  0 5402 1                TC      PHASCHNG
 0958                         43,3020   00112 0                OCT     112             SET GROUP 2 TO DO R64

 09585   REF   1              01,2044            2P11SPT1 =            2.11SPOT
 0959    REF   1              43,3021  0 2673 1                TC      CLEANOUT        CAUSE RESTART

R0960             V90PERF      VERB 90               DESCRIPTION
R0961                 REQUEST RENDEZVOUS OUT-OF-PLANE DISPLAY (R36)
```

```
R0962                     1. SET EXT VERB DISPLAY BUSY FLAG.
R0963                     2. SCHEDULE R36 CALL WITH PRIORITY 10
R0964                        A. DISPLAY
R0965                           TIME OF EVENT - HOURS , MINUTES , SECONDS
R0966                           Y  OUT-OF-PLANE POSITION - NAUTICAL MILES
R0967                           YDOT  OUT-OF-PLANE VELOCITY - FEET/SECOND
R0968                           PSI  ANGLE BTW LINE OF SIGHT AND FORWARD
R0969                                DIRECTION VECTOR IN HORIZONTAL PLANE - DEGREES
 0970    REF  15  LAST  273   43,3022  0 2076 1  V90PERF   TC       TESTXACT
 0971    REF   3  LAST  267   43,3023  3 5051 0            CAF      PRIO7                 R36.V90
 0972    REF  13  LAST  274   43,3024  0 5135 0            TC       FINDVAC
 0973    REF   2  LAST  257   40,2000                      SBANK=   PINSUPER
 0974    REF  15  LAST  236   E7,1412                      EBANK=   TIG
 0975    REF   1              43,3025   02000 0            2CADR    R36
 0975    REF   1              43,3026   50107 1
 0976    REF  13  LAST  275   43,3027  1 5205 1            TCF      ENDOFJOB
R0977    VERB 96  SET QUITFLAG TO STOP INTEGRATION.

 0978    REF  22  LAST  265   43,3030  0 5547 1  VERB96    TC       UPFLAG                QUITFLAG WILL CAUSE INTEGRATION TO EXIT
 0979    REF   1              43,3031   00221 0            ADRES    QUITFLAG                   AT NEXT TIMESTEP

 0980    REF  23  LAST  276   43,3032  0 5547 1            TC       UPFLAG
 0981    REF   1              43,3033   00204 1            ADRES    V96ONFLG
 0982    REF  30  LAST  258   43,3034  3 4772 1            CAF      ZERO
 0983    REF  13  LAST  270   43,3035  0 4655 0            TC       POSTJUMP
 0984    REF   1              43,3036   10007 1            CADR     V37                   GO TO P00

 0985    REF   4  LAST  231   E7,1751                      EBANK=   LANDMARK
 0986    REF  12  LAST  275   43,3037  0 5354 0  V52       TC       CHECKMM               IS P22 OPERATING
 0987                         43,3040   00026 0            MM       22
 0988    REF  21  LAST  275   43,3041  0 2116 0            TC       ALM/END               NO
 0989    REF   3  LAST  269   43,3042  0 4606 0            TC       E7SETTER
 0990    REF   4  LAST  276   43,3043  4 5051 1            CS       PRIO7                 YES  SET BITS 12,11,10 OF LANDMARK =
 0991    REF   5  LAST  276   43,3044  7 1751 1            MASK     LANDMARK              NO. OF MARKS TO GET OFFSET MARK NO.
 0992    REF   6  LAST  276   43,3045  55'751 1            TS       LANDMARK

 0993    REF   6  LAST  248   43,3046  3 1747 1            CA       BNN                   NO. OF MARKS
 0994                         43,3047  0 0006 1            EXTEND
 0995    REF  15  LAST  166   43,3050  7 4757 1            MP       BIT10
 0996    REF  24  LAST  258   43,3051  3 0001 0            CA       L
 0997    REF   7  LAST  276   43,3052  27'751 1            ADS      LANDMARK
 0998    REF  15  LAST  271   43,3053  0 2117 1            TC       GOPIN
R0999
R1000

R1001    VERB 67  ASTRONAUT DISPLAY OF W MATRIX

 1002    REF  16  LAST  276   43,3054  0 2076 1  V67       TC       TESTXACT
 1003    REF   5  LAST  267   43,3055  3 5047 1            CAF      PRIO5
 1004    REF  14  LAST  276   43,3056  0 5135 0            TC       FINDVAC
 1005   REF   5  LAST   97   E5,1400                      EBANK=  W
 1006   REF   1              43,3057   03636 1            2CADR   V67CALL
 1006   REF   1              43,3060   60105 0
 1007   REF  14  LAST  276   43,3061  0 5205 0            TC      ENDOFJOB
R1008
R1009   VB 45.      RESET SURFACE FLAG.

 1010   REF   6  LAST  273   43,3062  0 3065 1  RESTSRF   TC      DOWNX
 1011   REF   2  LAST  227   43,3063   00177 0            ADRES   SURFFLAG
 1012   REF   5  LAST  273   43,3064  0 3071 1  SETSURF   TC      UPX                 VB 44. SET SURFACE FLAG
```

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L        EXTENDED VERBS                                                              USER'S PAGE NO.  30      E7 S4

P1013             DOWNX, UPX    FLAG SETTING AND RESETTING FOR EXTENDED VERBS.

R1014                      RETURN IS TO GOPIN.


R1015                      CALLING SEQUENCES:

R1016                          FOR DOWNX

R1017                                    TC       DOWNX
R1018                                    ADRES    (FLAG NAME)


R1019                          FOR UPX

R1020                                    ADRES    (FLAG NAME)
R1021                                    TC       UPX


  10215   REF   1                                                           COUNT*  $$/FLAG
  1022    REF  29   LAST   261    43,3065   3 0002 0   DOWNX        CA      Q
  1023    REF   1                 43,3066   0 5565 1                TC      DEBIT
  1024    REF  25   LAST   276    43,3067   7 0001 1                MASK    L
  1025    REF   1                 43,3070   1 3077 0                TCF     COMXFLG

  1026    REF  30   LAST   278    43,3071   3 0002 0   UPX          CA      Q
  1027    REF   5   LAST   247    43,3072   6 7701 0                AD      NEG2
  1028    REF   2   LAST   278    43,3073   0 5565 1                TC      DEBIT
  1029                            43,3074   4 0000 0                COM
  1030                            43,3075   0 0006 1                EXTEND
  1031    REF  10   LAST   200    43,3076   04 001 1                ROR     LCHAN

  1032    REF  14   LAST   224    43,3077   50 061 0   COMXFLG      INDEX   ITEMP1
  1033    REF  17   LAST   268    43,3100   54 074 0                TS      FLAGWRD
  1034    REF  16   LAST   276    43,3101   1 2117 0                TCF     GOPIN
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L        EXTENDED VERBS                                                                                   USER'S PAGE NO.  31      E7 S4

P1035              VERB 57 SET FULL TRACK OPTION

 10355   REF   7 LAST  275 TO  278:      47    541*              COUNT* $$/EXTVB
 1036    REF  17  LAST  276    43,3102  0 2076 1  V57CALL   TC      TESTXACT

 1037    REF  16  LAST  262    43,3103  3 4766 1  PARTRACK CAF     BIT3                     OPTION 4 SPECIFY CONDITION OF FULTKFLG
 1038    REF   1               43,3104  55'255 0            TS      OPTIONX

 1039    REF   1               43,3105  3 4767 0  PRTRCK    CAF     FULTKBIT
 1040    REF  12  LAST  218    43,3106  7 0106 1            MASK    FLGWRD10
 1041                          43,3107  0 0006 1            EXTEND
 1042                          43,3110  1 3112 1            BZF     +2                       FULTKFLG NOT SET

 1043    REF  21  LAST  262    43,3111  3 4770 0            CAF     BIT1                     FULTKFLG SET
 1044    REF   2  LAST  279    43,3112  55'256 0            TS      OPTIONX +1
 1045    REF   1               43,3113  3 3131 1            CAF     V04N12
 1046    REF  35  LAST  273    43,3114  0 4636 0            TC      BANKCALL
 1047    REF   9  LAST  273    43,3115   20576 1            CADR    GOXDSPF
 1048    REF  16  LAST  273    43,3116  0 5524 1            TC      ENDEXT
 1049    REF  17  LAST  279    43,3117  0 5524 1            TC      ENDEXT
 1050    REF   3  LAST  279    43,3120  3 1256 1            CA      OPTIONX +1
 1051                          43,3121  0 0006 1            EXTEND
 1052                          43,3122  1 3126 0            BZF     +4
 1053    REF  24  LAST  276    43,3123  0 5547 1            TC      UPFLAG
 1054    REF   1               43,3124   00243 1            ADRES   FULTKFLG
 1055    REF   1               43,3125  1 3105 1            TCF     PRTRCK

 1056    REF  22  LAST  275    43,3126  0 5561 0            TC      DOWNFLAG
 1057    REF   2  LAST  279    43,3127   00243 1            ADRES   FULTKFLG
 1058    REF   2  LAST  279    43,3130  1 3105 1            TCF     PRTRCK

 1059                          43,3131   01014 0  V04N12    VN      0412
```

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L       PINBALL NOUN TABLES                                                         USER'S PAGE NO.  1      E  S4

P1000   THE FOLLOWING REFERS TO THE NOUN TABLES

R1001   COMPONENT CODE NUMBER           INTERPRETATION

R1002   00000                           1 COMPONENT
R1003   00001                           2 COMPONENT
R1004   00010                           3 COMPONENT
R1005   X1XXX                           BIT4 = 1. DECIMAL ONLY
R1006   1XXXX                           BIT5 = 1. NO LOAD
R1007   END OF COMPONENT CODE NUMBERS


R1008   SF ROUTINE CODE NUMBER          INTERPRETATION

R1009   00000     OCTAL ONLY
R1010   00001     STRAIGHT FRACTIONAL
R1011   00010     CDU DEGREES (XXX.XX)
R1012   00011     ARITHMETIC SF
R1013   00100     ARITH DP1   OUT(MULT BY 2EXP14 AT END)     IN(STRAIGHT)
R1014   00101     ARITH DP2   OUT(STRAIGHT)                  IN(SL 7 AT END)
R1015   00110     Y OPTICS DEGREES (XX.XXX MAX 89.999)
R1016   00111     ARITH DP3   OUT ( SL 7 AT END)       IN ( STRAIGHT)
R1017   01000     WHOLE HOURS IN R1, WHOLE MINUTES (MOD 60) IN R2,
R1018                 SECONDS (MOD 60) 0XX.XX IN R3. *** ALARMS IF USED WITH OCTAL
R1019   01001     MINUTES (MOD 60) IN D1D2, D3 BLANK, SECONDS (MOD 60) IN D4D5
R1020                                 LIMITS TO 59B59 IF MAG EXCEEDS THIS VALUE.
R1021                                 ALARMS IF USED WITH OCTAL  ********  IN (ALARM)
R1022   01010     ARITH DP4   OUT (STRAIGHT)                   IN (SL 3 AT END)
R10221  01011     ARITH1 SF   OUT(MULT BY 2EXP14 AT END)     IN(STRAIGHT)
R10222  01100     2 INTEGERS IN D1D2, D4D5, D3 BLANK.
R10223                                ALARMS IF USED WITH OCTAL  ********  IN (ALARM)
R10224  01101     DP STRAIGHT FRACTIONAL
R1023   END OF SF ROUTINE CODE NUMBERS


R1024   SF CONSTANT CODE NUMBER         INTERPRETATION

R1025   00000                           WHOLE                          USE ARITH
R1026   00000                           DP TIME SEC (XXX.XX SEC)       USE ARITHDP1
R1027   00001                           SPARE
R1028   00010                           CDU DEGREES                  USE CDU DEGREES
R1029   00010                           Y OPTICS DEGREES    USE Y OPTICS DEGREES
R1030   00011                           DP DEGREES (90) XX.XXX DEG  USE ARITHDP3
R1031   00100                           DP DEGREES (360) XXX.XX DEG USE ARITHDP4
R1032   00101                           DEGREES (180) XXX.XX DEG     USE ARITH
R1034   00110                           WEIGHT2 (XXXXX. LBS)         USE ARITH1
R1035   00111                           POSITION5 (XXX.XX NAUTICAL MILES)
R10351                                                               USE ARITHDP1
R1037   01000                           POSITION4 (XXXX.X NAUTICAL MILES)
```

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R10371                                                   USE ARITHDP3
R1038   01001                  VELOCITY2 (XXXXX. FT/SEC)   USE ARITHDP4
R1039   01010                  VELOCITY3 (XXXX.X FT/SEC)   USE ARITHDP3
R1040   01011                  ELEVATION DEGREES(89.999MAX) USE ARITH
R10401  01100                  TRIM DEGREES (XXX.XX DEG)   USE ARITH
R10402  01101                  INERTIA (XXXXXBB. SLUG FT FT)  USE ARITH
R104025 01101                  THRUST MOMENT (XXXXXBB.FT LBS) USE ARITH
R10403  01110                  VELOCITY/2VS (XXXXX. FT/SEC)USE ARITHDP4
R10404  01111                  POSITION6 (XXXX.X NAUT MI)  USE ARITHDP3
R10405  10000                  DRAG ACCELERATION (XXX.XX G)USE ARITHDP2
R10406  10001                  POSITION8 (XXXX.X NAUT MI)  USE ARITHDP3
R10407  10010                  POSITION9 (XXXXX. FT)       USE ARITHDP3
R10408  10011                  VELOCITY4 (XXXX.X FT/SEC)   USE ARITHDP2
R1041   END OF SF CONSTANT CODE NUMBERS

R1042   FOR GREATER THAN SINGLE PRECISION SCALES, PUT ADDRESS OF MAJOR PART INTO
R1043   NOUN TABLES.
R1044   OCTAL LOADS PLACE +0 INTO MAJOR PART, DATA INTO MINOR PART.
R1045   OCTAL DISPLAYS SHOW MINOR PART ONLY.
R1046   TO GET AT BOTH MAJOR AND MINOR PARTS(IN OCTAL), USE NOUN 01.

R1047   A NOUN MAY BE DECLARED :DECIMAL ONLY: BY MAKING BIT4=1 OF ITS COMPONENT
R1048   CODE NUMBER. IF THIS NOUN IS USED WITH ANY OCTAL DISPLAY VERB, OR IF
R1049   DATA IS LOADED IN OCTAL, IT ALARMS.

R1050   IN LOADING AN :HOURS, MINUTES, SECONDS: NOUN, ALL 3 WORDS MUST BE
R1051   LOADED, OR ALARM.
R1052   ALARM IF AN ATTEMPT IS MADE TO LOAD :SPLIT MINUTES/SECONDS: (MMBSS).
R1053   THIS IS USED FOR DISPLAY ONLY.
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L        PINBALL NOUN TABLES                                                                   USER'S PAGE NO.   3       E0 S4

P1054    THE FOLLOWING ROUTINES ARE FOR READING THE NOUN TABLES AND THE SF TABLES
R1055    (WHICH ARE IN A SEPARATE BANK FROM THE REST OF PINBALL). THESE READING
R1056    ROUTINES ARE IN THE SAME BANK AS THE TABLES. THEY ARE CALLED BY DXCH Z.


R1057    LODNNTAB LOADS NNADTEM WITH THE NNADTAB ENTRY, NNTYPTEM WITH THE
R1058    NNTYPTAB ENTRY. IF THE NOUN IS MIXED, IDADITEM IS LOADED WITH THE FIRST
R1059    IDADDTAB ENTRY, IDAD2TEM THE SECOND IDADDTAB ENTRY, IDAD3TEM THE THIRD
R1060    IDADDTAB ENTRY, RUTMXTEM WITH THE RUTMXTAB ENTRY. MIXBR IS SET FOR
R1061    MIXED OR NORMAL NOUN.

  120001 REF   1                 42,2000                          SETLOC PINBALL3
  120002                         42,2056                          BANK

  12001  REF   1                                                  COUNT* $$/NOUNS
   1201  REF   1                 42,2056  52 152 0  LODNNTAB DXCH    IDAD2TEM         SAVE RETURN INFO IN IDAD2TEM, IDAD3TEM.
   1202  REF   3  LAST  253      42,2057  51'205 1           INDEX   NOUNREG
   1203  REF   1                 42,2060   3 2127 1           CAF     NNADTAB
   1204  REF   1                 42,2061  54 146 0           TS      NNADTEM
   1205  REF   4  LAST  282      42,2062  51'205 1           INDEX   NOUNREG
   1206  REF   1                 42,2063   3 2273 0           CAF     NNTYPTAB
   1207  REF   1                 42,2064  54 147 1           TS      NNTYPTEM
   1208  REF   5  LAST  282      42,2065   4 1205 0           CS      NOUNREG
   1209  REF   1                 42,2066   6 5004 0           AD      MIXCON
   1210                          42,2067   0 0006 1           EXTEND
   1211  REF   1                 42,2070   6 2074 0           BZMF    LODMIXNN         NOUN NUMBER G/E FIRST MIXED NOUN
   1212  REF  12  LAST  255      42,2071   3 4770 0           CAF     ONE              NOUN NUMBER L/ FIRST MIXED NOUN
   1213  REF   1                 42,2072  54 140 0           TS      MIXBR            NORMAL.  +1 INTO MIXBR.
   1214  REF   1                 42,2073   0 2112 1           TC      LODNLV
   1215  REF   4  LAST  260      42,2074   3 4767 0  LODMIXNN CAF     TWO              MIXED.  +2 INTO MIXBR.
   1216  REF   2  LAST  282      42,2075  54 140 0           TS      MIXBR
   1217  REF   6  LAST  282      42,2076  51'205 1           INDEX   NOUNREG
   1218  REF   1                 42,2077   3 2773 0           CAF     RUTMXTAB -40D    FIRST MIXED NOUN = 40.
   1219  REF   1                 42,2100  54 153 1           TS      RUTMXTEM
   1220  REF   3  LAST  221      42,2101   3 5041 1           CAF     LOW10
   1221  REF   2  LAST  282      42,2102   7 0146 0           MASK    NNADTEM
   1222  REF  31  LAST  278      42,2103  54 002 1           TS      Q                TEMP
   1223  REF  75  LAST  265      42,2104  50 000 1           INDEX   A
   1224  REF   1                 42,2105   3 2557 1           CAF     IDADDTAB
   1225  REF   1                 42,2106  54 150 1           TS      IDADITEM         LOAD IDADITEM WITH FIRST IDADDTAB ENTRY
   1226                          42,2107   0 0006 1           EXTEND
   1227  REF  32  LAST  282      42,2110   5 0002 0           INDEX   Q                LOAD IDAD2TEM WITH 2ND IDADDTAB ENTRY
   1228  REF   2  LAST  282      42,2111   3 2561 1           DCA     IDADDTAB +1      LOAD IDAD3TEM WITH 3RD IDADDTAB ENTRY.
   1229  REF   2  LAST  282      42,2112  52 152 0  LODNLV   DXCH    IDAD2TEM         PUT RETURN INFO INTO A, L.
   1230  REF   1                 42,2113  52 006 0           DXCH    Z

   1231  REF   3  LAST  260         5004            MIXCON   =       OCT50            FIRST MIXED NOUN =40.  (DEC 40)
R1232    GTSFOUT LOADS SFTEMP1, SFTEMP2 WITH THE DP SFOUTAB ENTRIES.

   1233  REF   1                 42,2114  52 124 1  GTSFOUT  DXCH    SFTEMP1          2X(SFCONUM) ARRIVES IN SFTEMP1.
  1234                          42,2115  0 0006 1               EXTEND
  1235   REF  76  LAST  282     42,2116  5 0000 1               INDEX     A
  1236   REF   1                42,2117  3 2510 1               DCA       SFOUTAB
  1237   REF   2  LAST  282     42,2120  52 124 1   SFCOM       DXCH      SFTEMP1
  1238   REF   2  LAST  282     42,2121  52 006 0               DXCH      Z


R1239   GTSFIN LOADS SFTEMP1, SFTEMP2 WITH THE DP SFINTAB ENTRIES.

  1240   REF   3  LAST  283     42,2122  52 124 1   GTSFIN      DXCH      SFTEMP1            2X(SFCONUM) ARRIVES IN SFTEMP1.
  1241                          42,2123  0 0006 1               EXTEND
  1242   REF  77  LAST  283     42,2124  5 0000 1               INDEX     A
  1243   REF   1                42,2125  3 2440 0               DCA       SFINTAB
  1244   REF   1                42,2126  1 2120 1               TCF       SFCOM


A1400                                                                                            NN  NORMAL NOUNS
  1401                          42,2127   00000 1   NNADTAB     OCT       00000                  00 NOT IN USE
  1402                          42,2130   40000 0               OCT       40000                  01 SPECIFY MACHINE ADDRESS (FRACTIONAL)
  1403                          42,2131   40000 0               OCT       40000                  02 SPECIFY MACHINE ADDRESS (WHOLE)
  1404                          42,2132   40000 0               OCT       40000                  03 SPECIFY MACHINE ADDRESS (DEGREES)
  1405                          42,2133   00000 1               OCT       0                      04 SPARE
  1406   REF   3  LAST  242     42,2134   01250 1               ECADR     DSPTEM1                05 ANGULAR ERROR/DIFFERENCE
  1407   REF   4  LAST  187     42,2135   00775 1               ECADR     OPTION1                06 OPTION CODE
  1408   REF   1                42,2136   01266 1               ECADR     XREG                   07 ECADR OF WORD TO BE MODIFIED
A14081                                                                                              ONES FOR BITS TO BE MODIFIED
A14082                                                                                              1 TO SET OR 0 TO RESET SELECTED BITS
  1409   REF   2  LAST   87     42,2137   01363 0               ECADR     ALMCADR                08 ALARM DATA
  1410   REF   6  LAST  194     42,2140   00375 0               ECADR     FAILREG                09 ALARM CODES
  1411                          42,2141   77776 1               OCT       77776                  10 CHANNEL TO BE SPECIFIED
  1412   REF   4  LAST  217     42,2142   02462 0               ECADR     TCSI                   11 TIG OF CSI (HRS,MIN,SEC)
  1413   REF   4  LAST  279     42,2143   01255 1               ECADR     OPTIONX                12 OPTION CODE
A14131                                                                                                  (USED BY EXTENDED VERBS ONLY)
  1414   REF   4  LAST  185     42,2144   02460 1               ECADR     TCDH                   13 TIG OF CDH (HRS,MIN,SEC)
  1415   REF   1                42,2145   02355 0               ECADR     VC/U                   14 INERTIAL VEL MAG AT TLI CUTOFF
  1416                          42,2146   77777 0               OCT       77777                  15 INCREMENT MACHINE ADDRESS
  1417   REF   2  LAST   82     42,2147   01254 0               ECADR     DSPTEMX                16 TIME OF EVENT (HRS,MIN,SEC)
  1418   REF   3  LAST  257     42,2150   01013 1               ECADR     CPHIX                  17 ASTRONAUT TOTAL ATTITUDE
  1419   REF  13  LAST  261     42,2151   01307 1               ECADR     THETAD                 18 AUTO MANEUVER BALL ANGLES
  1420                          42,2152   00000 1               OCT       0                      19 SPARE
  1421   REF   6  LAST  257     42,2153   00032 0               ECADR     CDUX                   20 ICDU ANGLES
  1422   REF   3  LAST  182     42,2154   00037 0               ECADR     PIPAX                  21 PIPAS
  1423   REF  14  LAST  283     42,2155   01307 1               ECADR     THETAD                 22 NEW ICDU ANGLES
  1424                          42,2156   00000 1               OCT       00000                  23 SPARE
  1425   REF   3  LAST  258     42,2157   01254 0               ECADR     DSPTEM2 +1             24 DELTA TIME FOR AGC CLOCK(HRS,MIN,SEC)
  1426   REF   4  LAST  283     42,2160   01250 1               ECADR     DSPTEM1                25 CHECKLIST
A14261                                                                                                  (USED WITH PLEASE PERFORM ONLY)
  1427   REF   1                42,2161   01016 1               ECADR     N26/PRI                26 PRIO/DELAY, ADRES, BBCON
  1428   REF   4  LAST  273     42,2162   01362 1               ECADR     SMODE                  27 SELF TEST ON/OFF SWITCH
  1429                          42,2163   00000 1               OCT       0                      28 SPARE
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L          PINBALL NOUN TABLES                                                                USER'S PAGE NO.   5      EU 54

  1430     REF   5  LAST  283    42,2164   01250 1                 ECADR   DSPTEM1          29 XSM LAUNCH AZIMUTH
  1431     REF   6  LAST  284    42,2165   01250 1                 ECADR   DSPTEM1          30 TARGET CODES
  1432     REF   1               42,2166   03735 0                 ECADR   AGEOFW           31 TIME OF W-MATRIX INIT (P20)
  1433     REF   2  LAST   95    42,2167   02336 0                 ECADR   -TPER            32 TIME TO PERIGEE (HRS,MIN,SEC)
  1434     REF  16  LAST  276    42,2170   03412 0                 ECADR   TIG              33 TIME OF IGNITION (HRS,MIN(SEC)
  1435     REF   7  LAST  284    42,2171   01250 1                 ECADR   DSPTEM1          34 TIME OF EVENT (HRS,MIN,SEC)
  1436     REF   3  LAST  236    42,2172   03660 1                 ECADR   TTOGO            35 TIME TO GO TO EVENT (HRS,MIN,SEC)
  1437     REF  10  LAST  258    42,2173   00024 1                 ECADR   TIME2            36 TIME OF AGC CLOCK (HRS,MIN,SEC)
  1438     REF   3  LAST  185    42,2174   03662 0                 ECADR   TTPI             37 TIG OF TPI (HRS,MIN,SEC)
  1439     REF   4  LAST  187    42,2175   01516 1                 ECADR   TET              38 TIME OF STATE VECTOR
  1440     REF   1               42,2176   02640 1                 ECADR   T3TOT4           39 DELTA TIME TO TRANSFER (HRS,MIN,SEC)
R 14401    END OF NNADTAB FOR NORMAL NOUNS


A 14402                                                                                     NN  MIXED NOUNS
  1441                           42,2177   64000 0                 OCT     64000            40 TIME TO IGNITION/CUTOFF
A 14411                                                                                        VG
A 14412                                                                                        DELTA V (ACCUMULATED)
  1442                           42,2200   02003 0                 OCT     02003            41 TARGET   AZIMUTH
A 14421                                                                                                 ELEVATION
  1443                           42,2201   24006 1                 OCT     24006            42 APOGEE
A 14431                                                                                        PERIGEE
A 14432                                                                                        DELTA V (REQUIRED)
  1444                           42,2202   24011 1                 OCT     24011            43 LATITUDE
A 14441                                                                                        LONGITUDE
A 14442                                                                                        ALTITUDE
  1445                           42,2203   64014 0                 OCT     64014            44 APOGEE
A 14451                                                                                        PERIGEE
A 14452                                                                                        TFF
  1446                           42,2204   64017 0                 OCT     64017            45 MARKS (VHF - OPTICS)
A 14461                                                                                        TFI OF NEXT BURN
A 14462                                                                                        MGA
  1447                           42,2205   02022 0                 OCT     02022            46 AUTOPILOT CONFIGURATION
  1448                           42,2206   22025 0                 OCT     22025            47 THIS VEHICLE WEIGHT
A 14481                                                                                        OTHER VEHICLE WEIGHT
  1449                           42,2207   22030 1                 OCT     22030            48 PITCH TRIM
A 14491                                                                                        YAW TRIM
  1450                           42,2210   24033 1                 OCT     24033            49 DELTA R
A 14501                                                                                        DELTA V
A 14502                                                                                        VHF OR OPTICS CODE
  1451                           42,2211   64036 0                 OCT     64036            50 SPLASH ERROR
A 14511                                                                                        PERIGEE
A 14512                                                                                        TFF
  1452                           42,2212   22041 1                 OCT     22041            51 S-BAND ANTENNA PITCH
A 14521                                                                                                          YAW
  1453                           42,2213   00044 1                 OCT     00044            52 CENTRAL ANGLE OF ACTIVE VEHICLE
  1454                           42,2214   24047 1                 OCT     24047            53 RANGE
A 14541                                                                                        RANGE RATE
A 14542                                                                                        PHI
  1455                           42,2215   24052 0                 OCT     24052            54 RANGE
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L         PINBALL NOUN TABLES                                                     USER'S PAGE NO.  6       EQ 54

A 14551                                                                            RANGE RATE
A 14552                                                                            THETA
 1458                      42,2216   24055 1        OCT      24055              55 PERIGEE CODE
A 14581                                                                            ELEVATION ANGLE
A 14582                                                                            CENTRAL ANGLE
 1459                      42,2217   22060 1        OCT      22060              56 REENTRY ANGLE,
A 14591                                                                            DELTA V
 1460                      42,2220   00000 1        OCT      0                  57 SPARE
 1461                      42,2221   24066 1        OCT      24066              58 PERIGEE ALT
A 14611                                                                            DELTA V TPI
A 14612                                                                            DELTA V TPF
 1462                      42,2222   24071 1        OCT      24071              59 DELTA VELOCITY LOS
 1463                      42,2223   24074 1        OCT      24074              60 GMAX
A 14631                                                                            VPRED
A 14632                                                                            GAMMA EI
 1464                      42,2224   24077 1        OCT      24077              61 IMPACT LATITUDE
A 14641                                                                            IMPACT LONGITUDE
A 14642                                                                            HEADS UP/DOWN
 1465                      42,2225   24102 1        OCT      24102              62 INERTIAL VEL MAG (VI)
A 14651                                                                            ALT RATE CHANGE (HDOT)
A 14652                                                                            ALT ABOVE PAD RADIUS (H)
 1466                      42,2226   64105 1        OCT      64105              63 RANGE  297,431 TO SPLASH (RTGO)
A 14661                                                                            PREDICTED INERT VEL (VIO)
A 14662                                                                            TIME TO GO TO 297,431 (TTE)
 1467                      42,2227   24110 1        OCT      24110              64 DRAG ACCELERATION
A 14671                                                                            INERTIAL VELOCITY (VI)
A 14672                                                                            RANGE TO SPLASH
 1468                      42,2230   24113 1        OCT      24113              65 SAMPLED AGC TIME (HRS,MIN,SEC)
A 14681                                                                            (FETCHED IN INTERRUPT)
 1470                      42,2231   24116 1        OCT      24116              66 COMMAND BANK ANGLE (BETA)
A 14701                                                                            CROSS RANGE ERROR
A 14702                                                                            DOWN RANGE ERROR
 1471                      42,2232   24121 0        OCT      24121              67 RANGE TO TARGET
A 14711                                                                            PRESENT LATITUDE
A 14712                                                                            PRESENT LONGITUDE
 1472                      42,2233   24124 0        OCT      24124              68 COMMAND BANK ANGLE (BETA)
A 14721                                                                            INERTIAL VELOCITY (VI)
A 14722                                                                            ALT RATE CHANGE (RDOT)
 1473                      42,2234   24127 0        OCT      24127              69 BETA
A 14731                                                                            DL
A 14732                                                                            VL
 1474                      42,2235   04132 0        OCT      04132              70 STAR CODE
A 14741                                                                            LANDMARK DATA
A 14742                                                                            HORIZON DATA
 1475                      42,2236   04135 1        OCT      04135              71 STAR CODE
A 14751                                                                            LANDMARK
A 14752                                                                            HORIZON
 1476                      42,2237   00000 1        OCT      0                  72 SPARE
 1477                      42,2240   04143 0        OCT      04143              73 ALTITUDE
A 14771                                                                            VELOCITY
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L         PINBALL NOUN TABLES                                                      USER'S PAGE NO.   7      EQ S4

A 14772                                                                        FLIGHT PATH ANGLE
  1478                         42,2241   04146 0        OCT      04146      74 COMMAND BANK ANGLE (BETA)
A 14781                                                                        INERTIAL VELOCITY (VI)
A 14782                                                                        DRAG ACCELERATION
  1479                         42,2242   64151 0        OCT      64151      75 DELTA ALTITUDE CDH
A 14791                                                                        DELTA TIME (CDH-CSI OR TPI-CDH)
A 14792                                                                        DELTA TIME (TPI-CDH OR TPI-NOMTPI)
  1480                         42,2243   00000 1        OCT      0          76 SPARE
  1481                         42,2244   00000 1        OCT      0          77 SPARE
  1482                         42,2245   24162 1        OCT      24162      78 YAW ANGLE FOR P20
A 14821                                                                     78 PITCH ANGLE FOR P20
A 14822                                                                     78 AZIMUTH CONSTRAINT FOR P20
  1483                         42,2246   22165 0        OCT      22165      79 ORBRATE OR PTC RATE
A 14831                                                                        P20 ROTATION DEADBAND
  1484                         42,2247   64170 0        OCT      64170      80 TIME TO IGNITION/CUTOFF
A 14841                                                                        VG
A 14842                                                                        DELTA V (ACCUMULATED)
  1485                         42,2250   24173 1        OCT      24173      81 DELTA V (LV)
  1486                         42,2251   24176 1        OCT      24176      82 DELTA V (LV)
  1487                         42,2252   24201 1        OCT      24201      83 DELTA V (BODY)
  1488                         42,2253   24204 1        OCT      24204      84 DELTA V (OTHER VEHICLE)
  1489                         42,2254   24207 1        OCT      24207      85 VG (BODY)
  1490                         42,2255   24212 0        OCT      24212      86 DELTA V (LV)
  1491                         42,2256   02215 0        OCT      02215      87 MARK DATA  SHAFT
A 14911                                                                                  TRUNION
  1492                         42,2257   24220 1        OCT      24220      88 HALF UNIT SUN OR PLANET VECTOR
  1493                         42,2260   24223 1        OCT      24223      89 LANDMARK  LATITUDE
A 14931                                                                                 LONGITUDE/2
A 14932                                                                                 ALTITUDE
  1494                         42,2261   24226 1        OCT      24226      90 Y    (ACT VEH)
A 14941                                                                        YDOT (ACT VEH)
A 14942                                                                        YDOT (PAS VEH)
  1495                         42,2262   02231 0        OCT      02231      91 OCDU ANGLES  SHAFT
A 14951                                                                                   TRUNION
  1496                         42,2263   02234 0        OCT      02234      92 NEW OPTICS ANGLES  SHAFT
A 14961                                                                                         TRUNION
  1497                         42,2264   04237 0        OCT      04237      93 DELTA GYRO ANGLES
  1498                         42,2265   02242 1        OCT      02242      94 NEW OPTICS ANGLES  SHAFT
A 14981                                                                                         TRUNNION
  1499                         42,2266   04245 0        OCT      04245      95 TIME FROM IGNITION/CUTOFF
A 14991                                                                        VG
A 14992                                                                        INERTIAL VEL MAG
  1500                         42,2267   24250 0        OCT      24250      96 Y    (CM)
A 15001                                                                        YDOT (CM)
A 15002                                                                        YDOT (LM)
  1501                         42,2270   04253 1        OCT      04253      97 SYSTEM TEST INPUTS
  1502                         42,2271   04256 1        OCT      04256      98 SYSTEM TEST RESULTS
  1503                         42,2272   24261 1        OCT      24261      99 RMS IN POSITION
A 15031                                                                        RMS IN VELOCITY
A 15032                                                                        RMS OPTION
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R1504   END OF NNADTAB FOR MIXED NOUNS

A 1800                                                                  NN           NORMAL NOUNS
  1801                   42,2273   00000 1  NNTYPTAB OCT      00000     00 NOT IN USE
  1802                   42,2274   04040 1           OCT      04040     01 3COMP     FRACTIONAL
  1803                   42,2275   04140 0           OCT      04140     02 3COMP     WHOLE
  1804                   42,2276   04102 0           OCT      04102     03 3COMP     CDU DEGREES
  1805                   42,2277   00000 1           OCT      0         04 SPARE
  1806                   42,2300   00504 0           OCT      00504     05 1COMP     DPDEG(360)
  1807                   42,2301   02000 0           OCT      02000     06 2COMP     OCTAL ONLY
  1808                   42,2302   04000 0           OCT      04000     07 3COMP     OCTAL ONLY
  1809                   42,2303   04000 0           OCT      04000     08 3COMP     OCTAL ONLY
  1810                   42,2304   04000 0           OCT      04000     09 3COMP     OCTAL ONLY
  1811                   42,2305   00000 1           OCT      00000     10 1COMP     OCTAL ONLY
  1812                   42,2306   24400 0           OCT      24400     11 3COMP     HMS (DEC ONLY)
  1813                   42,2307   02000 0           OCT      02000     12 2COMP     OCTAL ONLY
  1814                   42,2310   24400 0           OCT      24400     13 3COMP     HMS (DEC ONLY)
  1815                   42,2311   00511 1           OCT      00511     14 1COMP     VEL2
  1816                   42,2312   00000 1           OCT      00000     15 1COMP     OCTAL ONLY
  1817                   42,2313   24400 0           OCT      24400     16 3COMP     HMS (DEC ONLY)
  1818                   42,2314   04102 0           OCT      04102     17 3COMP     CDU DEG
  1819                   42,2315   04102 0           OCT      04102     18 3COMP     CDU DEG
  1820                   42,2316   00000 1           OCT      0         19           SPARE
  1821                   42,2317   04102 0           OCT      04102     20 3COMP     CDU DEGREES
  1822                   42,2320   04140 0           OCT      04140     21 3COMP     WHOLE
  1823                   42,2321   04102 0           OCT      04102     22 3COMP     CDU DEGREES
  1824                   42,2322   00000 1           OCT      00000     23           SPARE
  1825                   42,2323   24400 0           OCT      24400     24 3COMP     HMS (DEC ONLY)
  1826                   42,2324   04140 0           OCT      04140     25 3COMP     WHOLE
  1827                   42,2325   04000 0           OCT      04000     26 3COMP     OCTAL ONLY
  1828                   42,2326   00140 1           OCT      00140     27 1COMP     WHOLE
  1829                   42,2327   00000 1           OCT      0         28           SPARE
  1830                   42,2330   20102 0           OCT      20102     29 1COMP     CDU DEG (DEC ONLY)
  1831                   42,2331   04140 0           OCT      04140     30 3COMP     WHOLE
  1832                   42,2332   24400 0           OCT      24400     31 3COMP     HMS (DEC ONLY)
  1833                   42,2333   24400 0           OCT      24400     32 3COMP     HMS (DEC ONLY)
  1834                   42,2334   24400 0           OCT      24400     33 3COMP     HMS (DEC ONLY)
  1835                   42,2335   24400 0           OCT      24400     34 3COMP     HMS (DEC ONLY)
  1836                   42,2336   24400 0           OCT      24400     35 3COMP     HMS (DEC ONLY)
  1837                   42,2337   24400 0           OCT      24400     36 3COMP     HMS (DEC ONLY)
  1838                   42,2340   24400 0           OCT      24400     37 3COMP     HMS (DEC ONLY)
  1839                   42,2341   24400 0           OCT      24400     38 3COMP     HMS (DEC ONLY)
  1840                   42,2342   24400 0           OCT      24400     39 3COMP     HMS (DEC ONLY)
R18401  END OF NNTYPTAB FOR NORMAL NOUNS


                                                                        NN    MIXED NOUNS
A18402
  1841                   42,2343   24500 1           OCT      24500     40 3COMP  MIN/SEC, VEL3, VEL3
A18411                                                                          (NO LOAD, DEC ONLY)
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L         PINBALL NOUN TABLES                                                      USER'S PAGE NO.   9       EQ S4

  1842                          42,2344   00542 1        OCT      00542           41 2COMP  CDU DEG, ELEV DEG
  1843                          42,2345   24410 1        OCT      24410           42 3COMP  POS4, POS4, VEL3
A 18431                                                                                     (DEC ONLY)
  1844                          42,2346   20204 0        OCT      20204           43 3COMP  DPDEG(360), DPDEG(360), POS4
A 18441                                                                                     (DEC ONLY)
  1845                          42,2347   00410 1        OCT      00410           44 3COMP  POS4, POS4, MIN/SEC
A 18451                                                                                     (NO LOAD, DEC ONLY)
  1846                          42,2350   10000 0        OCT      10000           45 3COMP  2INT, MIN/SEC, DPDEG(360)
A 18461                                                                                     (NO LOAD, DEC ONLY)
  1847                          42,2351   00000 1        OCT      00000           46 2COMP  OCTAL ONLY FOR EACH
  1848                          42,2352   00306 1        OCT      00306           47 2COMP WEIGHT2 FOR EACH
A 18481                                                                                     (DEC ONLY)
  1849                          42,2353   00614 1        OCT      00614           48 2COMP  TRIM DEG, TRIM DEG
A 18491                                                                                     (DEC ONLY)
  1850                          42,2354   00507 0        OCT      00507           49 3 COMP  POS5, VEL3, WHOLE
A 18501                                                                                     (DEC ONLY)
  1851                          42,2355   00417 0        OCT      00417           50 3COMP  POS6, POS4, MIN/SEC
A 18511                                                                                     (NO LOAD, DEC ONLY)
  1852                          42,2356   00204 1        OCT      00204           51 2COMP  DPDEG(360), DPDEG(360)
A 18521                                                                                     (DEC ONLY)
  1853                          42,2357   00004 0        OCT      00004           52 1COMP  DPDEG(360)
  1854                          42,2360   10507 1        OCT      10507           53 3COMP  POS5, VEL3, DPDEG(360)
A 18541                                                                                     (DEC ONLY)
  1855                          42,2361   10507 1        OCT      10507           54 3COMP  POS5, VEL3, DPDEG(360)
A 18551                                                                                     (DEC ONLY)
  1858                          42,2362   10200 1        OCT      10200           55 3COMP  WHOLE, DPDEG(360), DPDEG(360)
A 18581                                                                                     (DEC ONLY)
  1859                          42,2363   00444 0        OCT      00444           56 2COMP  DPDEG(360), VEL2
A 18591                                                                                     (DEC ONLY)
  1860                          42,2364   00000 1        OCT      0               57        SPARE
  1861                          42,2365   24510 0        OCT      24510           58 3COMP  POS4, VEL3, VEL3
A 18611                                                                                     (DEC ONLY)
  1862                          42,2366   24512 1        OCT      24512           59 3COMP  VEL3 FOR EACH
A 18621                                                                                     (DEC ONLY)
  1863                          42,2367   10440 0        OCT      10440           60 3COMP  WHOLE, VEL2, DPDEG(360)
A 18631                                                                                     (DEC ONLY)
  1864                          42,2370   00204 1        OCT      00204           61 3COMP  DPDEG(360), DPDEG(360), WHOLE
A 18641                                                                                     (DEC ONLY)
  1865                          42,2371   20451 0        OCT      20451           62 3COMP  VEL2, VEL2, POS4
A 18651                                                                                     (DEC ONLY)
  1866                          42,2372   00457 1        OCT      00457           63 3COMP  POS6, VEL2, MIN/SEC
A 18661                                                                                     (NO LOAD, DEC ONLY)
  1867                          42,2373   36460 0        OCT      36460           64 3COMP  DRAG ACCEL, VEL2, POS6
A 18671                                                                                     (DEC ONLY)
  1868                          42,2374   00000 1        OCT      00000           65 3COMP  HMS (DEC ONLY)
  1869                          42,2375   37044 0        OCT      37044           66 3COMP  DPDEG(360), POS8, POS6
A 18691                                                                                     (DEC ONLY)
  1870                          42,2376   10217 1        OCT      10217           67 3COMP  POS6, DPDEG(360), DPDEG(360)
A 18701                                                                                     (DEC ONLY)
  1871                          42,2377   34444 1        OCT      34444           68 3COMP  DPDEG(360), VEL2, VEL/2VS
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                                                                                (DEC ONLY)
A 18711
  1872                        42,2400   35004 0      OCT     35004     69 3COMP  DPDEG(360), DRAG ACCEL,VEL/2VS
                                                                                (DEC ONLY)
A 18721
  1873                        42,2401   00000 1      OCT     00000     70 3COMP  OCTAL ONLY FOR EACH
  1874                        42,2402   00000 1      OCT     0         71 3COMP  OCTAL ONLY FOR EACH
  1875                        42,2403   00000 1      OCT     0         72        SPARE
  1876                        42,2404   10450 1      OCT     10450     73 3COMP  POS4, VEL2, DPDEG(360)
  1877                        42,2405   40444 1      OCT     40444     74 3COMP  DPDEG(360), VEL2, DRAG ACCEL
  1878                        42,2406   00010 0      OCT     00010     75 3COMP  POS4, MIN/SEC, MIN/SEC
                                                                                (NO LOAD, DEC ONLY)
A 18761
  1879                        42,2407   00000 1      OCT     0         76        SPARE
  1880                        42,2410   00000 1      OCT     0         77        SPARE
  1881                        42,2411   10204 0      OCT     10204     78 3COMP  DPDEG(360) FOR EACH
  1882                        42,2412   00113 1      OCT     00113     79 2COMP  ELEVDEG, CDUDEG
  1883                        42,2413   22440 1      OCT     22440     80 3COMP  MIN/SEC, VEL2, VEL2
                                                                                (NO LOAD, DEC ONLY)
A 18831
  1884                        42,2414   24512 1      OCT     24512     81 3COMP  VEL3 FOR EACH
                                                                                (DEC ONLY)
A 18841
  1885                        42,2415   24512 1      OCT     24512     82 3COMP  VEL3 FOR EACH
                                                                                (DEC ONLY)
A 18851
  1886                        42,2416   24512 1      OCT     24512     83 3COMP  VEL3 FOR EACH
                                                                                (DEC ONLY)
A 18861
  1887                        42,2417   24512 1      OCT     24512     84 3COMP  VEL3 FOR EACH
                                                                                (DEC ONLY)
A 18871
  1888                        42,2420   24512 1      OCT     24512     85 3COMP  VEL3 FOR EACH
                                                                                (DEC ONLY)
A 18881
  1889                        42,2421   22451 1      OCT     22451     86 3COMP  VEL2 FOR EACH
                                                                                (DEC ONLY)
A 18891
  1890                        42,2422   00102 1      OCT     00102     87 2COMP  CDU DEG, Y OPTICS DEG
  1891                        42,2423   00000 1      OCT     0         88 3COMP  FRAC FOR EACH
                                                                                 (DEC ONLY)
A 18912
  1892                        42,2424   16143 0      OCT     16143     89 3COMP  DPDEG(90), DPDEG(90), POS5
                                                                                (DEC ONLY)
A 18921
  1893                        42,2425   24507 0      OCT     24507     90 3COMP  POS5,VEL3,VEL3
                                                                                (DEC ONLY)
A 18931
  1894                        42,2426   00102 1      OCT     00102     91 2COMP  CDU DEG, Y OPTICS DEG
  1895                        42,2427   00102 1      OCT     00102     92 2COMP  CDU DEG, Y OPTICS DEG
  1896                        42,2430   06143 1      OCT     06143     93 3COMP  DPDEG(90) FOR EACH
  1897                        42,2431   00102 1      OCT     00102     94 2COMP  CDU DEG, Y OPTICS DEG
  1898                        42,2432   22440 1      OCT     22440     95 3COMP  MIN/SEC, VEL2, VEL2
  1899                        42,2433   24507 0      OCT     24507     96        POS5,VEL3,VEL3
                                                                                (DEC ONLY)
A 18951
  1900                        42,2434   00000 1      OCT     00000     97 3COMP  WHOLE FOR EACH
  1901                        42,2435   00000 1      OCT     00000     98 3COMP  WHOLE, FRAC, WHOLE
  1902                        42,2436   01162 0      OCT     01162     99 3COMP POS9, VEL4, WHOLE
                                                                                (DEC ONLY)
A 19021
R1903   END OF NNTYPTAB FOR MIXED NOUNS


  2200                        42,2437   00006 1  SFINTAB  OCT     00006     WHOLE, DP TIME (SEC)
  2201                        42,2440   03240 1             OCT    03240
  2202                        42,2441   00000 1             OCT    00000         SPARE
  2203                        42,2442   00000 1             OCT    00000
  2204                        42,2443   00000 1             OCT    00000         CDU DEGREES, Y OPTICS DEGREES
  2205                        42,2444   00000 1             OCT    00000            (SFCONS IN DEGINSF, OPTDEGIN)
  2206                        42,2445   10707 0             OCT    10707         DP DEGREES (90)
  2207                        42,2446   03435 0             OCT    03435                   UPPED BY 1
  2208                        42,2447   13070 1             OCT    13070         DP DEGREES (360)(POINT BETWN BITS 11-12)
  2209                        42,2450   34345 1             OCT    34345                   UPPED BY 1
  2210                        42,2451   00005 1             OCT    00005         DEGREES (180)
  2211                        42,2452   21616 0             OCT    21616
  2212                        42,2453   26113 0             OCT    26113         WEIGHT2
  2213                        42,2454   31713 0             OCT    31713
  2214                        42,2455   00070 0             OCT    00070         POSITION5
  2215                        42,2456   20460 1             OCT    20460
  2216                        42,2457   01065 0             OCT    01065         POSITION4
  2217                        42,2460   05740 1             OCT    05740
  2218                        42,2461   11414 0             OCT    11414         VELOCITY2        (POINT BETWN BITS 11-12)
  2219                        42,2462   31463 1             OCT    31463
  2220                        42,2463   07475 0             OCT    07475         VELOCITY3
  2221                        42,2464   16051 1             OCT    16051
  2222                        42,2465   00001 0             OCT    00001         ELEVATION DEGREES
  2223                        42,2466   03434 1             OCT    03434
  2224                        42,2467   00002 0             OCT    00002         TRIM DEGREES
  2225                        42,2470   22245 1             OCT    22245
  2226                        42,2471   00014 1             OCT    00014         INERTIA, THRUST MOMENT
  2227                        42,2472   35607 0             OCT    35607
  2228                        42,2473   07606 0             OCT    07606         VELOCITY/2VS
  2229                        42,2474   06300 1             OCT    06300
  2230                        42,2475   16631 1             OCT    16631         POSITION 6
  2231                        42,2476   11307 0             OCT    11307
  2232                        42,2477   12000 1             OCT    12000         DRAG ACCELERATION (POINT BETWN BITS 7-8)
  2233                        42,2500   00000 1             OCT    00000
  2234                        42,2501   27176 1             OCT    27176         POSITION 8
  2235                        42,2502   14235 0             OCT    14235
  2236                        42,2503   01670 1             2DEC   30480 B-19    POSITION 9
  2236                        42,2504   20000 0
  2237                        42,2505   07475 0             2DEC   30.48 B-7     VELOCITY4
  2237                        42,2506   16051 1
 A2290                                                                         END OF SFINTAB


  2300                        42,2507   05174 0   SFOUTAB   OCT    05174         WHOLE, DP TIME (SEC)
  2301                        42,2510   13261 0             OCT    13261
  2302                        42,2511   00000 1             OCT    00000         SPARE
  2303                        42,2512   00000 1             OCT    00000
  2304                        42,2513   00000 1             OCT    00000         CDU DEGREES, Y OPTICS DEGREES
  2305                        42,2514   00000 1             OCT    00000            (SFCONS IN DEGOUTSF, OPTDEGOUT)
  2306                        42,2515   00714 0             OCT    00714         DP DEGREES (90) (POINT BETWN BITS 7-8)
  2307                        42,2516   31463 1             OCT    31463
  2308                      42,2517   13412 1            OCT    13412           DP DEGREES (360)
  2309                      42,2520   07534 1            OCT    07534
  2310                      42,2521   05605 1            OCT    05605           DEGREES (180)
  2311                      42,2522   03656 1            OCT    03656
  2312                      42,2523   00001 0            OCT    00001           WEIGHT2
  2313                      42,2524   16170 0            OCT    16170
  2314                      42,2525   00441 0            OCT    00441           POSITION5
  2315                      42,2526   34306 0            OCT    34306
  2316                      42,2527   07176 0            OCT    07176           POSITION4
  2317                      42,2530   21603 1            OCT    21603
  2318                      42,2531   15340 1            OCT    15340           VELOCITY2
  2319                      42,2532   15340 1            OCT    15340
  2320                      42,2533   01031 1            OCT    01031           VELOCITY3       (POINT BETWN BITS 7-8)
  2321                      42,2534   21032 0            OCT    21032
  2322                      42,2535   34631 1            OCT    34631           ELEVATION DEGREES
  2323                      42,2536   23146 0            OCT    23146
  2324                      42,2537   14340 0            OCT    14340           TRIM DEGREES
  2325                      42,2540   24145 1            OCT    24145
  2326                      42,2541   02363 0            OCT    02363           INERTIA, THRUST MOMENT
  2327                      42,2542   03721 0            OCT    03721
  2328                      42,2543   20373 1            OCT    20373           VELOCITY/2VS
  2329                      42,2544   02122 1            OCT    02122
  2330                      42,2545   00424 0            OCT    00424           POSITION 6      (POINT BETWN BITS 7-8)
  2331                      42,2546   30446 1            OCT    30446
  2332                      42,2547   00631 0            OCT    00631           DRAG ACCELERATION
  2333                      42,2550   23146 0            OCT    23146
  2334                      42,2551   00260 0            OCT    00260           POSITION 8
  2335                      42,2552   06213 1            OCT    06213
  2336                      42,2553   04231 0            2DEC   17.2010499 B-7  POSITION 9
  2336                      42,2554   27400 0
  2337                      42,2555   01031 1            2DEC   .032808399      VELOCITY4
  2337                      42,2556   21032 0
  A2390                                                                         END OF SFOUTAB

  A2400                                                                         NN  SF CONSTANT               SF ROUTINE

  2401  REF   4  LAST  284  42,2557   03660 1  IDADDTAB ECADR  TTOGO           40 MIN/SEC                     M/S
  2402  REF   1             42,2560   03762 1           ECADR  VGOISP          40 VEL3                        DP3
  2403  REF   5  LAST  235  42,2561   03425 1           ECADR  DVTOTAL         40 VEL3                        DP3
  2404  REF   8  LAST  284  42,2562   01250 1           ECADR  DSPTEM1         41 COU DEG                     COU
  2405  REF   9  LAST  291  42,2563   01251 0           ECADR  DSPTEM1 +1      41 ELEV DEG                    ARTH
  2406                      42,2564   00000 1           OCT    0               41 SPARE COMPONENT
  2407  REF   2  LAST   96  42,2565   02354 1           ECADR  HAPO            42 POS4                        DP3
  2408  REF   1             42,2566   02356 0           ECADR  HPER            42 POS4                        DP3
  2409  REF   2  LAST  291  42,2567   03762 1           ECADR  VGOISP          42 VEL3                        DP3
  2410  REF   5  LAST  190  42,2570   00746 1           ECADR  LAT             43 DPDEG(360)                  DP4
  2411  REF   3  LAST  190  42,2571   00750 0           ECADR  LONG            43 DPDEG(360)                  DP4
  2412  REF   3  LAST  190  42,2572   00752 1           ECADR  ALT             43 POS4                        DP3
  2413  REF   4  LAST  183  42,2573   02342 0           ECADR  HAPOX           44 POS4                        DP3
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 2414   REF   3  LAST  184   42,2574   02344 0         ECADR  HPERX           44 POS4                   DP3
 2415   REF   2  LAST   95   42,2575   02334 1         ECADR  TFF             44 MIN/SEC                M/S
 2416   REF   5  LAST  195   42,2576   00771 0         ECADR  VHFCNT          45 2INT                   2INT
 2417   REF   5  LAST  291   42,2577   03660 1         ECADR  TTOGO           45 MIN/SEC                M/S
 2418   REF   2  LAST  126   42,2600   03625 0         ECADR  +MGA            45 DPDEG(360)             DP4
 2419   REF  15  LAST  266   42,2601   03065 1         ECADR  DAPDATR1        46 OCTAL ONLY             OCT
 2420   REF   3  LAST  188   42,2602   03066 1         ECADR  DAPDATR2        46 OCTAL ONLY             OCT
 2421                        42,2603   00000 1         OCT    0               46 SPARE COMPONENT
 2422   REF   6  LAST  236   42,2604   03073 0         ECADR  CSMMASS         47 WEIGHT2                ARTH1
 2423   REF   4  LAST  187   42,2605   03072 1         ECADR  LEMMASS         47 WEIGHT2                ARTH1
 2424                        42,2606   00000 1         OCT    00000           47 SPARE COMPONENT
 2425   REF  10  LAST  271   42,2607   03023 0         ECADR  PACTOFF         48 TRIM DEG               ARTH
 2426   REF   3  LAST  184   42,2610   03024 1         ECADR  YACTOFF         48 TRIM DEG               ARTH
 2427                        42,2611   00000 1         OCT    00000           48 SPARE COMPONENT
 2428   REF   1              42,2612   03501 0         ECADR  N49DISP         49 POS5                   DP1
 2429   REF   2  LAST  292   42,2613   03503 1         ECADR  N49DISP +2      49 VEL3                   DP3
 2430   REF   3  LAST  292   42,2614   03505 1         ECADR  N49DISP +4      49 WHOLE                  ARTH
 2431   REF   2  LAST   95   42,2615   02346 1         ECADR  RSP-RREC        50 POS6                   DP3
 2432   REF   4  LAST  292   42,2616   02344 0         ECADR  HPERX           50 POS4                   DP3
 2433   REF   3  LAST  292   42,2617   02334 1         ECADR  TFF             50 MIN/SEC                M/S
 2434   REF   3  LAST  261   42,2620   02311 0         ECADR  RHOSB           51 DPDEG(360)
 2435   REF   1              42,2621   02313 1         ECADR  GAMMASB         51 DPDEG(360)             DP4
 2436                        42,2622   00000 1         OCT    0               51 SPARE COMPONENT
 2437   REF   2  LAST   98   42,2623   02632 1         ECADR  ACTCENT         52 DPDEG(360)             DP4
 2438                        42,2624   00000 1         OCT    00000           52 SPARE COMPONENT
 2439                        42,2625   00000 1         OCT    00000           52 SPARE COMPONENT
 2440   REF   7  LAST  185   42,2626   02311 0         ECADR  RANGE           53 POS5                   DP1
 2441   REF   4  LAST  186   42,2627   02313 1         ECADR  RRATE           53 VEL3                   DP3
 2442   REF   6  LAST  185   42,2630   02315 1         ECADR  RTHETA          53 DPDEG(360)             DP4
 2443   REF   8  LAST  292   42,2631   02311 0         ECADR  RANGE           54 POS5                   DP1
 2444   REF   5  LAST  292   42,2632   02313 1         ECADR  RRATE           54 VEL3                   DP3
 2445   REF   7  LAST  292   42,2633   02315 1         ECADR  RTHETA          54 DPDEG(360)             DP4
 2446   REF   1              42,2634   03765 0         ECADR  NN1             55 WHOLE                  ARTH
 2447   REF   4  LAST  180   42,2635   03743 1         ECADR  ELEV            55 DPDEG(360)             DP4
 2448   REF   4  LAST  185   42,2636   03753 0         ECADR  CENTANG         55 DPDEG(360)             DP4
 2449   REF   2  LAST  131   42,2637   03633 1         ECADR  RTEGAM2D        56 DPDEG(360)             DP4
 2450   REF   2  LAST  131   42,2640   03631 0         ECADR  RTEDVD          56 VEL2                   DP4
 2451                        42,2641   00000 1         OCT    0               56 SPARE COMPONENT
 2452                        42,2642   00000 1         OCT    0               57 SPARE
 2453                        42,2643   00000 1         OCT    0               57 SPARE COMPONENT
 2454                        42,2644   00000 1         OCT    0               57 SPARE COMPONENT
 2455   REF   2  LAST   98   42,2645   02640 1         ECADR  POSTTPI         58 POS4                   DP3
 2456   REF   3  LAST   98   42,2646   02634 1         ECADR  DELVTPI         58 VEL3                   DP3
 2457   REF   3  LAST  185   42,2647   02636 0         ECADR  DELVTPF         58 VEL3                   DP3
 2458   REF   4  LAST  105   42,2650   02610 1         ECADR  DVLOS           59 VEL3                   DP3
 2459   REF   5  LAST  292   42,2651   02612 0         ECADR  DVLOS +2        59 VEL3                   DP3
 2460   REF   6  LAST  292   42,2652   02614 0         ECADR  DVLOS +4        59 VEL3                   DP3
 2461   REF   2  LAST  123   42,2653   03721 0         ECADR  GMAX            60 WHOLE                  ARTH
 2462   REF   7  LAST  188   42,2654   03756 0         ECADR  VPRED           60 VEL2                   DP4
 2463   REF   9  LAST  187   42,2655   03760 0         ECADR  GAMMAEI         60 DPDEG(360)             DP4
 2464   REF   6  LAST  187   42,2656   03400 0        ECADR   LAT(SPL)      61 DPDEG(360)                           DP4
 2465   REF   4  LAST  188   42,2657   03402 1        ECADR   LNG(SPL)      61 DPDEG(360)                           DP4
 2466   REF   2  LAST  116   42,2660   03326 0        ECADR   HEADSUP       61 WHOLE                                ARTH
 2467   REF   6  LAST  182   42,2661   03722 0        ECADR   VMAGI         62 VEL2                                 DP4
 2468   REF   1              42,2662   03740 1        ECADR   HDOT          62 VEL2                                 DP4
 2469   REF   2  LAST  124   42,2663   03736 0        ECADR   ALTI          62 POS4                                 DP3
 2470   REF   4  LAST  124   42,2664   03713 1        ECADR   RTGO          63 POS6                                 DP3
 2471   REF   5  LAST  188   42,2665   03724 0        ECADR   VIO           63 VEL2                                 DP4
 2472   REF   5  LAST  188   42,2666   03726 1        ECADR   TTE           63 MIN/SEC                              M/S
 2473   REF   2  LAST  122   42,2667   03637 0        ECADR   D             64 DRAG ACCEL                           DP2
 2474   REF   7  LAST  293   42,2670   03722 0        ECADR   VMAGI         64 VEL2                                 DP4
 2475   REF   1              42,2671   03713 1        ECADR   RTGON64       64 POS6                                 DP3
 2476   REF   2  LAST  243   42,2672   00013 0        ECADR   SAMPTIME      65 HMS (MIXED ONLY TO KEEP CODE 65)     HMS
 2477   REF   3  LAST  293   42,2673   00013 0        ECADR   SAMPTIME      65 HMS                                  HMS
 2478   REF   4  LAST  293   42,2674   00013 0        ECADR   SAMPTIME      65 HMS                                  HMS
 2479   REF   3  LAST  188   42,2675   03315 0        ECADR   ROLLC         66 DPDEG(360)                           DP4
 2480   REF   1              42,2676   03675 0        ECADR   XRNGERR       66 POS8                                 DP3
 2481   REF   2  LAST  123   42,2677   03715 1        ECADR   DNRNGERR      66 POS6                                 DP3
 2482   REF   1              42,2700   03713 1        ECADR   RTGON67       67 POS6                                 DP3
 2483   REF   6  LAST  291   42,2701   00746 1        ECADR   LAT           67 DPDEG(360)                           DP4
 2484   REF   4  LAST  291   42,2702   00750 0        ECADR   LONG          67 DPDEG(360)                           DP4
 2485   REF   4  LAST  293   42,2703   03315 0        ECADR   ROLLC         68 DPDEG(360)                           DP4
 2486   REF   8  LAST  293   42,2704   03722 0        ECADR   VMAGI         68 VEL2                                 DP4
 2487   REF   4  LAST  188   42,2705   03677 1        ECADR   RDOT          68 VEL/2VS                              DP4
 2488   REF   5  LAST  293   42,2706   03315 0        ECADR   ROLLC         69 DPDEG(360)                           DP4
 2489   REF   1              42,2707   03174 0        ECADR   Q7            69 DRAG ACCEL                           DP2
 2490   REF   1              42,2710   03756 0        ECADR   VL            69 VEL/2VS                              DP4
 2491   REF   1              42,2711   01140 0        ECADR   STARCODE      70 OCTAL ONLY                           OCT
 2492   REF   8  LAST  276   42,2712   03751 1        ECADR   LANDMARK      70 OCTAL ONLY                           OCT
 2493   REF   2  LAST  134   42,2713   03752 1        ECADR   HORIZON       70 OCTAL ONLY                           OCT
 2494   REF   2  LAST  293   42,2714   01140 0        ECADR   STARCODE      71 OCTAL ONLY                           OCT
 2495   REF   9  LAST  293   42,2715   03751 1        ECADR   LANDMARK      71 OCTAL ONLY                           OCT
 2496   REF   3  LAST  293   42,2716   03752 1        ECADR   HORIZON       71 OCTAL ONLY                           OCT
 2497                        42,2717   00000 1        OCT     0             72 SPARE
 2498                        42,2720   00000 1        OCT     0             72 SPARE
 2499                        42,2721   00000 1        OCT     0             72 SPARE
 2500   REF   2  LAST  133   42,2722   03620 0        ECADR   P21ALT        73 POS4                                 DP3
 2501   REF   2  LAST  133   42,2723   03622 1        ECADR   P21VEL        73 VEL2                                 DP4
 2502   REF   1              42,2724   03624 1        ECADR   P21GAM        73 DPDEG(360)                           DP4
 2503   REF   6  LAST  293   42,2725   03315 0        ECADR   ROLLC         74 DPDEG(360)                           DP4
 2504   REF   9  LAST  293   42,2726   03722 0        ECADR   VMAGI         74 VEL2                                 DP4
 2505   REF   3  LAST  293   42,2727   03637 0        ECADR   D             74 DRAG ACCEL                           DP2
 2506   REF   2  LAST  185   42,2730   02632 1        ECADR   DIFFALT       75 POS4                                 DP3
 2507   REF   2  LAST  105   42,2731   02546 1        ECADR   T1TOT2        75 MIN/SEC                              M/S
 2508   REF   1              42,2732   03655 1        ECADR   T2TOT3        75 MIN/SEC                              M/S
 2509                        42,2733   00000 1        OCT     0             76 SPARE
 2510                        42,2734   00000 1        OCT     0             76 SPARE
 2511                        42,2735   00000 1        OCT     0             76 SPARE
 2512                        42,2736   00000 1        OCT     0             77 SPARE
 2513                        42,2737   00000 1        OCT     0             77 SPARE
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  2514                         42,2740   00000 1           OCT     0               77 SPARE
  2515   REF   3  LAST  131    42,2741   03741 0           ECADR   UTYAW           78 DPDEG(360)
  2516   REF   3  LAST  219    42,2742   03737 1           ECADR   UTPIT           78 DPDEG(360)
  2517   REF   2  LAST  216    42,2743   01352 1           ECADR   AZIMANGL        78 DPDEG(360)
  2518   REF   2  LAST  119    42,2744   03372 1           ECADR   RATEPTC         79 ELEV DEG                             ARTH
  2519   REF   2  LAST  119    42,2745   03373 0           ECADR   DBPTC           79 CDU DEG                              CDU
  2520                         42,2746   00000 1           OCT     0               79 SPARE COMPONENT
  2521   REF   6  LAST  292    42,2747   03660 1           ECADR   TTOGO           80 MIN/SEC                              M/S
  2522   REF   3  LAST  291    42,2750   03762 1           ECADR   VGDISP          80 VEL2                                 DP4
  2523   REF   6  LAST  291    42,2751   03425 1           ECADR   DVTOTAL         80 VEL2                                 DP4
  2524   REF   4  LAST  221    42,2752   03404 1           ECADR   DELVLVC         81 VEL3                                 DP3
  2525   REF   5  LAST  294    42,2753   03406 0           ECADR   DELVLVC +2      81 VEL3                                 DP3
  2526   REF   6  LAST  294    42,2754   03410 1           ECADR   DELVLVC +4      81 VEL3                                 DP3
  2527   REF   7  LAST  221    42,2755   03537 0           ECADR   DELVOV          82 VEL3                                  DP3
  2528   REF   8  LAST  294    42,2756   03541 1           ECADR   DELVOV +2       82 VEL3                                  DP3
  2529   REF   9  LAST  294    42,2757   03543 0           ECADR   DELVOV +4       82 VEL3                                  DP3
  2530   REF   3  LAST  232    42,2760   03674 1           ECADR   DELVIMU         83 VEL3                                 DP3
  2531   REF   4  LAST  294    42,2761   03676 0           ECADR   DELVIMU +2      83 VEL3                                 DP3
  2532   REF   5  LAST  294    42,2762   03700 0           ECADR   DELVIMU +4      83 VEL3                                 DP3
  2533   REF  10  LAST  294    42,2763   03537 0           ECADR   DELVOV          84 VEL3                                 DP3
  2534   REF  11  LAST  294    42,2764   03541 1           ECADR   DELVOV  +2      84 VEL3                                 DP3
  2535   REF  12  LAST  294    42,2765   03543 0           ECADR   DELVOV  +4      84 VEL3                                 DP3
  2536   REF   3  LAST  127    42,2766   03664 0           ECADR   VGBODY          85 VEL3                                 DP3
  2537   REF   4  LAST  294    42,2767   03666 1           ECADR   VGBODY +2       85 VEL3                                 DP3
  2538   REF   5  LAST  294    42,2770   03670 0           ECADR   VGBODY +4       85 VEL3                                 DP3
  2539   REF   7  LAST  294    42,2771   03404 1           ECADR   DELVLVC         86 VEL2                                 DP4
  2540   REF   8  LAST  294    42,2772   03406 0           ECADR   DELVLVC +2      86 VEL2                                 DP4
  2541   REF   9  LAST  294    42,2773   03410 1           ECADR   DELVLVC +4      86 VEL2                                 DP4
  2542   REF  19  LAST  269    42,2774   03725 1           ECADR   MRKBUF1 +3      87 CDU DEG                              CDU
  2543   REF  20  LAST  294    42,2775   03727 0           ECADR   MRKBUF1 +5      87 Y OPTICS DEG                         YOPT
  2544                         42,2776   00000 1           OCT     0               87 SPARE COMPONENT
  2545   REF   1               42,2777   03704 1           ECADR   STARSAV3        88 DPFRAC                             DPFRAC
  2546   REF   2  LAST  294    42,3000   03706 0           ECADR   STARSAV3 +2     88 DPFRAC                             DPFRAC
  2547   REF   3  LAST  294    42,3001   03710 1           ECADR   STARSAV3 +4     88 DPFRAC                             DPFRAC
  2548   REF   1               42,3002   00746 1           ECADR   LANDLAT         89 DPDEG(90)                            DP3
  2549   REF   2  LAST   95    42,3003   02350 0           ECADR   LANDLONG        89 DPDEG(90)                            DP3
  2550   REF   2  LAST   95    42,3004   02352 1           ECADR   LANDALT         89 POS5                                 DP1
  2551   REF   2  LAST   91    42,3005   01755 1           ECADR   YCSM            90 POS5                                 DP1
  2552   REF   2  LAST   91    42,3006   01757 0           ECADR   YDOTC           90 VEL3                                 DP3
  2553   REF   1               42,3007   01761 0           ECADR   YDOTL           90 VEL3                                 DP3
  2554   REF   7  LAST  243    42,3010   00036 1           ECADR   CDUS            91 CDU DEG                              CDU
  2555   REF   6  LAST  243    42,3011   00035 1           ECADR   CDUT            91 Y OPTICS DEG                         YOPT
  2556                         42,3012   00000 1           OCT     0               91 SPARE COMPONENT
  2557   REF   3  LAST  255    42,3013   02773 0           ECADR   SAC             92 CDU DEG                              CDU
  2558   REF   3  LAST  255    42,3014   02775 0           ECADR   PAC             92 Y OPTICS DEG                         YOPT
  2559                         42,3015   00000 1           OCT     0               92 SPARE COMPONENT
  2560   REF   8  LAST  256    42,3016   02757 0           ECADR   OGC             93 DPDEG(90)                            DP3
  2561   REF   9  LAST  294    42,3017   02761 0           ECADR   OGC       +2    93 DPDEG(90)                            DP3
  2562   REF  10  LAST  294    42,3020   02763 1           ECADR   OGC       +4    93 DPDEG(90)                            DP3
  2563   REF  21  LAST  294    42,3021   03725 1           ECADR   MRKBUF1 +3      94 CDU DEG                              CDU
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L        PINBALL NOUN TABLES                                                             USER'S PAGE NO.  16       E0 S4

  2564   REF  22  LAST  294    42,3022   03727 0             ECADR   MRKBUF1 +5     94 Y OPTICS DEG                          YOPT
  2565                         42,3023   00000 1             OCT     0              94 SPARE
  2566   REF   7  LAST  294    42,3024   03660 1             ECADR   TTOGO          95 MIN/SEC                               M/S
  2567   REF   2  LAST  182    42,3025   03724 0             ECADR   VGTLI          95 VEL2                                  DP4
  2568   REF   1               42,3026   03722 0             ECADR   VNOW           95 VEL2                                  DP4
  2569   REF   9  LAST  292    42,3027   02311 0             ECADR   RANGE          96 POS5                                  DP1
  2570   REF   6  LAST  292    42,3030   02313 1             ECADR   RRATE          96 VEL3                                  DP3
  2571   REF   1               42,3031   02315 1             ECADR   RRATE2         96 VEL3                                  DP3
  2572   REF  10  LAST  291    42,3032   01250 1             ECADR   DSPTEM1        97 WHOLE                                 ARTH
  2573   REF  11  LAST  295    42,3033   01251 0             ECADR   DSPTEM1 +1     97 WHOLE                                 ARTH
  2574   REF  12  LAST  295    42,3034   01252 0             ECADR   DSPTEM1 +2     97 WHOLE                                 ARTH
  2575   REF   4  LAST  283    42,3035   01253 1             ECADR   DSPTEM2        98 WHOLE                                 ARTH
  2576   REF   5  LAST  295    42,3036   01254 0             ECADR   DSPTEM2 +1     98 FRAC                                  FRAC
  2577   REF   6  LAST  295    42,3037   01255 1             ECADR   DSPTEM2 +2     98 WHOLE                                 ARTH
  2578   REF   1               42,3040   02311 0             ECADR   WWPOS          99 POS9                                  DP3
  2579   REF   1               42,3041   02313 1             ECADR   WWVEL          99 VEL4                                  DP2
  2580   REF   1               42,3042   02315 1             ECADR   WWOPT          99 WHOLE                                 ARTH
R2600    END OF IDADDTAB


 A2800                                                                              NN  SF ROUTINES

  2801                         42,3043   16351 1  RUTMXTAB OCT     16351          40 M/S, DP3, DP3
  2802                         42,3044   00142 0           OCT     00142          41 CDU, ARTH
  2803                         42,3045   16347 0           OCT     16347          42 DP3, DP3, DP3
  2804                         42,3046   16512 0           OCT     16512          43 DP4, DP4, DP3
  2805                         42,3047   22347 1           OCT     22347          44 DP3, DP3, M/S
  2806                         42,3050   24454 1           OCT     24454          45 2INT, M/S, DP4
  2807                         42,3051   00000 1           OCT     00000          46 OCT, OCT
  2808                         42,3052   00553 1           OCT     00553          47 ARITH1, ARITH1
  2809                         42,3053   00143 1           OCT     00143          48 ARTH, ARTH
  2810                         42,3054   06344 1           OCT     06344          49 DP1, DP3, ARTH
  2811                         42,3055   22347 1           OCT     22347          50 DP3, DP3, M/S
  2812                         42,3056   00512 1           OCT     00512          51 DP4, DP4
  2813                         42,3057   00012 1           OCT     00012          52 DP4
  2814                         42,3060   24344 1           OCT     24344          53 DP1, DP3, DP4
  2815                         42,3061   24344 1           OCT     24344          54 DP1, DP3, DP4
  2816                         42,3062   24503 1           OCT     24503          55 ARTH, DP4 , DP4
  2817                         42,3063   00512 1           OCT     00512          56 DP4, DP4
  2818                         42,3064   00007 0           OCT     00007          57 DP3
  2819                         42,3065   16347 0           OCT     16347          58 DP3, DP3, DP3
  2820                         42,3066   16347 0           OCT     16347          59 DP3, DP3, DP3
  2821                         42,3067   24503 1           OCT     24503          60 ARTH, DP4, DP4
  2822                         42,3070   06512 1           OCT     06512          61 DP4, DP4, ARTH
  2823                         42,3071   16512 0           OCT     16512          62 DP4, DP4, DP3
  2824                         42,3072   22507 0           OCT     22507          63 DP3, DP4, M/S
  2825                         42,3073   16505 0           OCT     16505          64 DP2, DP4, DP3
  2826                         42,3074   20410 0           OCT     20410          65 HMS, HMS, HMS
  2827                         42,3075   16352 1           OCT     16352          66 DP4, DP3, DP3
  2828                         42,3076   24507 0           OCT     24507          67 DP3, DP4, DP4
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L         PINBALL NOUN TABLES                                                          USER'S PAGE NO.  17      L  54

  2829                          42,3077   24512 1          OCT      24512           68 DP4, DP4, DP4
  2830                          42,3100   24252 1          OCT      24252           69 DP4, DP2, DP4
  2831                          42,3101   00000 1          OCT      00000           70 OCT, OCT, OCT
  2832                          42,3102   00000 1          OCT      0               71 OCT, OCT, OCT
  2833                          42,3103   00000 1          OCT      0               72 SPARE
  2834                          42,3104   24507 0          OCT      24507           73 DP3, DP4, DP4
  2835                          42,3105   12512 1          OCT      12512           74 DP4, DP4, DP2
  2836                          42,3106   22447 0          OCT      22447           75 DP3, M/S, M/S
  2837                          42,3107   00000 1          OCT      0               76 SPARE
  2838                          42,3110   00000 1          OCT      0               77 SPARE
  2839                          42,3111   24512 1          OCT      24512           78 DP4,DP4,DP4
  2840                          42,3112   00103 0          OCT      103             79 ARTH,CDU
  2841                          42,3113   24511 1          OCT      24511           80 M/S, DP4, DP4
  2842                          42,3114   16347 0          OCT      16347           81 DP3, DP3, DP3
  2843                          42,3115   16347 0          OCT      16347           82 DP3, DP3, DP3
  2844                          42,3116   16347 0          OCT      16347           83 DP3, DP3, DP3
  2845                          42,3117   16347 0          OCT      16347           84 DP3, DP3, DP3
  2846                          42,3120   16347 0          OCT      16347           85 DP3, DP3, DP3
  2847                          42,3121   24512 1          OCT      24512           86 DP4, DP4, DP4
  2848                          42,3122   00302 0          OCT      00302           87 CDU, YOPT
  2849                          42,3123   32655 0          OCT      32655           88 DPFRAC FOR EACH
  2850                          42,3124   10347 0          OCT      10347           89 DP3, DP3, DP1
  2851                          42,3125   16344 0          OCT      16344           90 DP1, DP3, DP3
  2852                          42,3126   00302 0          OCT      00302           91 CDU, YOPT
  2853                          42,3127   00302 0          OCT      00302           92 CDU, YOPT
  2854                          42,3130   16347 0          OCT      16347           93 DP3, DP3, DP3
  2855                          42,3131   00302 0          OCT      00302           94 CDU, YOPT
  2856                          42,3132   24511 1          OCT      24511           95 M/S, DP4, DP4
  2857                          42,3133   16344 0          OCT      16344           96 DP1, DP3, DP3
  2858                          42,3134   06143 1          OCT      06143           97 ARTH, ARTH, ARTH
  2859                          42,3135   06043 0          OCT      06043           98 ARTH, FRAC, ARTH
  2860                          42,3136   06247 0          OCT      06247           99 DP3, DP2, ARTH
 R2870   END OF RUTMXTAB

  2871   REF   3  LAST  221   30,2000                   SBANK= LOWSUPER
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L          CSM GEOMETRY                                                                          USER'S PAGE NO.   1       62 52

 0002   REF    1                 23,2000                              SETLOC COMGEOM1
 0003                            23,2000                              BANK

R0004   THIS ROUTINE TAKES THE SHAFT AND TRUNNION ANGLES AS READ BY THE CM OPTICAL SYSTEM AND CONVERTS THEM INTO A  UNIT
R0006   VECTOR REFERENCED TO THE NAVIGATION BASE COORDINATE SYSTEM AND COINCIDENT WITH THE SEXTANT LINE OF SIGHT.

R0008   THE INPUTS ARE  1) THE SEXTANT SHAFT AND TRUNNION ANGLES ARE STORED SP IN LOCATIONS 3 AND 5 RESPECTIVELY OF THE
R0010   MARK VAC AREA.  2) THE COMPLEMENT OF THE BASE ADDRESS OF THE MARK VAC AREA IS STORED SP AT LOCATION X1 OF YOUR
R0012   JOB VAC AREA.

R0013   THE OUTPUT IS A HALF-UNIT VECTOR IN NAVIGATION BASE COORDINATES AND STORED AT LOCATION 32D OF THE VAC AREA. THE
R0015   OUTPUT IS ALSO AVAILABLE AT MPAC.


 0016   REF    1                                                      COUNT* $$/GEOM
 0017                            23,2000   47133 0   SXTNB            SLOAD* RTB                PUSHDOWN  00,02,04,(17D-19D),32D-36D
 0018                            23,2001   00006 1                           5,1                TRUNNION = TA
 0019   REF    1                 23,2002   51754 0                           CDULOGIC
 0020                            23,2003   41434 1                    RTB    PUSH
 0021   REF    1                 23,2004   46027 0                           SXTLOGIC
 0022                            23,2005   72556 1                    SIN    SL1
 0023                            23,2006   66606 1                    PUSH   SLOAD*             PD2 = SIN(TA)
 0024                            23,2007   00004 0                           3,1                SHAFT = SA
 0025                            23,2010   41434 1                    RTB    PUSH               PD4 = SA
 0026   REF    2  LAST   297     23,2011   51754 0                           CDULOGIC

 0027                            23,2012   41346 0                    COS    DMP
 0028                            23,2013   00003 1                           2
 0029   REF    1                 23,2014   14041 1                    STODL  STARM              COS(SA)SIN(TA)

 0030                            23,2015   41356 1                    SIN    DMP
 0031                            23,2016   77626 0                    STADR
 0032   REF    2  LAST   297     23,2017   63734 1                    STODL  STARM +2           SIN(SA)SIN(TA)

 0033                            23,2020   77746 1                    COS
 0034   REF    3  LAST   297     23,2021   24045 0                    STOVL  STARM +4
 0035   REF    4  LAST   297     23,2022   00041 1                           STARM              STARM = 32D
 0036                            23,2023   76521 0                    MXV    VSL1
 0037   REF    1                 23,2024   06300 1                           NB1NB2
 0038                            23,2025   00041 1                    STORE  32D
 0039                            23,2026   77616 0                    RVQ


 0040   REF    1                 23,2027  3 2321 0   SXTLOGIC CAF     10DEGS-            CORRECT FOR 19.775 DEGREE OFFSET
 0041   REF   33  LAST   273     23,2030  26 154 0                    ADS    MPAC
 0042   REF    1                 23,2031  3 4754 0                    CAF    QUARTER
 0043   REF    1                 23,2032  0 7256 1                    TC     SHORTMP
 0044   REF    2  LAST   222     23,2033  0 6030 1                    TC     DANZIG
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L        CSM GEOMETRY                                                                       USER'S PAGE NO.  2      EO 53

R0045    CALCSXA COMPUTES THE SEXTANT SHAFT AND TRUNNION ANGLES REQUIRED TO POSITION THE OPTICS SUCH THAT A STAR LINE-
R0047    OF-SIGHT LIES ALONG THE STAR VECTOR. THE ROUTINE TAKES THE GIVEN STAR VECTOR AND EXPRESSES IT AS A VECTOR REF-
R0049    ERENCED TO THE OPTICS COORDINATE SYSTEM. IN ADDITION IT SETS UP THREE UNIT VECTORS DEFINING THE X,Y, AND Z AXES
R0051    REFERENCED TO THE OPTICS COORDINATE SYSTEM.

R0052    THE INPUTS ARE  1) THE STAR VECTOR REFERRED TO PRESENT STABLE MEMBER COORDINATES STORED AT STAR.   2) SAME ANGLE
R0054    INPUT AS *SMNB*, I.E. SINES AND COSINES OF THE CDU ANGLES, IN THE ORDER Y Z X, AT SINCDU AND COSCDU.   A CALL
R0056    TO CDUTRIG WILL PROVIDE THIS INPUT.

R0057    THE OUTPUTS ARE THE SEXTANT SHAFT AND TRUNNION ANGLES STORED UP AT SAC AND PAC RESPECTIVELY.  (LOW ORDER PART
R0059    EQUAL TO ZERO).


 0060                           23,2034   77220 1  CALCSXA  ITA      VLOAD                 PUSHDOWN  00-26D,28D,30D,32D-36D
 0061                           23,2035   00034 0                    28D
 0062    REF   3  LAST  233     23,2036   02766 1                    STAR
 0063                           23,2037   77624 1           CALL
 0064    REF   1                23,2040   47633 1                    *SMNB*
 0065                           23,2041   76521 0           MXV      VSL1
 0066    REF   1                23,2042   06256 0                    NB2NB1
 0067    REF   4  LAST  298     23,2043   26766 1           STOVL    STAR
 0068    REF   1                23,2044   15334 1                    HIUNITX
 0069    REF   2  LAST   97     23,2045   26555 0           STOVL    XNB1
 0070    REF   1                23,2046   15332 1                    HIUNITY
 0071    REF   2  LAST   97     23,2047   26563 0           STOVL    YNB1
 0072    REF   1                23,2050   15330 0                    HIUNITZ
 0073    REF   2  LAST   97     23,2051   36571 1           STCALL   ZNB1
 0074    REF   1                23,2052   46076 1                    SXTANG1
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L       CSM GEOMETRY                                                                              USER'S PAGE NO.   3      E0 S3

R0075   SXTANG COMPUTES THE SEXTANT SHAFT AND TRUNNION ANGLES REQUIRED TO POSITION THE OPTICS SUCH THAT A STAR LINE-OF-
R0077   SIGHT LIES ALONG THE STAR VECTOR.

R0078   THE INPUTS ARE  1) THE STAR VECTOR REFERRED TO ANY COORDINATE SYSTEM STORED AT STAR.  2) THE NAVIGATION BASE
R0080   COORDINATES REFERRED TO THE SAME COORDINATE SYSTEM. THESE THREE HALF-UNIT VECTORS ARE STORED AT XNB, YNB, AND
R0082   ZNB.

R0083   THE OUTPUTS ARE THE SEXTANT SHAFT AND TRUNNION ANGLES STORED DP AT SAC AND PAC RESPECTIVELY.  (LOW ORDER PART
R0085   EQUAL TO ZERO).

 0086                        23,2053   47020 0  SXTANG    ITA      RTB            PUSHDOWN  16D,18D,22D-26D,28D
 0087                        23,2054   00034 0                     28D
 0088    REF   1             23,2055   45731 0                     TRANSP1        EREF WRT NB2
 0089                        23,2056   64375 1            VLOAD    MXV
 0090    REF   1             23,2057   02714 1                     XNB
 0091    REF   2  LAST  298  23,2060   06256 0                     NB2NB1
 0092                        23,2061   77772 0            VSL1
 0093    REF   3  LAST  298  23,2062   26555 0            STOVL    XNB1
 0094    REF   1             23,2063   02722 1                     YNB
 0095                        23,2064   76521 0            MXV      VSL1
 0096    REF   3  LAST  299  23,2065   06256 0                     NB2NB1
 0097    REF   3  LAST  298  23,2066   26563 0            STOVL    YNB1
 0098    REF   1             23,2067   02730 1                     ZNB
 0099                        23,2070   76521 0            MXV      VSL1
 0100    REF   4  LAST  299  23,2071   06256 0                     NB2NB1
 0101    REF   3  LAST  298  23,2072   02571 0            STORE    ZNB1

 0102                        23,2073   47034 0            RTB      RTB
 0103    REF   2  LAST  299  23,2074   45731 0                     TRANSP1
 0104    REF   1             23,2075   45745 0                     TRANSP2

 0105                        23,2076   47375 0  SXTANG1   VLOAD    VXV
 0106    REF   4  LAST  299  23,2077   02571 0                     ZNB1
 0107    REF   5  LAST  298  23,2100   02766 1                     STAR
 0108                        23,2101   77600 1            BOV
 0109                        23,2102   46103 1                     +1
 0110                        23,2103   40056 0            UNIT     BOV
 0111    REF   1             23,2104   46145 0                     ZNB=S1
 0112    REF   1             23,2105   00027 1            STORE    PDA            PDA = UNIT(ZNB X S)

 0113                        23,2106   57441 1            DOT      DCOMP
 0114    REF   4  LAST  299  23,2107   02555 0                     XNB1
 0115    REF   1             23,2110   24023 0            STOVL    SINTH          SIN(SA) = PDA . -XNB
 0116    REF   2  LAST  299  23,2111   00027 1                     PDA

 0117                        23,2112   77641 1            DOT
 0118    REF   4  LAST  299  23,2113   02563 0                     YNB1
 0119    REF   1             23,2114   34021 0            STCALL   COSTH          COS(SA) = PDA . YNB
 0120    REF   1             23,2115   47311 1                     ARCTRIG
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L        CSM GEOMETRY                                                                    USER'S PAGE NO.   4      E0 53

0121                           23,2116   77634 0                RTB
0122    REF    1               23,2117   45640 1                       1STO2S
0123    REF    4  LAST  294    23,2120   26774 1                STOVL  SAC
0124    REF    6  LAST  299    23,2121   02766 1                       STAR
0125                           23,2122   77600 1                BOV
0126                           23,2123   46124 1                       +1
0127                           23,2124   72441 0                DOT    SL1
0128    REF    5  LAST  299    23,2125   02571 0                       ZNB1
0129                           23,2126   77726 1                ACOS
0131                           23,2127   62440 0                BMN    SL2
0132    REF    1               23,2130   46142 1                       SXTALARM          TRUNNION ANGLE NEGATIVE
0133                           23,2131   45200 1                BOV    DSU
0134    REF    2  LAST  300    23,2132   46142 1                       SXTALARM          TRUNNION ANGLE GREATER THAN 90 DEGREES
0135    REF    1               23,2133   06327 1                       200DEG-
0136                           23,2134   77634 0                RTB
0137    REF    2  LAST  300    23,2135   45640 1                       1STO2S
0138    REF    4  LAST  294    23,2136   02776 0                STORE  PAC               FOR FLIGHT USE, CULTFLAG IS ON IF
0139                           23,2137   77614 1                CLRGO                    TRUNION IS GREATER THAN 90 DEG
0140    REF    1               23,2140   01630 0                       CULTFLAG
0141                           23,2141   00034 0                       28D
0142                           23,2142   77614 1   SXTALARM     SETGO                    ALARM HAS BEEN REMOVED FROM THIS
0143    REF    2  LAST  300    23,2143   01430 1                       CULTFLAG
0144                           23,2144   00034 0                       28D               SUBROUTINE,ALARM WILL BE SET BY MPI
0145                           23,2145   77745 1   ZNB=S1       DLOAD
0146    REF    1               23,2146   06323 0                       270DEG
0147    REF    5  LAST  300    23,2147   16774 1                STODL  SAC
0148    REF    1               23,2150   06325 0                       200DEGS-
0149    REF    5  LAST  300    23,2151   02776 0                STORE  PAC
0150                           23,2152   77614 1                CLRGO
0151    REF    3  LAST  300    23,2153   01630 0                       CULTFLAG
0152                           23,2154   00034 0                       28D
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L        CSM GEOMETRY                                                                                  USER'S PAGE NO.   5        E0 53

R0153    THESE TWO ROUTINES COMPUTE THE ACTUAL STATE VECTOR FOR LM, CSM BY ADDING
R0154    THE CONIC R,V AND THE DEVIATIONSR,V. THE STATE VECTORS ARE CONVERTED TO
R0155    METERS B-29 AND METERS/CSEC B-7 AND STORED APPROPRIATELY IN RN,VN OR
R0156    R-OTHER , V-OTHER FOR DOWNLINK. THE ROUTINES NAMES ARE SWITCHED IN THE
R0157    OTHER VEHICLES COMPUTER.

R0158    INPUT
R0159      STATE VECTOR IN TEMPORARY STORAGE AREA
R0160      IF STATE VECTOR IS SCALED POS B27 AND VEL B5
R0161         SET X2 TO +2
R0162      IF STATE VECTOR IS SCALED POS B29 AND VEL B7
R0163         SET X2 TO 0

R0164    OUTPUT
R0165      R(T) IN RN, V(T) IN VN, T IN PIPTIME
R0166    OR
R0167      R(T) IN R-OTHER, V(T) IN V-OTHER   (T IS DEFINED BY T-OTHER)


 0169    REF    1                 10,2000                          SETLOC  COMGEOM2
 0170                             10,2240                          BANK
 0171    REF    1                                                  COUNT*  $$/GEOM
 0172                             10,2240    43414 1   SVDWN1      BOF     RVQ                 SW=1=AVETOMID DOING W-MATRIX INTEG
 01721   REF    1                 10,2241    04756 1                       AVEMIDSW
 01722                            10,2242    20243 0                       +1
 01723                            10,2243    53775 1               VLOAD   VSL*
 0173    REF    2  LAST    89     10,2244    01521 0                       TDELTAV
 0174                             10,2245    57605 0                       0 -7,2
 0175                             10,2246    53655 1               VAD     VSL*
 0176    REF    2  LAST    89     10,2247    01535 0                       RCV
 0177                             10,2250    57576 1                       0,2
 0178    REF    4  LAST   180     10,2251    25030 0               STOVL   RN
 0179    REF    2  LAST    89     10,2252    01527 0                       TNUV
 0180                             10,2253    53257 1               VSL*    VAD
 0181                             10,2254    57602 1                       0 -4,2
 0182    REF    2  LAST    89     10,2255    01543 1                       VCV
 0183                             10,2256    77657 0               VSL*
 0184                             10,2257    57576 1                       0,2
 0185    REF    4  LAST   180     10,2260    15036 0               STODL   VN
 0186    REF    5  LAST   284     10,2261    01517 0                       TET
 0187    REF    3  LAST   180     10,2262    01044 0               STORE   PIPTIME
 0188                             10,2263    77616 0               RVQ


 0189                             10,2264    53775 1   SVDWN2      VLOAD   VSL*
 0190    REF    3  LAST   301     10,2265    01521 0                       TDELTAV
 0191                             10,2266    57605 0                       0 -7,2
 0192                             10,2267    53655 1               VAD     VSL*
 0193    REF    3  LAST   301     10,2270    01535 0                       RCV
 0194                             10,2271    57576 1                       0,2
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0195   REF   4  LAST  181   10,2272   25720 0          STOVL  R-OTHER
0196   REF   3  LAST  301   10,2273   01527 0                 TNUV
0197                        10,2274   53257 1          VSL*   VAD
0198                        10,2275   57602 1                 0 -4,2
0199   REF   3  LAST  301   10,2276   01543 1                 VCV
0200                        10,2277   77657 0          VSL*
0201                        10,2300   57576 1                 0,2
0202   REF   4  LAST  181   10,2301   01726 0          STORE  V-OTHER
0203                        10,2302   77616 0          RVQ
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L        CSM GEOMETRY                                                                    USER'S PAGE NO.   7      E0 S3

P0204    SUBROUTINE TO COMPUTE THE NATURAL LOG OF C(MPAC, MPAC +1).

R0205              ENTRY:      CALL
R0206                                    LOG

R0207    SUBROUTINE RETURNS WITH  -LOG  IN DP MPAC.

R0208    EBANK IS ARBITRARY..

 0210    REF   1                 23,2000                          SETLOC  POWFLIT2
 0211                            23,2155                          BANK
 0212    REF   2 LAST  297 TO   301:    109    109*               COUNT*  $$/GEOM
 0213                            23,2155   44301 0   LOG          NORM    BOSU          GENERATES LOG BY SHIFTING ARG
 0214    REF  34  LAST  297      23,2156   00160 0                        MPAC +3       UNTIL IT LIES BETWEEN .5 AND 1.
 0215    REF   1                 23,2157   15344 0                        NEARLY1       THE LOG OF THIS PART IS FOUND AND THE
 0216                            23,2160   77776 1                EXIT                  LOG OF THE SHIFTED PART IS COMPUTED

 0217    REF   1                 23,2161  0 7171 1                TC      POLY          AND ADDED IN. SHIFT COUNT STORED

 0218                            23,2162   00002 0                DEC     2             (N-1, SUPPLIED BY SMERZH)
 0219                            23,2163   00000 1                2DEC    0             IN MPAC +3.
 0219                            23,2164   00000 1
 0220                            23,2165   01001 1                2DEC    .031335467
 0220                            23,2166   14636 1
 0221                            23,2167   00325 0                2DEC    .0130145859
 0221                            23,2170   07310 1
 0222                            23,2171   00541 1                2DEC    .0215738898
 0222                            23,2172   16735 1

 0223    REF  31  LAST  276      23,2173  3 4772 1                CAF     ZERO
 0224    REF  35  LAST  303      23,2174  54 156 1                TS      MPAC +2
 0225                            23,2175  0 0006 1                EXTEND
 0226    REF   1                 23,2176  3 2212 1                DCA     CLOG2/32
 0227    REF  36  LAST  303      23,2177  52 155 1                DXCH    MPAC
 0228    REF  37  LAST  303      23,2200  52 160 1                DXCH    MPAC +3
 0229                            23,2201  4 0000 0                COM                   LOAD POSITIVE SHIFT COUNT IN A.
 0230    REF   2  LAST  297      23,2202  0 7256 1                TC      SHORTMP       MULTIPLY BY SHIFT COUNT.

 0231    REF  38  LAST  303      23,2203  52 156 1                DXCH    MPAC +1
 0232    REF  39  LAST  303      23,2204  52 155 1                DXCH    MPAC
 0233    REF  40  LAST  303      23,2205  52 160 1                DXCH    MPAC +3
 0234    REF  41  LAST  303      23,2206  20 155 1                DAS     MPAC
 0235    REF  11  LAST  275      23,2207  0 6006 1                TC      INTPRET       RESULT IN MPAC, MPAC +1

 0236                            23,2210   77616 0                RVQ

 0237    REF   1                 26,3343             NEARLY1  =           NEARONE
 0238                            23,2211   00542 1   CLOG2/32 2DEC        .0216608494
 0238                            23,2212   34414 1
```

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R0239   SUBROUTINE NAME:        EARTH ROTATOR     (EARROT1 OR EARROT2)          DATE:            15 FEB 67
R0241   MOD NO:  N +1                                                            LOG SECTION:     POWERED FLIGHT SUBROS
R0243   MOD BY:  ENTRY GROUP  (BAIRNSFATHER)
R0244   FUNCTIONAL DESCRIPTION:      THIS ROUTINE PROJECTS THE INITIAL EARTH TARGET VECTOR   RTINIT   AHEAD THROUGH
R0246            THE ESTIMATED TIME OF FLIGHT. INITIAL CALL RESOLVES THE INITIAL TARGET VECTOR   RTINIT   INTO EASTERLY
R0248            AND NORMAL COMPONENTS   RTEAST   AND   RTNORM   . INITIAL AND  SUBSEQUENT CALLS ROTATE THIS VECTOR
R0250            ABOUT THE (FULL) UNIT POLAR AXIS   UNITW   THROUGH THE ANGLE    WIE DTEAROT   TO OBTAIN THE ROTATED
R0252            TARGET VECTOR   RT   . ALL VECTORS EXCEPT   UNITW   ARE HALF UNIT.
R0254            THE EQUATIONS ARE
R0255                   -   -        -                  -
R0256                   RT = RTINIT + RTNORM (COS(WT) -1) + RTEAST SIN(WT)
R0257            WHERE  WT = WIE DTEAROT
R0258                   RTINIT = INITIAL TARGET VECTOR
R0259                   -        -    -
R0260                   RTEAST = UNITW*RTINIT
R0261                   -        -      -
R0262                   RTNORM = RTEAST*UNITW

R0263            FOR CONTINUOUS UPDATING, ONLY ONE ENTRY TO EARROT1 IS REQUIRED, WITH SUBSEQUENT ENTRIES AT EARROT2.
R0265   CALLING SEQUENCE:  FIRST CALL                        SUBSEQUENT CALL
R0266                      STCALL DTEAROT                    STCALL DTEAROT
R0267                             EARROT1                           EARROT2
R0268                      C(MPAC) UNSPECIFIED               C(MPAC) = DTEAROT
R0269            PUSHLOC = PDL+0, ARBITRARY.  6 LOCATIONS USED.

R0270   SUBROUTINES USED:  NONE
R0271   NORMAL EXIT MODES:   RVQ
R0272   ALARMS:  NONE
R0273   OUTPUT:  RTEAST (-1)            .5 UNIT VECTOR EAST, COMPNT OF RTINIT   LEFT BY FIRST CALL
R0275            RTNORM (-1)            .5 UNIT VECTOR NORML, COMPNT OF RTINIT  LEFT BY FIRST CALL
R0277            RT     (-1)            .5 UNIT TARGET VECTOR, ROTATED          LEFT BY ALL CALLS
R0279            DTEAROT  (-28) CS      MAY BE CHANGED BY EARROT2, IF OVER 1 DAY
R0280   ERASABLE INITIALIZATION REQUIRED:
R0281            UNITW  (0)             UNIT POLAR VECTOR                       PAD LOADED
R0283            RTINIT (-1)            .5 UNIT INITIAL TARGET VECTOR           LEFT BY ENTRY
R0285            DTEAROT  (-28) CS      TIME OF FLIGHT                          LEFT BY CALLER
R0287   DEBRIS:  QPRET,     PDL+0 ... PDL+5
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L         CSM GEOMETRY                                                                      USER'S PAGE NO.  9      E0 S3

PC288

 0289   REF   3  LAST  234   E7,1451                         EBANK= RTINIT

 0290                        23,2213   47375 0  EARROT1  VLOAD  VXV
 0291   REF   3  LAST   90   23,2214   01712 1                   UNITW              FULL UNIT VECTOR
 0292   REF   4  LAST  305   23,2215   03452 1                   RTINIT             .5 UNIT
 0293   REF   2  LAST  122   23,2216   03460 0           STORE   RTEAST             .5 UNIT

 0294                        23,2217   77635 1           VXV
 0295   REF   4  LAST  305   23,2220   01712 1                   UNITW              FULL UNIT
 0296   REF   2  LAST  122   23,2221   17466 0           STODL   RTNORM             .5 UNIT
 0297   REF   2  LAST  122   23,2222   03606 1                   DTEAROT            (-28) CS

 0298                        23,2223   56204 1  EARROT2  BOVB    DDV
 0299   REF   1              23,2224   57544 0                   TCDANZIG           RESET OVFIND, IF ON
 0300   REF   1              23,2225   06254 1                   1/WIE
 0301                        23,2226   41400 0           BOV     PUSH
 0302   REF   1              23,2227   46243 0                   OVERADAY
 0303                        23,2230   45346 1           COS     DSU
 0304   REF   1              23,2231   15334 1                   HIDPHALF
 0305                        23,2232   65361 0           VXSC    PDDL               XCH W PUSH LIST
 0306   REF   3  LAST  305   23,2233   03466 0                   RTNORM             .5 UNIT
 0307                        23,2234   74356 1           SIN     VXSC
 0308   REF   3  LAST  305   23,2235   03460 0                   RTEAST             .5 UNIT
 0309                        23,2236   76455 1           VAD     VSL1
 0310                        23,2237   53455 0           VAD     UNIT               INSURE THAT RT IS 'UNIT'.
 0311   REF   5  LAST  305   23,2240   03452 1                   RTINIT             .5 UNIT
 0312   REF   2  LAST  122   23,2241   03474 0           STORE   RT                 .5 UNIT TARGET VECTOR

 0313                        23,2242   77616 0           RVQ

 0314                        23,2243   75345 1  OVERADAY DLOAD   SIGN
 0315   REF   2  LAST  305   23,2244   06254 1                   1/WIE
 0316   REF   3  LAST  305   23,2245   03606 1                   DTEAROT
 0317                        23,2246   77621 1           BDSU
 0318   REF   4  LAST  305   23,2247   03606 1                   DTEAROT
 0319   REF   5  LAST  305   23,2250   03606 1           STORE   DTEAROT

 0320                        23,2251   77650 1           GOTO
 0321   REF   1              23,2252   46223 0                   EARROT2

A0322                                           WIE      2DEC    .1901487997
 0323                        23,2253   01015 1  1/WIE    2DEC    8616410
 0323                        23,2254   34732 0
 1036                        23,2255   15373 1  NB2NB1   2DEC    +.8431756920 B-1
 1036                        23,2256   11346 0
 1037                        23,2257   00000 1           2DEC    0
 1037                        23,2260   00000 1
 1038                        23,2261   67313 1           2DEC    -.5376381241 B-1
 1038                        23,2262   65307 0
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  1039                          23,2263   00000 1  ZERINFLT 2DEC    0
  1039                          23,2264   00000 1
  1040                          23,2265   20000 0  HALFNFLT 2DEC    .5
  1040                          23,2266   00000 1
  1041                          23,2267   00000 1           2DEC    0
  1041                          23,2270   00000 1

  1042                          23,2271   10464 0           2DEC    +.5376381241 B-1
  1042                          23,2272   12470 1
  1043                          23,2273   00000 1           2DEC    0
  1043                          23,2274   00000 1
  1044                          23,2275   15373 1           2DEC    +.8431756920 B-1
  1044                          23,2276   11346 0


  1045                          23,2277   15373 1  NB1NB2   2DEC    +.8431756920 B-1
  1045                          23,2300   11346 0
  1046                          23,2301   00000 1           2DEC    0
  1046                          23,2302   00000 1
  1047                          23,2303   10464 0           2DEC    +.5376381241 B-1
  1047                          23,2304   12470 1
  1048                          23,2305   00000 1           2DEC    0
  1048                          23,2306   00000 1
  1049                          23,2307   20000 0           2DEC    .5
  1049                          23,2310   00000 1
  1050                          23,2311   00000 1           2DEC    0
  1050                          23,2312   00000 1

  1051                          23,2313   67313 1           2DEC    -.5376381241 B-1
  1051                          23,2314   65307 0
  1052                          23,2315   00000 1           2DEC    0
  1052                          23,2316   00000 1
  1053                          23,2317   15373 1           2DEC    +.8431756920 B-1
  1053                          23,2320   11346 0
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 1054                          23,2321   07020 1  10DEGS-  DEC    3600

 1055                          23,2322   60000 1  270DEG   OCT    60000           SHAFT   270 DEGREES    2S COMP.
 1056                          23,2323   00000 1           OCT    00000

 1057                          23,2324   61740 0  20DEGS-  DEC    -07199
 1058                          23,2325   77777 0           DEC    -00000

 1059                          23,2326   07020 1  20DEG-   DEC    03600
 1060                          23,2327   00000 1           DEC    00000
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                                                                                        USER'S PAGE NO.   1       E0 53
L          IMU COMPENSATION PACKAGE

000101 REF   1                   06,2000                            SETLOC IMUCOMP
000102                           06,3276                            BANK
0002   REF   1                   E3,1460                            EBANK= NBDX

0100   REF   1                                                      COUNT* $$/ICOMP
0112   REF   1                   06,3276  3 3535 1  1/PIPA          CAF     LGCOMP              SAVE EBANK OF CALLING PROGRAM
0113   REF   8  LAST  255        06,3277  56 003 1                  XCH     EBANK
0114   REF   1                   06,3300  54 163 1                  TS      MODE

0115   REF   1                   06,3301  11'477 0                  CCS     GCOMPSW             BYPASS IF GCOMPSW NEGATIVE
0116                             06,3302  1 3305 0                  TCF     +3
0117                             06,3303  1 3305 0                  TCF     +2
0118   REF   1                   06,3304  1 3422 1                  TCF     IRIG1               RETURN

01181                            06,3305  0 0004 0                  INHINT                       ASSURE COMPLETE COMPENSATION OF DELV'S
A01182                                                                                          FOR DOWNLINK.
0119   REF   1                   06,3306  3 4766 1  1/PIPA1         CAF     FOUR                PIPAZ, PIPAY, PIPAX
01191  REF   8  LAST  269        06,3307  7 7702 1    +1            MASK    NEGONE
0120   REF   4  LAST   70        06,3310  54 132 0                  TS      BUF +2

0121   REF   5  LAST  308        06,3311  50 132 1                  INDEX   BUF +2
0122   REF   1                   06,3312  3 1453 1                  CA      PIPASCF             (P.P.M.) X 2(-9)
0123                             06,3313  0 0006 1                  EXTEND
0124   REF   6  LAST  308        06,3314  5 0132 1                  INDEX   BUF +2
0125   REF   1                   06,3315  7 1314 1                  MP      DELVX               (PP) X 2(+14) NOW (PIPA PULSES) X 2(+5)
0126   REF  33  LAST  282        06,3316  54 002 1                  TS      Q                   SAVE MAJOR PART

0127   REF  26  LAST  278        06,3317  3 0001 0                  CA      L                   MINOR PART
0128                             06,3320  0 0006 1                  EXTEND
0129   REF  21  LAST  243        06,3321  7 4763 0                  MP      BIT6                SCALE 2(+9)    SHIFT RIGHT 9
0130   REF   7  LAST  308        06,3322  50 132 1                  INDEX   BUF +2
0131   REF   2  LAST  308        06,3323  55'315 0                  TS      DELVX +1            FRACTIONAL PIPA PULSES SCALED 2(+14)

0132   REF  34  LAST  308        06,3324  3 0002 0                  CA      Q                   MAJOR PART
0133                             06,3325  0 0006 1                  EXTEND
0134   REF  22  LAST  308        06,3326  7 4763 0                  MP      BIT6                SCALE 2(+9)    SHIFT RIGHT 9
0135   REF   8  LAST  308        06,3327  50 132 1                  INDEX   BUF +2
0136   REF   3  LAST  308        06,3330  21'315 0                  DAS     DELVX               (PIPAI) + (PIPAI)(SFE)

0137   REF   9  LAST  308        06,3331  50 132 1                  INDEX   BUF +2
0138   REF   1                   06,3332  4 1452 1                  CS      PIPABIAS            (PIPA PULSES)/(CS) X 2(-6)
0139                             06,3333  0 0006 1                  EXTEND
0140   REF   2  LAST   63        06,3334  7 1277 0                  MP      1/PIPADT            (CS) X 2(+8) NOW (PIPA PULSES) X 2(+2)
0141                             06,3335  0 0006 1                  EXTEND
0142   REF  17  LAST  279        06,3336  7 4766 0                  MP      BIT3                SCALE 2(+12) SHIFT RIGHT 12
0143   REF  10  LAST  308        06,3337  50 132 1                  INDEX   BUF +2
0144   REF   4  LAST  308        06,3340  21'315 0                  DAS     DELVX               (PIPAI) + (PIPAI)(SFE) - (BIAS)(DELTAT)

0145   REF  11  LAST  308        06,3341  10 132 0                  CCS     BUF +2              PIPAZ, PIPAY, PIPAX
0146   REF   1                   06,3342  1 3307 1                  TCF     1/PIPA1  +1
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01461                   06,3343  0 0003 1         RELINT
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L        IMU COMPENSATION PACKAGE                                                     USER'S PAGE NO.  3     E3 53

P01482
 0149   REF  2 LAST 308   06,3344  55'477 0  IRIGCOMP TS      GCOMPSW              INDICATE COMMANDS 2 PULSES OR LESS
 0150   REF 12 LAST 308   06,3345  54 130 1           TS      BUF                  INDEX COUNTER - IRIGX, IRIGY, IRIGZ

 0151                     06,3346  0 0006 1  IRIGX    EXTEND
 0152   REF  5 LAST 308   06,3347  4 1315 0           DCS     DELVX                (PIPA PULSES) X 2(+14)
 0153   REF 42 LAST 303   06,3350  52 155 1           DXCH    MPAC
 0154   REF  1            06,3351  3 1463 1           CA      ADIAX                (GYRO PULSES)/(PIPA PULSE) X 2(-3)      *
 0155   REF  1            06,3352  0 3425 1           TC      GCOMPSUB             -(ADIAX)(PIPAX)   (GYRO PULSES) X 2(+14)

 0156                     06,3353  0 0006 1           EXTEND
 0157   REF  1            06,3354  4 1317 1           DCS     DELVY                (PIPA PULSES) X 2(+14)
 0158   REF 43 LAST 310   06,3355  52 155 1           DXCH    MPAC
 0159   REF  1            06,3356  4 1466 0           CS      ADSRAX               (GYRO PULSES)/(PIPA PULSE) X 2(-3)      *
 0160   REF  2 LAST 310   06,3357  0 3425 1           TC      GCOMPSUB             +(ADSRAX)(PIPAY)  (GYRO PULSES) X 2(+14)

A01603                                                EXTEND               ***
A01604                                                DCS     DELVZ        ***     (PIPA PULSES) X 2(+14)
A01605                                                DXCH    MPAC         ***
A01606                                                CA      ADOAX        ***     (GYRO PULSES)/(PIPA PULSE) X 2(-3)      *
A01607                                                TC      GCOMPSUB     ***     -(ADOAX)(PIPAZ)   (GYRO PULSES) X 2(+14)

 0161   REF  2 LAST 308   06,3360  4 1460 0           CS      NBDX                 (GYRO PULSES)/(CS) X 2(-5)
 0162   REF  1            06,3361  0 3454 1           TC      DRIFTSUB             -(NBDX)(DELTAT)   (GYRO PULSES) X 2(+14)

 0163                     06,3362  0 0006 1  IRIGY    EXTEND
 0164   REF  2 LAST 310   06,3363  4 1317 1           DCS     DELVY                (PIPA PULSES) X 2(+14)
 0165   REF 44 LAST 310   06,3364  52 155 1           DXCH    MPAC
 0166   REF  1            06,3365  3 1464 0           CA      ADIAY                (GYRO PULSES)/(PIPA PULSE) X 2(-3)      *
 0167   REF  3 LAST 310   06,3366  0 3425 1           TC      GCOMPSUB             -(ADIAY)(PIPAY)   (GYRO PULSES) X 2(+14)

 0168                     06,3367  0 0006 1           EXTEND
 0169   REF  1            06,3370  4 1321 1           DCS     DELVZ                (PIPA PULSES) X 2(+14)
 0170   REF 45 LAST 310   06,3371  52 155 1           DXCH    MPAC
 0171   REF  1            06,3372  4 1467 1           CS      ADSRAY               (GYRO PULSES)/(PIPA PULSE) X 2(-3)      *
 0172   REF  4 LAST 310   06,3373  0 3425 1           TC      GCOMPSUB             +(ADSRAY)(PIPAZ)  (GYRO PULSES) X 2(+14)

A01723                                                EXTEND               ***
A01724                                                DCS     DELVX        ***     (PIPA PULSES) X 2(+14)
A01725                                                DXCH    MPAC         ***
A01726                                                CA      ADOAY        ***     (GYRO PULSES)/(PIPA PULSE) X 2(-3)      *
A01727                                                TC      GCOMPSUB     ***     -(ADOAY)(PIPAX)   (GYRO PULSES) X 2(+14)

 0173   REF  1            06,3374  4 1461 1           CS      NBDY                 (GYRO PULSES)/(CS) X 2(-5)
 0174   REF  2 LAST 310   06,3375  0 3454 1           TC      DRIFTSUB             -(NBDY)(DELTAT)   (GYRO PULSES) X 2(+14)

 0175                     06,3376  0 0006 1  IRIGZ    EXTEND
 0176   REF  3 LAST 310   06,3377  4 1317 1           DCS     DELVY                (PIPA PULSES) X 2(+14)
 0177   REF 46 LAST 310   06,3400  52 155 1           DXCH    MPAC
 0178   REF  1            06,3401  3 1470 0           CA      ADSRAZ               (GYRO PULSES)/(PIPA PULSE) X 2(-3)      *
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L        IMU COMPENSATION PACKAGE                                                      USER'S PAGE NO.  4       E3 S3

 0179   REF   5  LAST  310   06,3402  0 3425 1          TC      GCOMPSUB            -(ADSRAZ)(PIPAY)   (GYRO PULSES) X 2(+14)

 0180                        06,3403  0 0006 1          EXTEND
 0181   REF   2  LAST  310   06,3404  4 1321 1          DCS     DELVZ               (PIPA PULSES) X 2(+14)
 0182   REF  47  LAST  310   06,3405  52 155 1          DXCH    MPAC
 0183   REF   1              06,3406  3 1465 1          CA      ADIAZ               (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
 0184   REF   6  LAST  311   06,3407  0 3425 1          TC      GCOMPSUB            -(ADIAZ)(PIPAZ)    (GYRO PULSES) X 2(+14)

A01843                                                  EXTEND            ***
A01844                                                  DCS     DELVX     ***       (PIPA PULSE) X 2(+14)
A01845                                                  DXCH    MPAC      ***
A01846                                                  CS      ADOAZ     ***       (GYRO PULSES)/(PIPA PULSE) X 2(-3)     *
A01847                                                  TC      GCOMPSUB  ***       +(ADOAZ)(PIPAX)    (GYRO PULSES) X 2(+14)

 0185   REF   1              06,3410  3 1462 0          CA      NBDZ                (GYRO PULSES)/(CS) X 2(-5)
 0186   REF   3  LAST  310   06,3411  0 3454 1          TC      DRIFTSUB            +(NBDZ)(DELTAT)    (GYRO PULSES) X 2(+14)
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0187   REF   3  LAST  310   06,3412  11'477 0              CCS     GCOMPSW        ARE GYRO COMMANDS GREATER THAN 2 PULSES
0188                        06,3413  1 3415 0              TCF     +2             YES
0189   REF   2  LAST  308   06,3414  1 3422 1              TCF     IRIG1          NO

0191   REF   1              06,3415  3 5057 0              CAF     PRIO21         HIGHER THAN SERVICER-LESS THAN PRELAUNCH
0192   REF   6  LAST  268   06,3416  0 5121 0              TC      NOVAC
0193   REF   3  LAST  310   E3,1460                        EBANK=  NBDX
0194   REF   1              06,3417   03507 0              2CADR   I/CHECK
0194   REF   1              06,3420   14063 1

0195                        06,3421  0 0003 1              RELINT
0196   REF   2  LAST  308   06,3422  3 0163 0  IRIG1       CA      MODE           SET EBANK FOR RETURN
0197   REF   9  LAST  308   06,3423  54 003 0              TS      EBANK
0198   REF   2  LAST  224   06,3424  1 4651 0              TCF     SWRETURN

0199   REF  48  LAST  311   06,3425  56 154 1  GCOMPSUB XCH        MPAC           ADIA OR ADSRA COEFFICIENT ARRIVES IN A
0200                        06,3426  0 0006 1              EXTEND                 C(MPAC) = (PIPA PULSES) X 2(+14)
0201   REF  49  LAST  312   06,3427  7 0154 0              MP      MPAC           (GYRO PULSES)/(PIPA PULSE) X 2(-5)      *
0202   REF  13  LAST   70   06,3430  52 123 0              DXCH    VBUF           NOW = (GYRO PULSES) X 2(+11)            *

0203   REF  50  LAST  312   06,3431  3 0155 0              CA      MPAC +1        MINOR PART PIPA PULSES
0204                        06,3432  0 0006 1              EXTEND
0205   REF  51  LAST  312   06,3433  7 0154 0              MP      MPAC           ADIA OR ADSRA
0206   REF  27  LAST  308   06,3434  54 001 1              TS      L
0207   REF  32  LAST  303   06,3435  3 4772 1              CAF     ZERO
0208   REF  14  LAST  312   06,3436  20 123 0              DAS     VBUF           NOW = (GYRO PULSES) X 2(+11)            *

0209   REF  15  LAST  312   06,3437  3 0122 0              CA      VBUF           PARTIAL RESULT - MAJOR
0210                        06,3440  0 0006 1              EXTEND
0211   REF  16  LAST  204   06,3441  7 4755 0              MP      BIT12          SCALE 2(+3)      SHIFT RIGHT 3          *
0212   REF  13  LAST  310   06,3442  50 130 0              INDEX   BUF            RESULT = (GYRO PULSES) X 2(+14)
0213   REF   3  LAST   89   06,3443  21'472 0              DAS     GCOMP          HI(ADIA)(PIPAI)  OR  HI(ADSRA)(PIPAI)

0214   REF  16  LAST  312   06,3444  3 0123 1              CA      VBUF +1        PARTIAL RESULT - MINOR
0215                        06,3445  0 0006 1              EXTEND
0216   REF  17  LAST  312   06,3446  7 4755 0              MP      BIT12          SCALE 2(+3)      SHIFT RIGHT 3          *
0217   REF  28  LAST  312   06,3447  54 001 1              TS      L
0218   REF  33  LAST  312   06,3450  3 4772 1              CAF     ZERO
0219   REF  14  LAST  312   06,3451  50 130 0              INDEX   BUF            RESULT = (GYRO PULSES) X 2(+14)
0220   REF   4  LAST  312   06,3452  21'472 0              DAS     GCOMP          (ADIA)(PIPAI)  OR  (ADSRA)(PIPAI)

0221   REF  35  LAST  308   06,3453  0 0002 0              TC      Q
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0222                             06,3454  0 0006 1  DRIFTSUB EXTEND
0223   REF  15  LAST  312        06,3455  22 131 1           QXCH    BUF +1

0224                             06,3456  0 0006 1           EXTEND                      C(A) = NBD     (GYRO PULSES)/(CS) X 2(-5)
0225   REF   3  LAST  308        06,3457  7 1277 0           MP      1/PIPADT            (CS) X 2(+8)   NOW (GYRO PULSES) X 2(+3)
0226   REF  52  LAST  312        06,3460  22 155 0           LXCH    MPAC +1             SAVE FOR FRACTIONAL COMPENSATION
0227                             06,3461  0 0006 1           EXTEND
0228   REF  20  LAST  265        06,3462  7 4765 0           MP      BIT4                SCALE 2(+11)      SHIFT RIGHT 11
0229   REF  16  LAST  313        06,3463  50 130 0           INDEX   BUF
0230   REF   5  LAST  312        06,3464  21'472 0           DAS     GCOMP               HI(NBD)(DELTAT)    (GYRO PULSES) X 2(+14)

0231   REF  53  LAST  313        06,3465  3 0155 0           CA      MPAC +1             NOW MINOR PART
0232                             06,3466  0 0006 1           EXTEND
0233   REF  21  LAST  313        06,3467  7 4765 0           MP      BIT4                SCALE 2(+11)      SHIFT RIGHT 11
0234   REF  29  LAST  312        06,3470  54 001 1           TS      L
0235   REF  34  LAST  312        06,3471  3 4772 1           CAF     ZERO
0236   REF  17  LAST  313        06,3472  50 130 0           INDEX   BUF                 ADD IN FRACTIONAL COMPENSATION
0237   REF   6  LAST  313        06,3473  21'472 0           DAS     GCOMP               (NBD)(DELTAT)      (GYRO PULSES) X 2(+14)

0238   REF   5  LAST  282        06,3474  3 4767 0  DRFTSUB2 CAF     TWO                 PIPAX, PIPAY, PIPAZ
0239   REF  18  LAST  313        06,3475  6 0130 0           AD      BUF
0240   REF  19  LAST  313        06,3476  56 130 0           XCH     BUF
0241   REF  78  LAST  283        06,3477  50 000 1           INDEX   A
0242   REF   7  LAST  313        06,3500  11'471 0           CCS     GCOMP               ARE GYRO COMMANDS 1 PULSE OR GREATER
0243                             06,3501  1 3503 0           TCF     +2                  YES
0244   REF  20  LAST  313        06,3502  0 0131 1           TC      BUF +1              NO

0245   REF   9  LAST  308        06,3503  7 7702 1           MASK    NEGONE
0246   REF  79  LAST  313        06,3504  10 000 0           CCS     A                   ARE GYRO COMMANDS GREATER THAN 2 PULSES
0247   REF   4  LAST  312        06,3505  55'477 0           TS      GCOMPSW             YES - SET GCOMPSW POSITIVE
0248   REF  21  LAST  313        06,3506  0 0131 1           TC      BUF +1              NO
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L        IMU COMPENSATION PACKAGE                                                        USER'S PAGE NO.  7      E3 S3

 02481  REF   5  LAST  256   06,3507  3 1335 0  1/CHECK  CA      MODECADR
 02482                       06,3510  0 0006 1           EXTEND
 02483  REF   1              06,3511  1 3513 1           BZF     1/GYRO
 02484  REF  15  LAST  277   06,3512  1 5205 1           TCF     ENDOFJOB

 0249   REF   2  LAST  308   06,3513  3 4766 1  1/GYRO   CAF     FOUR              PIPAZ, PIPAY, PIPAX
 0250   REF  22  LAST  313   06,3514  54 130 1    +1     TS      BUF

 0251   REF  23  LAST  314   06,3515  50 130 0           INDEX   BUF               SCALE GYRO COMMANDS FOR IMUPULSE
 0252   REF   8  LAST  313   06,3516  3 1472 1           CA      GCOMP +1          FRACTIONAL PULSES
 0253                        06,3517  0 0006 1           EXTEND
 0254   REF  23  LAST  221   06,3520  7 4761 1           MP      BIT8              SHIFT RIGHT 7
 0255   REF  24  LAST  314   06,3521  50 130 0           INDEX   BUF
 0256   REF   9  LAST  314   06,3522  55'472 0           TS      GCOMP +1          FRACTIONAL PULSES SCALED

 0257   REF  35  LAST  313   06,3523  3 4772 1           CAF     ZERO              SET GCOMP = 0 FOR DAS INSTRUCTION
 0258   REF  25  LAST  314   06,3524  50 130 0           INDEX   BUF
 0259   REF  10  LAST  314   06,3525  57'471 1           XCH     GCOMP             GYRO PULSES
 0260                        06,3526  0 0006 1           EXTEND
 0261   REF  24  LAST  314   06,3527  7 4761 1           MP      BIT8              SHIFT RIGHT 7
 0262   REF  26  LAST  314   06,3530  50 130 0           INDEX   BUF
 0263   REF  11  LAST  314   06,3531  21'472 0           DAS     GCOMP             ADD THESE TO FRACTIONAL PULSES ABOVE

 0264   REF  27  LAST  314   06,3532  10 130 1           CCS     BUF               PIPAZ, PIPAY, PIPAX
 0265   REF   1              06,3533  6 7702 0           AD      NEG1
 0266   REF   2  LAST  314   06,3534  1 3514 0           TCF     1/GYRO +1
 0267   REF  12  LAST  314   06,3535   01471 1  LGCOMP   ECADR   GCOMP             LESS THAN ZERO IMPOSSIBLE

 0268   REF   2  LAST  308   06,3536  3 3535 1           CAF     LGCOMP
 0269   REF  36  LAST  279   06,3537  0 4636 0           TC      BANKCALL
 0270   REF   2  LAST  256   06,3540   17244 0           CADR    IMUPULSE          CALL GYRO TORQUING ROUTINE
 0271   REF  37  LAST  314   06,3541  0 4636 0           TC      BANKCALL
 0272   REF   5  LAST  256   06,3542   17644 1           CADR    IMUSTALL          WAIT FOR PULSES TO GET OUT
 0273                        06,3543  1 3544 0           TCF     +1

 0274   REF   3  LAST  314   06,3544  3 4766 1  GCOMP1   CAF     FOUR              PIPAZ, PIPAY, PIPAX
 0275   REF  28  LAST  314   06,3545  54 130 1    +1     TS      BUF

 0276   REF  29  LAST  314   06,3546  50 130 0           INDEX   BUF               RESCALE
 0277   REF  13  LAST  314   06,3547  3 1472 1           CA      GCOMP +1
 0278                        06,3550  0 0006 1           EXTEND
 0279   REF  25  LAST  314   06,3551  7 4761 1           MP      BIT8              SHIFT MINOR PART LEFT 7 - MAJOR PART =
 0280   REF  30  LAST  314   06,3552  50 130 0           INDEX   BUF
 0281   REF  14  LAST  314   06,3553  23'472 1           LXCH    GCOMP +1          BITS 8-14 OF MINOR PART WERE = 0

 0282   REF  31  LAST  314   06,3554  10 130 1           CCS     BUF               PIPAZ, PIPAY, PIPAX
 0283   REF   2  LAST  314   06,3555  6 7702 0           AD      NEG1
 0284   REF   1              06,3556  1 3545 1           TCF     GCOMP1 +1
 0285                        06,3557   75252 0  OCT75252 OCT     75252             -15 DEGREES USED BY T4RUPT
 0286   REF  16  LAST  314   06,3560  1 5205 1           TCF     ENDOFJOB
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0287   REF   5  LAST  313   06,3561  11'477 0  NBDONLY  CCS     GCOMPSW         BYPASS IF GCOMPSW NEGATIVE
0288                        06,3562   1 3565 0           TCF     +3
0289                        06,3563   1 3565 0           TCF     +2
0290   REF  17  LAST  314   06,3564   1 5205 1           TCF     ENDOFJOB

029005                      06,3565   0 0004 0           INHINT
02901  REF   9  LAST  247   06,3566   3 0076 0           CA      FLAGWRD2
02902  REF   1              06,3567   7 4752 1           MASK    DRFTBIT
02903                       06,3570   0 0006 1           EXTEND
02904  REF  18  LAST  315   06,3571   1 5205 1           BZF     ENDOFJOB

0291   REF   8  LAST  238   06,3572   3 0025 0           CA      TIME1           (CS) X 2(+14)
0292   REF   4  LAST  313   06,3573  57'277 1           XCH     1/PIPADT        PREVIOUS TIME
02925                       06,3574   0 0003 1           RELINT
0293                        06,3575   4 0000 0           COM
0294   REF   5  LAST  315   06,3576   6 1277 1           AD      1/PIPADT
0295   REF  80  LAST  313   06,3577  10 000 0  NBD2     CCS     A               CALCULATE ELAPSED TIME
0296   REF  13  LAST  282   06,3600   6 4770 0           AD      ONE             NO TIME1 OVERFLOW
0297   REF   1              06,3601   1 3606 0           TCF     NBD3            RESTORE TIME DIFFERENCE AND JUMP
0298                        06,3602   1 3604 1           TCF     +2              TIME1 OVERFLOW
0299   REF  19  LAST  315   06,3603   1 5205 1           TCF     ENDOFJOB        IF ELAPSED TIME = 0   (DIFFERENCE = -0)

0300                        06,3604   4 0000 0           COM                     CALCULATE ABSOLUTE DIFFERENCE
0301   REF   7  LAST  262   06,3605   6 4750 1           AD      POSMAX

0302                        06,3606   0 0006 1  NBD3     EXTEND                  C(A) = DELTAT    (CS) X 2(+14)
0303   REF  16  LAST  276   06,3607   7 4757 1           MP      BIT10           SHIFT RIGHT 5
0304   REF  17  LAST  312   06,3610  52 123 0           DXCH    VBUF
0305                        06,3611   0 0006 1           EXTEND
0306   REF  18  LAST  315   06,3612   3 0123 1           DCA     VBUF
0307   REF  54  LAST  313   06,3613  52 155 1           DXCH    MPAC            DELTAT NOW SCALED (CS) X 2(+19)

0308   REF  36  LAST  314   06,3614   3 4772 1           CAF     ZERO
0309   REF   6  LAST  315   06,3615  55'477 0           TS      GCOMPSW         INDICATE COMMANDS 2 PULSES OR LESS
0310   REF  32  LAST  314   06,3616  54 130 1           TS      BUF             PIPAX, PIPAY, PIPAZ

0311   REF   4  LAST  312   06,3617   4 1460 0           CS      NBDX            (GYRO PULSES)/(CS) X 2(-5)
0312   REF   1              06,3620   0 3636 1           TC      FBIASSUB        -(NBDX)(DELTAT)   (GYRO PULSES) X 2(+14)

0313                        06,3621   0 0006 1           EXTEND
0314   REF  19  LAST  315   06,3622   4 0123 0           DCS     VBUF
0315   REF  55  LAST  315   06,3623  52 155 1           DXCH    MPAC            DELTAT SCALED (CS) X 2(+19)
0316   REF   2  LAST  310   06,3624   3 1461 0           CA      NBDY            (GYRO PULSES)/(CS) X 2(-5)
0317   REF   2  LAST  315   06,3625   0 3636 1           TC      FBIASSUB        -(NBDY)(DELTAT)   (GYRO PULSES) X 2(+14)

0318                        06,3626   0 0006 1           EXTEND
0319   REF  20  LAST  315   06,3627   4 0123 0           DCS     VBUF
0320   REF  56  LAST  315   06,3630  52 155 1           DXCH    MPAC            DELTAT SCALED (CS) X 2(+19)
0321   REF   2  LAST  311   06,3631   4 1462 1           CS      NBDZ            (GYRO PULSES)/(CS) X 2(-5)
0322   REF   3  LAST  315   06,3632   0 3636 1           TC      FBIASSUB        +(NBDZ)(DELTAT)   (GYRO PULSES) X 2(+14)
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 0323   REF   7  LAST  315   06,3633  11477 0        CCS     GCOMPSW        ARE GYRO COMMANDS GREATER THAN 2 PULSES
 0324   REF   3  LAST  314   06,3634  1 3513 1       TCF     1/GYRO         YES
 0325   REF  20  LAST  315   06,3635  1 5205 1       TCF     ENDOFJOB       NO
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                                                                                   USER'S PAGE NO.  1        E3 S3
L       IMU COMPENSATION PACKAGE

 0326    REF  36  LAST  312   06,3636  56 002 0   FBIASSUB XCH     Q
 0327    REF  33  LAST  315   06,3637  54 131 0            TS      BUF +1

 0328    REF  37  LAST  317   06,3640   3 0002 0           CA      Q            NBD SCALED (GYRO PULSES)/(CS) X 2(-5)
 0329                         06,3641   0 0006 1           EXTEND
 0330    REF  57  LAST  315   06,3642   7 0154 0           MP      MPAC         DELTAT SCALED (CS) X 2(+19)
 0331    REF  34  LAST  317   06,3643  50 130 0            INDEX   BUF
 0332    REF  15  LAST  314   06,3644  21'472 0            DAS     GCOMP        HI(NBD)(DELTAT)    (GYRO PULSES) X 2(+14)

 0333    REF  38  LAST  317   06,3645   3 0002 0           CA      Q            NOW FRACTIONAL PART
 0334                         06,3646   0 0006 1           EXTEND
 0335    REF  58  LAST  317   06,3647   7 0155 1           MP      MPAC +1
 0336    REF  30  LAST  313   06,3650  54 001 1            TS      L
 0337    REF  37  LAST  315   06,3651   3 4772 1           CAF     ZERO
 0338    REF  35  LAST  317   06,3652  50 130 0            INDEX   BUF
 0339    REF  16  LAST  317   06,3653  21'472 0            DAS     GCOMP        (NBD)(DELTAT)      (GYRO PULSES) X 2(+14)

 0340    REF   1              06,3654   1 3474 1           TCF     DRFTSUB2     CHECK MAGNITUDE OF COMPENSATION

 03401   REF  38  LAST  314   06,3655   0 4636 0  LASTBIAS TC      BANKCALL
 03402   REF   1              06,3656    17214 0           CADR    PIPUSE

 0341    REF   8  LAST  316   06,3657  11'477 0            CCS     GCOMPSW      BYPASS IF GCOMPSW NEGATIVE
 0342                         06,3660   1 3663 0           TCF     +3
 0343                         06,3661   1 3663 0           TCF     +2
 0344    REF  21  LAST  316   06,3662   1 5205 1           TCF     ENDOFJOB

 0345    REF   1              06,3663   3 7652 1           CAF     PRIO31       2 SECONDS SCALED (CS) X 2(+8)
 0346    REF   6  LAST  315   06,3664  57'277 1            XCH     1/PIPADT
 0347                         06,3665   4 0000 0           COM
 0348    REF   4  LAST  188   06,3666   6 1105 1           AD      PIPTIME1 +1  TIME AT PIPA1 =0
 0349    REF   1              06,3667   1 3577 0           TCF     NBD2

 0350                         06,3670    21450 0  90SECS   DEC     900
 0351                         06,3671    16037 1  20DEGS   DEC     7199
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L       PINBALL GAME  BUTTONS AND LIGHTS                                                     USER'S PAGE NO.   1      L 51

R0001   PROGRAM NAME - KEYBOARD AND DISPLAY PROGRAM
R0002   MOD BY - BARNERT    DATE - 20 AUG 1969
R0004   LOG SECTION - PINBALL GAME  BUTTONS AND LIGHTS

R0009   FUNCTIONAL DESCRIPTION-

R0010      THE KEYBOARD AND DISPLAY SYSTEM PROGRAM OPERATES UNDER EXECUTIVE
R0011   CONTROL AND PROCESSES INFORMATION EXCHANGED BETWEEN THE AGC AND THE
R0012   COMPUTER OPERATOR.  THE INPUTS TO THE PROGRAM ARE FROM THE KEYBOARD,
R0013   FROM INTERNAL PROGRAMS, AND FROM THE UPLINK.
R0014      THE LANGUAGE OF COMMUNICATION WITH THE PROGRAM IS A PAIR OF WORDS
R0015   KNOWN AS VERB AND NOUN.  EACH OF THESE IS REPRESENTED BY A 2 CHARACTER
R0016   DECIMAL NUMBER.  THE VERB CODE INDICATES WHAT ACTION IS TO BE TAKEN, THE
R0017   NOUN CODE INDICATES TO WHAT THIS ACTION IS APPLIED.  NOUNS USUALLY
R0018   REFER TO A GROUP OF ERASABLE REGISTERS.

R0020   VERBS ARE GROUPED INTO DISPLAYS, LOADS, MONITORS (DISPLAYS THAT ARE
R0021   UPDATED ONCE PER SECOND), SPECIAL FUNCTIONS, AND EXTENDED VERBS(THESE
R0022   ARE OUTSIDE OF THE DOMAIN OF PINBALL AND CAN BE FOUND UNDER LOG SECTION
R0023   :EXTENDED VERBS:).
R0024   A LIST OF VERBS AND NOUNS IS GIVEN IN LOG SECTION :ASSEMBLY AND
R0025   OPERATION INFORMATION:.


R0026   CALLING SEQUENCES-

R0027   KEYBOARD:
R0028      EACH DEPRESSION OF A MAIN (NAVIGATION) KEYBOARD BUTTON ACTIVATES
R0029   INTERRUPT KEYRUPT1 (KEYRUPT2) AND PLACES THE 5 BIT KEY CODE INTO
R00291  CHANNEL 15 (CHANNEL 16).  KEYRUPT1 (KEYRUPT2) PLACES THE KEY
R0030   CODE INTO MPAC, ENTERS AN EXECUTIVE REQUEST FOR THE KEYBOARD AND DISPLAY
R0031   PROGRAM (AT :CHARIN:), AND EXECUTES A RESUME.

R0032   UPLINK:
R0033      EACH WORD RECEIVED BY THE UPLINK ACTIVATES INTERRUPT UPRUPT WHICH
R0034   PLACES THE 5 BIT KEY CODE INTO MPAC, ENTERS AN EXECUTIVE REQUEST FOR THE
R0035   KEYBOARD AND DISPLAY PROGRAM (AT:CHARIN:) AND EXECUTES A RESUME.

R0036   INTERNAL PROGRAMS:
R0037      INTERNAL PROGRAMS CALL PINBALL AT :NVSUB: WITH THE DESIRED VERB/NOUN
R0038   CODE IN A (LOW 7 BITS FOR NOUN, NEXT 7 BITS FOR VERB).  DETAILS
R0039   DESCRIBED ON REMARKS CARDS JUST BEFORE :NVSUB: (SEE
R0040   SYMBOL TABLE FOR PAGE NUMBERS).


R0045   NORMAL EXIT MODES-

R0046      IF PINBALL WAS CALLED BY EXTERNAL ACTION, THERE ARE FOUR EXITS:
R00460S          1) ALL BUT (2), (3), AND (4) EXIT DIRECTLY TO ENDOFJOB.
R00461           2) EXTENDED VERBS GO TO THE EXTENDED VERB FAN AS PART OF THE
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R004615                PINBALL EXECUTIVE JOB WITH PRIORITY 30000.  IT IS THE
R00462                 RESPONSIBILITY OF THE EXTENDED VERB CALLED TO EVENTUALLY
R00463                 CHANGE PRIORITY (IF NECESSARY) AND DO AN ENDOFJOB.
R004635                ALSO PINBALL IS A NOVAC JOB. EBANK SET FOR COMMON.
R00464              3) VERB 37. CHANGE OF PROGRAM (MAJOR MODE) CALLS :V37: IN THE
R00465                 SERVICE ROUTINES AS PART OF THE PINBALL EXEC JOB WITH PRIO
R00466                 30000.  THE NEW PROGRAM CODE (MAJOR MODE) IS LEFT IN A.
R00467              4) KEY RELEASE BUTTON CALLS :PINBRNCH: IN THE DISPLAY INTERFACE
R00468                 ROUTINES AS PART OF THE PINBALL EXEC JOB WITH PRIO 30000 IF
R00469                 THE KEY RELEASE LIGHT IS OFF AND :CADRSTOR: IS NOT +0.

R0047        IF PINBALL WAS CALLED BY INTERNAL PROGRAMS, EXIT FROM PINBALL IS BACK
R0048     TO CALLING ROUTINE.  DETAILS DESCRIBED IN REMARKS CARDS JUST BEFORE
R0049     :NVSUB:
R0050     ALARM OR ABORT EXIT MODES-

R0051     EXTERNAL INITIATION:
R0052        IF SOME IMPROPER SEQUENCE OF KEY CODES IS DETECTED, THE OPERATOR
R0053     ERROR LIGHT IS TURNED ON AND EXIT IS TO :ENDOFJOB:.

R0054     INTERNAL PROGRAM INITIATION:
R0055        IF AN ILLEGAL V/N COMBINATION IS ATTEMPTED, AN ABORT IS CAUSED
R0056     (WITH OCTAL 21501)
R00561       IF A SECOND ATTEMPT IS MADE TO GO TO SLEEP IN PINBALL, AN ABORT IS
R00562    CAUSED (WITH OCTAL 21206). THERE ARE TWO WAYS TO GO TO SLEEP IN PINBALL:
R00563              1) ENDIDLE
R00564              2) NVSUBUSY
R0059     OUTPUT-

R0060        INFORMATION TO BE SENT TO THE DISPLAY PANEL IS LEFT IN THE :DSPTAB:
R0061     BUFFERS REGISTERS (UNDER EXEC CONTROL).  :DSPOUT: (A PART OF T4RUPT)
R0062     HANDLES THE PLACING OF THE :DSPTAB: INFORMATION INTO OUTPUT CHANNEL 10
R0063     IN INTERRUPT.

R0064     ERASABLE INITIALIZATION-

R0065        FRESH START AND RESTART INITIALIZE THE NECESSARY E REGISTERS FOR
R0066     PINBALL IN :STARTSUB:.   REGISTERS ARE:  DSPTAB BUFFER, CADRSTOR,
R0067     REQRET, CLPASS, DSPLOCK, MONSAVE, MONSAVE1, VERBREG, NOUNREG, DSPLIST,
R0068     DSPCOUNT, NOUT.

R0069     A COMPLETE LIST OF ALL THE ERASABLES (BOTH RESERVED AND TEMPORARIES) FOR
R0070     PINBALL IS GIVEN BELOW.

R0071     THE FOLLOWING ARE OF GENERAL INTEREST-

R0072        REMARKS CARDS PRECEDE THE REFERENCED SYMBOL DEFINITION.  SEE SYMBOL
R0073     TABLE TO FIND APPROPRIATE PAGE NUMBERS.
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L          PINBALL GAME  BUTTONS AND LIGHTS                                                USER'S PAGE NO.   3      EQ S3

R0074       NVSUB   CALLING POINT FOR INTERNAL USE OF PINBALL.
R0075                   OF RELATED INTEREST - NVSUBUSY
R0083       ENDIDLE    ROUTINE FOR INTERNAL PROGRAMS WISHING TO GO TO SLEEP WHILE
R0084                   AWAITING OPERATORS RESPONSE.

R00851      DSPMMJOB ROUTINE CALL WITH PRIO 30000, USED TO DISPLAY A DECIMAL
R00852               PROGRAM CODE (MAJOR MODE) IN THE PROGRAM (MAJOR MODE) LIGHTS.
R00853      BLANKSUB   ROUTINE BY WHICH AN INTERNAL PROGRAM MAY BLANK ANY
R00854                  COMBINATION OF THE DISPLAY REGISTERS R1, R2, R3.

R00855      JAMTERM    ROUTINES BY WHICH AN INTERNAL PROGRAM MAY PERFORM THE
R00856                 TERNINATE (V 34) FUNCTION
R0086       MONITOR    VERBS FOR PERIODIC ( 1 PER SEC) DISPLAY.

R00861      PLEASE PERFORM, PLEASE MARK SITUATIONS
R00862                     REMARKS DESCRIBING HOW AN INTERNAL ROUTINE SHOULD HANDLE
R00863                     THESE SITUATIONS CAN BE FOUND JUST BEFORE :NVSUB: (SEE
R00864                     SYMBOL TABLE FOR PAGE NUMBER).

R0087       THE NOUN TABLE FORMAT IS DESCRIBED ON A PAGE OF REMARKS CARDS JUST
R0088       BEFORE :DSPABC: (SEE SYMBOL TABLE FOR PAGE NUMBER).

R0089       THE NOUN TABLES THEMSELVES ARE FOUND IN LOG SECTION :PINBALL NOUN
R00891      TABLES:.

R0090    FOR FURTHER DETAILS ABOUT OPERATION OF THE KEYBOARD AND DISPLAY SYSTEM
R0091    PROGRAM, SEE THE MISSION PLAN AND/OR MIT/IL E-2129
R0092    DESCRIBING KEYBOARD AND DISPLAY OPERATION FOR 278.

R0150    THE FOLLOWING QUOTATION IS PROVIDED THROUGH THE COURTESY OF THE AUTHORS.

R0151          ::IT WILL BE PROVED TO THY FACE THAT THOU HAST MEN ABOUT THEE THAT
R0152    USUALLY TALK OF A NOUN AND A VERB, AND SUCH ABOMINABLE WORDS AS NO
R0153    CHRISTIAN EAR CAN ENDURE TO HEAR.::

R0154                          HENRY 6, ACT 2, SCENE 4

R0155    THE FOLLOWING ASSIGNMENTS FOR PINBALL ARE MADE ELSEWHERE

R0156    RESERVED FOR PINBALL EXECUTIVE ACTION

R0157    DSPCOUNT ERASE                     DISPLAY POSITION INDICATOR
R0158    DECBRNCH ERASE                     +DEC, - DEC, OCT INDICATOR
R0159    VERBREG  ERASE                     VERB CODE
R0160    NOUNREG  ERASE                     NOUN CODE
R0161    XREG     ERASE                     R1 INPUT BUFFER
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R0162   YREG      ERASE                      R2 INPUT BUFFER
R0163   ZREG      ERASE                      R3 INPUT BUFFER
R0164   XREGLP    ERASE                      LO PART OF XREG (FOR DEC CONV ONLY)
R0165   YREGLP    ERASE                      LO PART OF YREG (FOR DEC CONV ONLY)
R0166   HITEMOUT =        YREGLP             TEMP FOR DISPLAY OF HRS, MIN, SEC
R0167                                                   MUST = LOTEMOUT-1.
R0168   ZREGLP    ERASE                      LO PART OF ZREG (FOR DEC CONV ONLY)
R0169   LOTEMOUT =        ZREGLP             TEMP FOR DISPLAY OF HRS, MIN, SEC
R0170                                                   MUST = HITEMOUT+1.
R0171   MODREG    ERASE                      MODE CODE
R0172   DSPLOCK   ERASE                      KEYBOARD/SUBROUTINE CALL INTERLOCK
R0173   REQRET    ERASE                      RETURN REGISTER FOR LOAD
R0174   LOADSTAT  ERASE                      STATUS INDICATOR FOR LOADTST
R0175   CLPASS    ERASE                      PASS INDICATOR CLEAR
R0176   NOUT      ERASE                      ACTIVITY COUNTER FOR DSPTAB
R0177   NOUNCADR  ERASE                      MACHINE CADR FOR NOUN
R0178   MONSAVE   ERASE                      N/V CODE FOR MONITOR. (= MONSAVE1-1)
R0179   MONSAVE1  ERASE                      NOUNCADR FOR MONITOR(MATBS) =MONSAVE +1
R01795  MONSAVE2  ERASE                      NVMONOPT OPTIONS
R0180   DSPTAB    ERASE           +13D       0-10,DISPLAY PANEL BUFFER.11-13,C RELAYS
R0181   CADRSTOR  ERASE                      ENDIDLE STORAGE
R0182   NVQTEM    ERASE                      NVSUB STORAGE FOR CALLING ADDRESS
R0183                                        MUST = NVBNKTEM-1
R0184   NVBNKTEM  ERASE                      NVSUB STORAGE FOR CALLING BANK
R0185                                        MUST = NVQTEM+1
R0186   VERBSAVE  ERASE                      NEEDED FOR RECYCLE
R0187   DSPLIST   ERASE                      WAITING REG FOR DSP SYST INTERNAL USE
R0188   EXTVBACT  REASE                      EXTENDED VERB ACTIVITY INTERLOCK
R0189   DSPTEM1   ERASE           +2         BUFFER STORAGE AREA 1 (MOSTLY FOR TIME)
R0190   DSPTEM2   ERASE           +2         BUFFER STORAGE AREA 2 (MOSTLY FOR DEG)
R0191   END OF ERASABLES RESERVED FOR PINBALL EXECUTIVE ACTION


R0192   TEMPORARIES FOR PINBALL EXECUTIVE ACTION

R0193   DSEXIT    =       INTB15+            RETURN FOR DSPIN
R0194   EXITEM    =       INTB15+            RETURN FOR SCALE FACTOR ROUTINE SELECT
R0195   BLANKRET  =       INTB15+            RETURN FOR 2BLANK

R0196   WRDRET    =       INTBIT15           RETURN FOR 5BLANK
R0197   WDRET     =       INTBIT15           RETURN FOR DSPWD
R0198   DECRET    =       INTBIT15           RETURN FOR PUTCOM(DEC LOAD)
R0199   21/22REG  =       INTBIT15           TEMP FOR CHARIN

R0200   UPDATRET  =       POLISH             RETURN FOR UPDATNN, UPDATVB
R0201   CHAR      =       POLISH             TEMP FOR CHARIN
R0202   ERCNT     =       POLISH             COUNTER FOR ERROR LIGHT RESET
R0203   DECOUNT   =       POLISH             COUNTER FOR SCALING AND DISPLAY (DEC)

R0204   SGNON     =       VBUF               TEMP FOR +,- ON
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R0205   NCUNTEM  =      VBUF               COUNTER FOR MIXNOUN FETCH
R0206   DISTEM   =      VBUF               COUNTER FOR OCTAL DISPLAY VERBS
R0207   DECTEM   =      VBUF               COUNTER FOR FETCH (DEC DISPLAY VERBS)

R0208   SGNOFF   =      VBUF     +1        TEMP FOR +,- ON
R0209   NVTEMP   =      VBUF     +1        TEMP FOR NVSUB
R0210   SFTEMP1  =      VBUF     +1        STORAGE FOR SF CONST HI PART(=SFTEMP2-1)
R0211   HITEMIN  =      VBUF     +1        TEMP FOR LOAD OF HRS, MIN, SEC
R0212                                               MUST = LOTEMIN-1.
R0213   CODE     =      VBUF     +2        FOR DSPIN
R0214   SFTEMP2  =      VBUF     +2        STORAGE FOR SF CONST LO PART(=SFTEMP1+1)
R0215   LOTEMIN  =      VBUF     +2        TEMP FOR LOAD OF HRS, MIN, SEC
R0216                                               MUST = HITEMIN+1.
R0217   MIXTEMP  =      VBUF     +3        FOR MIXNOUN DATA
R0218   SIGNRET  =      VBUF     +3        RETURN FOR +,- ON

R0219   ALSO MIXTEMP+1 = VBUF+4, MIXTEMP+2 = VBUF+5.

R0220   ENTRET   =      DOTINC             EXIT FROM ENTER

R0221   WDCNT    =      DOTRET             CHAR COUNTER FOR DSPWD
R0222   INREL    =      DOTRET             INPUT BUFFER SELECTOR ( X,Y,Z, REG )

R0223   DSPMMTEM =      MATINC             DSPCOUNT SAVE FOR DSPMM
R0224   MIXBR    =      MATINC             INDICATOR FOR MIXED OR NORMAL NOUN

R0225   TEM1     ERASE                     EXEC TEMP
R0226   DSREL    =      TEM1               REL ADDRESS FOR DSPIN

R0227   TEM2     ERASE                     EXEC TEMP
R0228   DSMAG    =      TEM2               MAGNITUDE STORE FOR DSPIN
R0229   IDADDTEM =      TEM2               MIXNOUN INDIRECT ADDRESS STORAGE

R0230   TEM3     ERASE                     EXEC TEMP
R0231   COUNT    =      TEM3               FOR DSPIN

R0232   TEM4     ERASE                     EXEC TEMP
R0233   LSTPTR   =      TEM4               LIST POINTER FOR GRABUSY
R0234   RELRET   =      TEM4               RETURN FOR RELDSP
R0235   FREERET  =      TEM4               RETURN FOR FREEDSP
R0236   DSPWDRET =      TEM4               RETURN FOR DSPSIGN
R0237   SEPSCRET =      TEM4               RETURN FOR SEPSEC
R0238   SEPMNRET =      TEM4               RETURN FOR SEPMIN

R0239   TEM5     ERASE                     EXEC TEMP
R0240   NOUNADD  =      TEM5               TEMP STORAGE FOR NOUN ADDRESS

R0241   NNADTEM  ERASE                     TEMP FOR NOUN ADDRESS TABLE ENTRY
R0242   NNTYPTEM ERASE                     TEMP FOR NOUN TYPE TABLE ENTRY
R0243   IDADITEM ERASE                     TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
```

```
R0244                                     MUST = IDAD2TEM-1, = IDAD3TEM-2.
R0245   IDAD2TEM ERASE                    TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0246                                     MUST = IDAD1TEM+1, = IDAD3TEM-1.
R0247   IDAD3TEM ERASE                    TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0248                                     MUST = IDAD1TEM+2, = IDAD2TEM+1.
R0249   RUTMXTEM ERASE                    TEMP FOR SF ROUT TABLE ENTRY(MIXNN ONLY)
R0250   END OF TEMPORARIES FOR PINBALL EXECUTIVE ACTION


R02501  ADDITIONAL TEMPORARIES FOR PINBALL EXECUTIVE ACTION

R02502  MPAC, THRU MPAC +6
R02503  BUF, +1, +2
R02504  BUF2, +1, +2
R02506  MPTEMP
R02507  ADDRWD
R02509    END OF ADDITIONAL TEMPS FOR PINBALL EXEC ACTION


R0251   RESERVED FOR PINBALL INTERRUPT ACTION

R0252   DSPCNT   ERASE                    COUNTER FOR DSPOUT
R0253   UPLOCK   ERASE                    BIT1 = UPLINK INTERLOCK (ACTIVATED BY
A0254                                                                RECEPTION OF A BAD MESSAGE IN UPLINK)
R0255   END OF ERASABLES RESERVED FOR PINBALL INTERRUPT ACTION


R0256   TEMPORARIES FOR PINBALL INTERRUPT ACTION

R0257   KEYTEMP1 =       WAITEXIT         TEMP FOR KEYRUPT, UPRUPT
R0258   DSRUPTEM =       WAITEXIT         TEMP FOR DSPOUT
R0259   KEYTEMP2 =       RUPTAGN          TEMP FOR KEYRUPT, UPRUPT
R0260   END OF TEMPORARIES FOR PINBALL INTERRUPT ACTION
```

```
R0261   THE INPUT CODES ASSUMED FOR THE KEYBOARD ARE,
R0262   0          10000
R0263   1          00001
R0264   9          01001
R0265   VERB       10001
R0266   ERROR RES10010
R0267   KEY RLSE 11001
R0268   +          11010
R0269   -          11011
R0270   ENTER      11100
R0271   CLEAR      11110
R0272   NOUN       11111


R0273   OUTPUT FORMAT FOR DISPLAY PANEL. SET OUT0 TO  AAAABCCCCCDDDDD.
R0274   A-S SELECT A RELAYWORD. THIS DETERMINES WHICH PAIR OF CHARACTERS ARE
R0275   ENERGIZED.
R0276   B FOR SPECIAL RELAYS SUCH AS SIGNS ETC.
R0277   C-S  5 BIT RELAY CODE FOR LEFT CHAR OF PAIR SELECTED BY RELAYWORD
R0278   D-S  5 BIT RELAY CODE FOR RIGHTCHAR OF PAIR SELECTED BY RELAYWORD.

R0279   THE PANEL APPEARS AS FOLLOWS,
R0280   MD1      MD2                                  (MAJOR MODE)
R0281   VD1      VD2 (VERB)     ND1        ND2        (NOUN)
R0282   R1D1     R1D2     R1D3     R1D4     R1D5      (R1)
R0283   R2D1     R2D2     R2D3     R2D4     R2D5      (R2)
R0284   R3D1     R3D2     R3D3     R3D4     R3D5      (R3)

R0285   EACH OF THESE IS GIVEN A DSPCOUNT NUMBER FOR USE WITHIN COMPUTATION ONLY
R0286   MD1    25       R2D1  11             ALL ARE OCTAL
R0287   MD2    24       R2D2  10
R0288   VD1    23       R2D3   7
R0289   VD2    22       R2D4   6
R0290   ND1    21       R2D5   5
R0291   ND2    20       R3D1   4
R0292   R1D1  16        R3D2   3
R0293   R1D2  15        R3D3   2
R0294   R1D3  14        R3D4   1
R0295   R1D4  13        R3D5   0
R0296   R1D5  12


R0297   THERE IS AN 11 REGISTER TABLE (DSPTAB) FOR THE DISPLAY PANEL.

R0298   DSPTAB RELAYWD          BIT11        BITS 10-6        BITS 5-1
R0299   RELADD
R0300   10        1011                       MD1  (25)        MD2  (24)
R0301   9         1010                       VD1  (23)        VD2  (22)
R0302   8         1001                       ND1  (21)        ND2  (20)
R0303   7         1000                                        R1D1 (16)
```

```
L         PINBALL GAME  BUTTONS AND LIGHTS                                                           USER'S PAGE NO.   8        EO 53

R0304   6       0111            +R1         R1D2 (15)      R1D3 (14)
R0305   5       0110            -R1         R1D4 (13)      R1D5 (12)
R0306   4       0101            +R2         R2D1 (11)      R2D2 (10)
R0307   3       0100            -R2         R2D3 (7)       R2D4 (6)
R0308   2       0011                        R2D5 (5)       R3D1 (4)
R0309   1       0010            +R3         R3D2 (3)       R3D3 (2)
R0310   0       0001            -R3         R3D4 (1)       R3D5 (0)
R0311           0000   NO RELAYWORD

R0312   THE 5 BIT OUTPUT RELAY CODES ARE:
R0313   BLANK           00000
R0314   0               10101
R0315   1               00011
R0316   2               11001
R0317   3               11011
R0318   4               01111
R0319   5               11110
R0320   6               11100
R0321   7               10011
R0322   8               11101
R0323   9               11111

R03231  OUTPUT BITS USED BY PINBALL:

R03232                  KEY RELEASE LIGHT     - BIT 5 OF CHANNEL 11
R03233                  VERB/NOUN FLASH       - BIT 6 OF CHANNEL 11
R03234                  OPERATOR ERROR LIGHT  - BIT 7 OF CHANNEL 11
```

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L        PINBALL GAME  BUTTONS AND LIGHTS                                                    USER'S PAGE NO.  9     E 53

P0324    START OF EXECUTIVE SECTION OF PINBALL

 032501 REF    1              40,2000                            SETLOC PINBALL1
 032502                       40,2000                            BANK

 03255  REF    1                                                 COUNT* $$/PIN
 0330   REF   14  LAST  315   40,2000   3 4770 0   CHARIN        CAF    ONE              BLOCK DISPLAY SYST
 0331   REF    2  LAST  204   40,2001  57'215 0                  XCH    DSPLOCK          MAKE DSP SYST BUSY, BUT SAVE OLD
 0332   REF    1              40,2002  54 115 0                  TS     21/22REG         C(DSPLOCK) FOR ERROR LIGHT RESET.
 03321  REF    2  LAST  204   40,2003  11'245 1                  CCS    CADRSTOR         ALL KEYS EXCEPT ER TURN ON KR LITE IF
 03322                        40,2004   0 2006 0                 TC     +2               CADRSTOR IS FULL.  THIS REMINDS OPERATOR
 03323  REF    1              40,2005   0 2013 1                 TC     CHARIN2          TO RE-ESTABLISH A FLASHING DISPLAY
 03324  REF    1              40,2006   4 2212 0                 CS     ELRCODE1         WHICH HE HAS OBSCURED WITH DISPLAYS OF
 03325  REF   59  LAST  317   40,2007   6 0154 1                 AD     MPAC             HIS OWN (SEE REMARKS PRECEDING ROUTINE
 03326                        40,2010   0 0006 1                 EXTEND                  VBRELDSP).
 03327  REF    2  LAST  326   40,2011   1 2013 0                 BZF    CHARIN2
 03328  REF    1              40,2012   0 4356 0                 TC     RELDSPON
 0333   REF   60  LAST  326   40,2013  56 154 1    CHARIN2       XCH    MPAC
 0334   REF    1              40,2014  54 117 1                  TS     CHAR
 0335   REF   81  LAST  315   40,2015  50 000 1                  INDEX  A
 0336                         40,2016   0 2017 0                 TC     +1               INPUT CODE      FUNCTION
 0337   REF    1              40,2017   0 3275 1                 TC     CHARALRM          0
 0338   REF    1              40,2020   0 2074 0                 TC     NUM               1
 0339   REF    2  LAST  326   40,2021   0 2074 0                 TC     NUM               2
 0340   REF    3  LAST  326   40,2022   0 2074 0                 TC     NUM               3
 0341   REF    4  LAST  326   40,2023   0 2074 0                 TC     NUM               4
 0342   REF    5  LAST  326   40,2024   0 2074 0                 TC     NUM               5
 0343   REF    6  LAST  326   40,2025   0 2074 0                 TC     NUM               6
 0344   REF    7  LAST  326   40,2026   0 2074 0                 TC     NUM               7
 0345   REF    1              40,2027   0 2064 1                 TC     89TEST            10               8
 0346   REF    2  LAST  326   40,2030   0 2064 1                 TC     89TEST            11               9
 0347   REF    2  LAST  326   40,2031   0 3275 1                 TC     CHARALRM          12
 0348   REF    3  LAST  326   40,2032   0 3275 1                 TC     CHARALRM          13
 0349   REF    4  LAST  326   40,2033   0 3275 1                 TC     CHARALRM          14
 0350   REF    5  LAST  326   40,2034   0 3275 1                 TC     CHARALRM          15
 0351   REF    6  LAST  326   40,2035   0 3275 1                 TC     CHARALRM          16
 0352   REF    7  LAST  326   40,2036   0 3275 1                 TC     CHARALRM          17
 0353   REF    8  LAST  326   40,2037   0 2072 0                 TC     NUM      -2       20               0
 0354   REF    1              40,2040   0 2251 0                 TC     VERB              21               VERB
 0355   REF    1              40,2041   0 3553 1                 TC     ERROR             22               ERROR LIGHT RESET
 0356   REF    8  LAST  326   40,2042   0 3275 1                 TC     CHARALRM          23
 0357   REF    9  LAST  326   40,2043   0 3275 1                 TC     CHARALRM          24
 0358   REF   10  LAST  326   40,2044   0 3275 1                 TC     CHARALRM          25
 0359   REF   11  LAST  326   40,2045   0 3275 1                 TC     CHARALRM          26
 0360   REF   12  LAST  326   40,2046   0 3275 1                 TC     CHARALRM          27
 0361   REF   13  LAST  326   40,2047   0 3275 1                 TC     CHARALRM          30
 0362   REF    1              40,2050   0 3325 0                 TC     VBRELDSP          31               KEY RELEASE
 0363   REF    1              40,2051   0 2304 1                 TC     POSGN             32               +
 0364   REF    1              40,2052   0 2271 1                 TC     NEGSGN            33               -
 0365   REF   1                40,2053   0 4200 1              TC      ENTERJMP          34                  ENTER
 0366   REF  14  LAST  326     40,2054   0 3275 1              TC      CHARALRM          35
 0367   REF   1                40,2055   0 2364 1              TC      CLEAR             36                  CLEAR
 0368   REF   1                40,2056   0 2265 1              TC      NOUN              37                  NOUN


 0369   REF   3  LAST  204     40,2057  11'202 1   CHKDSP      CCS     DSPCOUNT
 0370   REF  39  LAST  317     40,2060   0 0002 0              TC      Q
 0371   REF  40  LAST  327     40,2061   0 0002 0              TC      Q
 0372   REF  22  LAST  317     40,2062   1 5205 1              TCF     ENDOFJOB          BLOCK DATA IN IF DSPCOUNT NEG.
 0373   REF  23  LAST  327     40,2063   1 5205 1              TCF     ENDOFJOB

 0376   REF   1                40,2064   0 2057 1   89TEST     TC      CHKDSP
 03761  REF   5  LAST  262     40,2065   3 6214 0              CAF     THREE
 0377   REF   1                40,2066   7 1203 0              MASK    DECBRNCH
 0378   REF  82  LAST  326     40,2067  10 0000 0              CCS     A
 0379   REF   9  LAST  326     40,2070   0 2074 0              TC      NUM               IF DECBRNCH IS +, 8 OR 9 OK
 0380   REF  15  LAST  327     40,2071   0 3275 1              TC      CHARALRM          IF DECBRNCH IS +0, REJECT 8 OR 9


R0381   NUM ASSEMBLES OCTAL 3 BITS AT A TIME. FOR DECIMAL IT CONVERTS INCOMING
R0382   WORD AS A FRACTION, KEEPING RESULTS TO DP.
R0383   OCTAL RESULTS ARE LEFT IN XREG, YREG, OR ZREG. HI PART OF DEC IN XREG,
R0384   YREG, ZREG. THE LOW PARTS IN XREGLP, YREGLP, OR ZREGLP)
R0385   DECBRNCH IS LEFT AT +0 FOR OCT, +1 FOR + DEC, +2 FOR - DEC.
R0386   IF DSPCOUNT WAS LEFT -, NO MORE DATA IS ACCEPTED.

 0387   REF  38  LAST  317     40,2072   3 4772 1     -2       CAF     ZERO
 0388   REF   2  LAST  326     40,2073  54 0117 1              TS      CHAR
 0389   REF   2  LAST  327     40,2074   0 2057 1   NUM        TC      CHKDSP
 0394   REF   1                40,2075   0 2221 1              TC      GETINREL
 0395   REF   2  LAST  204     40,2076  11'220 1               CCS     CLPASS            IF CLPASS IS + OR +0, MAKE IT +0
 0396   REF  39  LAST  327     40,2077   3 4772 1              CAF     ZERO
 0397   REF   3  LAST  327     40,2100  55'220 1               TS      CLPASS
 0398                          40,2101   0 2102 0              TC      +1
 0399   REF   3  LAST  327     40,2102   3 0117 0              CA      CHAR
 0400   REF   1                40,2103   0 4423 0              TC      CODSTOR
 0405   REF   1                40,2104   0 3161 1              TC      DSPIN
 0406   REF   6  LAST  327     40,2105   3 6214 0              CAF     THREE
 0407   REF   2  LAST  327     40,2106   7 1203 0              MASK    DECBRNCH
 0408   REF  83  LAST  327     40,2107  10 0000 0              CCS     A                 +0, OCTAL.  +1, + DEC.  +2, - DEC.
 0409   REF   1                40,2110   0 2121 1              TC      DECTOBIN          +
 0410   REF   1                40,2111  50 0137 1              INDEX   INREL             +0 OCTAL
 0411   REF   2  LAST  204     40,2112  57'204 0               XCH     VERBREG
 0412   REF   5  LAST  214     40,2113  54 0022 0              TS      CYL
 0413   REF   6  LAST  327     40,2114   4 0022 0              CS      CYL
 0414   REF   7  LAST  327     40,2115   4 0022 0              CS      CYL
 0415   REF   8  LAST  327     40,2116  56 0022 1              XCH     CYL
 0416   REF   4  LAST  327     40,2117   6 0117 0              AD      CHAR
 0417   REF   1                40,2120   0 2136 1              TC      ENDNMTST
 0418    REF   2  LAST  327   40,2121  50 137 1  DECTOBIN INDEX   INREL
 0419    REF   3  LAST  327   40,2122  57'204 0           XCH     VERBREG
 0420    REF  61  LAST  326   40,2123  54 154 0           TS      MPAC                 SUM X 2EXP-14 IN MPAC
 0421    REF  40  LAST  327   40,2124  3 4772 1           CAF     ZERO
 0422    REF  62  LAST  328   40,2125  54 155 1           TS      MPAC      +1
 0423    REF   2  LAST  204   40,2126  3 4355 0           CAF     TEN                  10 X 2EXP-14
 0424    REF   3  LAST  303   40,2127  0 7256 1           TC      SHORTMP              10SUM X 2EXP-28 IN MPAC, MPAC+1
 0425    REF  63  LAST  328   40,2130  56 155 0           XCH     MPAC      +1
 0426    REF   5  LAST  327   40,2131  6 0117 0           AD      CHAR
 0427    REF  64  LAST  328   40,2132  54 155 1           TS      MPAC      +1
 0428    REF   2  LAST  327   40,2133  0 2136 1           TC      ENDNMTST             NO OF
 0429    REF  65  LAST  328   40,2134  26 154 0           ADS     MPAC                 OF MUST BE 5TH CHAR
 0430    REF   1              40,2135  0 2156 1           TC      DECCEND
 0431    REF   3  LAST  328   40,2136  50 137 1  ENDNMTST INDEX   INREL
 0432    REF   4  LAST  328   40,2137  55'204 1           TS      VERBREG
 0433    REF   4  LAST  327   40,2140  4 1202 1           CS      DSPCOUNT
 0434    REF   4  LAST  328   40,2141  50 137 1           INDEX   INREL
 0435    REF   1              40,2142  6 2212 1           AD      CRITCON
 0436                         40,2143  0 0006 1           EXTEND
 0437    REF   1              40,2144  1 2150 0           BZF     ENDNUM               -0, DSPCOUNT = CRITCON
 0438    REF   5  LAST  328   40,2145  11'202 1  MORNUM   CCS     DSPCOUNT             -, DSPCOUNT G/ CRITCON
 04383   REF   6  LAST  328   40,2146  55'202 1           TS      DSPCOUNT             DECREMENT DSPCOUNT
 04386   REF  24  LAST  327   40,2147  0 5205 0           TC      ENDOFJOB
 0439    REF   7  LAST  327   40,2150  3 6214 0  ENDNUM   CAF     THREE
 0440    REF   3  LAST  327   40,2151  7 1203 0           MASK    DECBRNCH
 0441    REF  84  LAST  327   40,2152  10 000 0           CCS     A
 0442    REF   2  LAST  328   40,2153  0 2156 1           TC      DECCEND
 0443    REF   7  LAST  328   40,2154  4 1202 1  ENDALL   CS      DSPCOUNT             BLOCK NUMIN BY PLACING DSPCOUNT
 0444    REF   1              40,2155  0 2146 0           TC      MORNUM    +1         NEGATIVELY
 04442   REF  39  LAST  317   40,2156  0 4636 0  DECCEND  TC      BANKCALL
 04443   REF   1              40,2157   60161 1           CADR    DECEND
 04444   REF   1              40,2160  0 2154 0           TC      ENDALL
 0445    REF  15  LAST  326   40,2161  4 4770 1  DECEND   CS      ONE
 0446    REF   5  LAST  328   40,2162  6 0137 1           AD      INREL
 0447                         40,2163  0 0006 1           EXTEND
 0448    REF   2  LAST  328   40,2164  6 2154 0           BZMF    ENDALL               IF INREL=0,1(VBREG,NNREG), LEAVE WHOLE
 04481   REF   2  LAST  327   40,2165  0 2221 1    +4     TC      GETINREL
 04482   REF   6  LAST  328   40,2166  50 137 1           INDEX   INREL
 04483   REF   5  LAST  328   40,2167  3 1204 0           CA      VERBREG
 04484   REF  66  LAST  328   40,2170  54 155 1           TS      MPAC +1
 0449    REF   1              40,2171  0 7052 1           TC      DMP                  IF INREL=2,3,4(R1,R2,R3),CONVERT TO FRAC
A0450                                                                                  MULT SUM X 2EXP-28 IN MPAC, MPAC+1 BY
 0451    REF   1              40,2172   02217 1           ADRES   DECON                2EXP14/10EXP5. GIVES(SUM/10EXP5)X2EXP-14
 0452    REF   8  LAST  328   40,2173  3 6214 0           CAF     THREE                IN MPAC, +1, +2.
 0453    REF   4  LAST  328   40,2174  7 1203 0           MASK    DECBRNCH
 0454    REF  85  LAST  328   40,2175  50 000 1           INDEX   A
 0455                         40,2176  0 2176 0           TC      +0
 0456    REF   1              40,2177  0 2203 1           TC      +DECSGN
 0457                         40,2200  0 0006 1           EXTEND                       - CASE
 0458    REF  67  LAST  328   40,2201  4 0156 1           DCS     MPAC      +1
 0459  REF 68  LAST 328  40,2202  52 156 1            DXCH    MPAC    +1
 0460  REF 69  LAST 329  40,2203  56 156 0  +DECSGN   XCH     MPAC    +2
 0461  REF  7  LAST 328  40,2204  50 137 1            INDEX   INREL
 0462  REF  1            40,2205  55'207 1            TS      XREGLP  -2
 0463  REF 70  LAST 329  40,2206  56 135 0            XCH     MPAC    +1
 0464  REF  8  LAST 329  40,2207  50 137 1            INDEX   INREL
 0465  REF  6  LAST 328  40,2210  55'204 1            TS      VERBREG
 0466  REF  3  LAST 312  40,2211  0 4651 1            TC      SWRETURN
 04695 REF  2  LAST 328  40,2212            ELRCODE1  EQUALS  CRITCON
 0470                    40,2212   00022 1  CRITCON   OCT     22               (DEC 18)
 0471                    40,2213   00020 0            OCT     20               (DEC 16)
 0472                    40,2214   00012 1            OCT     12               (DEC 10)
 0473                    40,2215   00005 1            OCT     5
 0474                    40,2216   00000 1            OCT     0

 0475                    40,2217   05174 0  CECON     2DEC    E-5 B14          2EXP14/10EXP5 = .16384 DEC
 0475                    40,2220   13261 0


R0476  GETINREL GETS PROPER DATA REG REL ADDRESS FOR CURRENT C(DSPCOUNT) AND
R0477  PUTS IN INTO INREL. +0 VERBREG, 1 NOUNREG, 2 XREG, 3 YREG, 4 ZREG.

 0478  REF  8  LAST 328  40,2221  51'202 0  GETINREL  INDEX   DSPCOUNT
 0479  REF  1            40,2222  3 2225 0            CAF     INREL TAB
 0480  REF  9  LAST 329  40,2223  54 137 0            TS      INREL            (A TEMP, REG)
 0481  REF 41  LAST 327  40,2224  0 0002 0            TC      Q

 0482                    40,2225   00004 0  INRELTAB  OCT     4                R3D5 (DSPCOUNT = 0)
 0483                    40,2226   00004 0            OCT     4                R3D4           =(1)
 0484                    40,2227   00004 0            OCT     4                R3D3           =(2)
 0485                    40,2230   00004 0            OCT     4                R3D2           =(3)
 0486                    40,2231   00004 0            OCT     4                R3D1           =(4)
 0487                    40,2232   00003 1            OCT     3                R2D5           =(5)
 0488                    40,2233   00003 1            OCT     3                R2D4           =(6)
 0489                    40,2234   00003 1            OCT     3                R2D3           =(7)
 0490                    40,2235   00003 1            OCT     3                R2D2           =(8D)
 0491                    40,2236   00003 1            OCT     3                R2D1           =(9D)
 0492                    40,2237   00002 0            OCT     2                R1D5           =(10D)
 0493                    40,2240   00002 0            OCT     2                R1D4           =(11D)
 0494                    40,2241   00002 0            OCT     2                R1D3           =(12D)
 0495                    40,2242   00002 0            OCT     2                R1D2           =(13D)
 0496                    40,2243   00002 0            OCT     2                R1D1           =(14D)
 0497                    40,2244   00244 0  VNDSPCON  OCT     244              .01 ROUNDED UP. CANNOT GET HERE
 0498                    40,2245   00001 0            OCT     1                ND2            =(16D)
 0499                    40,2246   00001 0            OCT     1                ND1            =(17D)
 0500                    40,2247   00000 1            OCT     0                VD2            =(18D)
 0501                    40,2250   00000 1            OCT     0                VD1            =(19D)


 0502  REF 41  LAST 328  40,2251  3 4772 1  VERB      CAF     ZERO
 0503   REF   7  LAST  329   40,2252  55'204 1             TS       VERBREG
 0504   REF   2  LAST  204   40,2253  3 4351 1             CAF      VD1
 0505   REF   9  LAST  329   40,2254  55'202 1  NVCOM      TS       DSPCOUNT
 0506   REF   1              40,2255  0 2473 0             TC       2BLANK
 0507   REF  16  LAST  328   40,2256  3 4770 0             CAF      ONE
 0508   REF   5  LAST  328   40,2257  55'203 0             TS       DECBRNCH          SET FOR DEC V/N CODE
 0509   REF  42  LAST  329   40,2260  3 4772 1             CAF      ZERO
 0510   REF   2  LAST  204   40,2261  55'216 1             TS       REQRET            SET FOR ENTPAS
 0511   REF   1              40,2262  3 4170 0             CAF      ENDINST           IF DSPALARM OCCURS BEFORE FIRST ENTPAS
 0512   REF   2  LAST   71   40,2263  54 136 1             TS       ENTRET            OR NVSUB, ENTRET MUST ALREADY BE SET
A0513                                                                                 TO TC ENDOFJOB
 0514   REF  25  LAST  328   40,2264  0 5205 0             TC       ENDOFJOB
 0515   REF  43  LAST  330   40,2265  3 4772 1  NOUN       CAF      ZERO
 0516   REF   7  LAST  282   40,2266  55'205 0             TS       NOUNREG
 0517   REF   1              40,2267  3 4352 1             CAF      ND1               ND1, OCT 21 (DEC 17)
 0518   REF   1              40,2270  0 2254 0             TC       NVCOM


 0519   REF   1              40,2271  0 2344 0  NEGSGN     TC       SIGNTEST
 0520   REF   1              40,2272  0 2330 0             TC       -ON
 0521   REF   6  LAST  313   40,2273  3 4767 0             CAF      TWO
 0522   REF  10  LAST  329   40,2274  50 137 1  BOTHSGN    INDEX    INREL             SET DEC COMP BIT TO 1 (IN DECBRNCH)
 0523   REF  18  LAST  243   40,2275  6 4762 0             AD       BIT7              BIT 5 FOR R1,  BIT 4 FOR R2,
 0524   REF   6  LAST  330   40,2276  27'203 0             ADS      DECBRNCH          BIT 3 FOR R3
 0525   REF   4  LAST  327   40,2277  11'220 1  FIXCLPAS   CCS      CLPASS            IF CLPASS IS + OR +0, MAKE IT +0
 0526   REF  44  LAST  330   40,2300  3 4772 1             CAF      ZERO
 0527   REF   5  LAST  330   40,2301  55'220 1             TS       CLPASS
 0528                        40,2302  0 2303 0             TC       +1
 0529   REF  26  LAST  330   40,2303  0 5205 0             TC       ENDOFJOB

 0530   REF   2  LAST  330   40,2304  0 2344 0  POSGN      TC       SIGNTEST
 0531   REF   1              40,2305  0 2310 1             TC       +ON
 0532   REF  17  LAST  330   40,2306  3 4770 0             CAF      ONE
 0533   REF   1              40,2307  0 2274 1             TC       BOTHSGN

 0534   REF  42  LAST  329   40,2310  22 002 0  +ON        LXCH     Q
 0535   REF   3  LAST  328   40,2311  0 2221 1             TC       GETINREL
 0536   REF  11  LAST  330   40,2312  50 137 1             INDEX    INREL
 0537   REF   1              40,2313  3 2336 0             CAF      SGNTAB   -2
 0538   REF   1              40,2314  54 123 0             TS       SGNOFF
 0539   REF  18  LAST  330   40,2315  6 4770 0             AD       ONE
 0540   REF   1              40,2316  54 122 1             TS       SGNON
 0541   REF  45  LAST  330   40,2317  3 4772 1  SGNCOM     CAF      ZERO
 0542   REF   1              40,2320  54 124 1             TS       CODE
 0543   REF   2  LAST  330   40,2321  56 123 1             XCH      SGNOFF
 0544   REF   1              40,2322  0 3247 0             TC       11DSPIN
 0545   REF  15  LAST  221   40,2323  3 4756 1             CAF      BIT11
 0546   REF   2  LAST  330   40,2324  54 124 1             TS       CODE
 0547   REF   2  LAST  330   40,2325  56 122 0             XCH      SGNON
 0548   REF   2  LAST  330   40,2326  0 3247 0             TC       11DSPIN
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0549     REF  31  LAST  317   40,2327   0 0001 0     -1      TC       L
0550     REF  43  LAST  330   40,2330  22 0002 0   -ON       LXCH     Q
0551     REF   4  LAST  330   40,2331   0 2221 1             TC       GETINREL
0552     REF  12  LAST  330   40,2332  50 137 1              INDEX    INREL
0553     REF   2  LAST  330   40,2333   3 2336 0             CAF      SGNTAB  -2
0554     REF   3  LAST  330   40,2334  54 122 1              TS       SGNON
0555     REF  19  LAST  330   40,2335   6 4770 0             AD       ONE
0556     REF   3  LAST  330   40,2336  54 123 0              TS       SGNOFF
0557     REF   1              40,2337   0 2317 0             TC       SGNCOM

0558                          40,2340    00005 1  SGNTAB     OCT      5                     -R1
0559                          40,2341    00003 1             OCT      3                     -R2
0560                          40,2342    00000 1    -1       OCT      00000                 -R3
05601                         40,2343    02476 0  DECROUND   OCT      02476                 MUST FOLLOW ZERO WORD
0561     REF  44  LAST  331   40,2344  22 002 0   SIGNTEST   LXCH     Q                     ALLOWS +,- ONLY WHEN DSPCOUNT=R1D1,
0562     REF   9  LAST  328   40,2345   3 6214 0             CAF      THREE                 R2D1, OR R3D1. ALLOWS ONLY FIRST OF
0563     REF   7  LAST  330   40,2346   7 1203 0             MASK     DECBRNCH              CONSECUTIVE +/- CHARACTERS.
0564     REF  86  LAST  328   40,2347  10 000 0              CCS      A                     IF LOW2 BITS OF DECBRNCH NOT= 0, SIGN
0565     REF  27  LAST  330   40,2350   0 5205 0             TC       ENDOFJOB              FOR THIS WORD ALREADY IN. REJECT.
0566     REF   2  LAST  242   40,2351   4 4321 1             CS       R1D1
0567     REF   1              40,2352   0 2360 0             TC       SGNTST1
0568     REF   1              40,2353   4 4322 1             CS       R2D1
0569     REF   2  LAST  331   40,2354   0 2360 0             TC       SGNTST1
0570     REF   1              40,2355   4 4323 0             CS       R3D1
0571     REF   3  LAST  331   40,2356   0 2360 0             TC       SGNTST1
0572     REF  28  LAST  331   40,2357   0 5205 0             TC       ENDOFJOB              NO MATCH FOUND. SIGN ILLEGAL.
0573     REF  10  LAST  330   40,2360   6 1202 0  SGNTST1    AD       DSPCOUNT
0574                          40,2361   0 0006 1             EXTEND
0575     REF   2  LAST  330   40,2362   1 2327 1             BZF      -ON -1                MATCH FOUND. SIGN LEGAL
0576     REF  45  LAST  331   40,2363   0 0002 0             TC       Q
R0578    CLEAR BLANKS WHICH R1, R2, R3 IS CURRENT OR LAST TO BE DISPLAYED(PERTINE
R0579    NT XREG,YREG,ZREG IS CLEARED). SUCCESSIVE CLEARS TAKE CARE OF EACH RX
R0580    L/ RC UNTIL R1 IS DONE. THEN NO FURTHER ACTION

R0581    THE SINGLE COMPONENT LOAD VERBS ALLOW ONLY THE SINGLE RC THAT IS
R0582    APPROPRIATE TO BE CLEARED.

R0583    CLPASS    +0   PASS0, CAN BE BACKED UP
R0584              +NZ  HIPASS, CAN BE BACKED UP
R0585              -NZ  PASS0, CANNOT BE BACKED UP

0586     REF  11  LAST  331   40,2364  11'202 1   CLEAR      CCS      DSPCOUNT
0587     REF  20  LAST  331   40,2365   6 4770 0             AD       ONE
0588                          40,2366   0 2370 1             TC       +2
0589     REF  21  LAST  331   40,2367   6 4770 0             AD       ONE
0590     REF  87  LAST  331   40,2370  50 000 1              INDEX    A                     DO NOT CHANGE DSPCOUNT BECAUSE MAY LATER
0591     REF   2  LAST  329   40,2371   3 2225 0             CAF      INRELTAB              FAIL LEGALTST.
0592     REF  13  LAST  331   40,2372  54 137 0              TS       INREL                 MUST SET INREL, EVEN FOR HIPASS.
0593     REF   6  LAST  330   40,2373  11'220 1              CCS      CLPASS
0594     REF   1              40,2374   0 2402 0             TC       CLPASHI               +
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 0595                         40,2375  0 2377 0            TC      +2                 +      IF CLPASS IS +0 OR -, IT IS PASS0
 0596                         40,2376  0 2377 0            TC      +1                 -
 0597   REF  14  LAST  331    40,2377  3 0137 1            CA      INREL
 0598   REF   1               40,2400  0 2424 1            TC      LEGALTST
 0599   REF   1               40,2401  0 2417 1            TC      CLEAR1
 0600   REF  15  LAST  332    40,2402  10 137 0  CLPASHI   CCS     INREL
 0601   REF  16  LAST  332    40,2403  54 137 0            TS      INREL
 0602   REF   2  LAST  332    40,2404  0 2424 1            TC      LEGALTST
 0603   REF   1               40,2405  3 2472 1            CAF     DOUBLK +2          +3 TO - NUMBER. BACKS DATA REQUESTS.
 0604   REF   3  LAST  330    40,2406  27'216 1            ADS     REQRET
 0605   REF  17  LAST  332    40,2407  3 0137 1            CA      INREL
 0606   REF   1               40,2410  54 125 0            TS      MIXTEMP            TEMP STORAGE FOR INREL
 0607                         40,2411  0 0006 1            EXTEND
 0608   REF   8  LAST  330    40,2412  27'204 1            DIM     VERBREG            DECREMENT VERB AND RE-DISPLAY
 0609   REF  40  LAST  328    40,2413  0 4636 0            TC      BANKCALL
 0610   REF   1               40,2414   62337 1            CADR    UPDATVB
 0611   REF   2  LAST  332    40,2415  3 0125 1            CA      MIXTEMP
 0612   REF  18  LAST  332    40,2416  54 137 0            TS      INREL              RESTORE INREL
 0613   REF   1               40,2417  0 2422 1  CLEAR1    TC      CLR5
 0614   REF   7  LAST  331    40,2420  25'220 0            INCR    CLPASS             ONLY IF CLPASS IS + OR +0,
 0615   REF  29  LAST  331    40,2421  0 5205 0            TC      ENDOFJOB           SET FOR HIGHER PASS.
 0616   REF  46  LAST  331    40,2422  22 0002 0 CLR5      LXCH    Q                  USES 5BLANK  BUT AVOIDS ITS TC GETINREL
 0617   REF   1               40,2423  0 2433 1            TC      5BLANK  +2
 0618   REF   3  LAST  314    40,2424  6 7702 0  LEGALTST  AD      NEG1
 0619                         40,2425  0 0006 1            EXTEND
 0620   REF  30  LAST  332    40,2426  6 5205 0            BZMF    ENDOFJOB           ILLEGAL. INREL=0,1
 0621   REF  47  LAST  332    40,2427  0 0002 0            TC      Q                  LEGAL. INREL GE 2
R0624   5BLANK BLANKS 5 CHAR DISPLAY WORD IN R1, R2, OR R3. IT ALSO ZEROES XREG,
R0625   YREG, OR ZREG.PLACE ANY + DSPCOUNT NUMBER FOR PERTINENT RC INTO DSPCOUNT
R0626   DSPCOUNT IS LEFT SET TO LEFT MOST DSP NUMB FOR RC JUST BLANKED.

 0627   REF  12  LAST  331    40,2430  55'202 1    -1      TS      DSPCOUNT           NEEDED FOR BLANKSUB
 0628   REF  48  LAST  332    40,2431  22 002 0  5BLANK    LXCH    Q
 0629   REF   5  LAST  331    40,2432  0 2221 1            TC      GETINREL
 0630   REF  46  LAST  330    40,2433  3 4772 1    +2      CAF     ZERO
 0631   REF  19  LAST  332    40,2434  50 137 1            INDEX   INREL
 0632   REF   9  LAST  332    40,2435  55'204 1            TS      VERBREG            ZERO X, Y, Z REG.
 0633   REF  20  LAST  332    40,2436  50 137 1            INDEX   INREL
 0634   REF   2  LAST  329    40,2437  55'207 1            TS      XREGLP  -2
 0635   REF   3  LAST  330    40,2440  54 124 1            TS      CODE
 0636   REF  21  LAST  332    40,2441  50 137 1            INDEX   INREL              ZERO PERTINENT DEC COMP BIT.
 0637   REF  19  LAST  330    40,2442  4 4762 1            CS      BIT7               PROTECT OTHERS
 0638   REF   8  LAST  331    40,2443  7 1203 0            MASK    DECBRNCH
 0639   REF   1               40,2444  7 7700 0            MASK    BRNCHCON           ZERO LOW 2 BITS.
 0640   REF   9  LAST  332    40,2445  55'203 0            TS      DECBRNCH
 0641   REF  22  LAST  332    40,2446  50 137 1            INDEX   INREL
 0642   REF   1               40,2447  3 2463 1            CAF     SINBLANK -2        BLANK ISOLATED CHAR SEPARATELY
 0643   REF   1               40,2450  54 143 0            TS      COUNT
 0644   REF   2  LAST  327    40,2451  0 3161 1            TC      DSPIN
 0645   REF  23  LAST  332    40,2452  50 137 1  5BLANK1   INDEX   INREL
 0646   REF   2  LAST  332   40,2453  3 2466 1              CAF     DOUBLK  -2
 0647   REF  13  LAST  332   40,2454  55'202 1              TS      DSPCOUNT
 0648   REF   2  LAST  330   40,2455  0 2473 0              TC      2BLANK
 0649   REF   7  LAST  330   40,2456  4 4767 1              CS      TWO
 0650   REF  14  LAST  333   40,2457  27'202 1              ADS     DSPCOUNT
 0651   REF   5  LAST  333   40,2460  0 2473 0              TC      2BLANK
 0652   REF  24  LAST  332   40,2461  50 137 1              INDEX   INREL
 0653   REF   3  LAST  331   40,2462  3 4317 0              CAF     R1D1    -2
 0654   REF  15  LAST  333   40,2463  55'202 1              TS      DSPCOUNT          SET DSPCOUNT TO LEFT MOST DSP NUMBER
 0655   REF  32  LAST  331   40,2464  0 0001 0              TC      L                 OF REG. JUST BLANKED

 0656                        40,2465   00016 0   SINBLANK  OCT     16                DEC 14
 0657                        40,2466   00005 1             OCT     5
 0658                        40,2467   00004 0             OCT     4
 0659                        40,2470   00015 0   DOUBLK    OCT     15                DEC 13
 0660                        40,2471   00011 1             OCT     11                DEC 9
 0661                        40,2472   00003 1     +2      OCT     3
 0662   REF   1                 7700             BRNCHCON EQUALS  REG3

R0663   2BLANK BLANKS TWO CHAR. PLACE DSP NUMBER OF LEFT CHAR  OF THE PAIR INTO
R0664   DSPCOUNT. THIS NUMBER IS LEFT IN DSPCOUNT

 0665   REF  16  LAST  333   40,2473  3 1202 0   2BLANK    CA      DSPCOUNT
 0666   REF   1              40,2474  54 021 0             TS      SR
 0667   REF   1              40,2475  4 4755 0             CS      BLANKCON
 0668                        40,2476  0 0004 0             INHINT
 0669   REF   2  LAST  333   40,2477  50 021 1             INDEX   SR
 0670   REF  25  LAST  204   40,2500  57'226 0             XCH     DSPTAB
 0671                        40,2501  0 0006 1             EXTEND
 0672                        40,2502  6 2504 1             BZMF    +2                IF OLD CONTENTS -, NOUT OK
 0673   REF   6  LAST  204   40,2503  25'221 1             INCR    NOUT              IF OLD CONTENTS +, +1 TO NOUT
 0674   REF   2  LAST  238   40,2504  1 5642 0             TCF     REQ               IF -,NOUT OK
 0676   REF  18  LAST  312      4755             BLANKCON EQUALS  BIT12
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R0677   ENTER PASS 0 IS THE EXECUTE FUNCTION. HIGHER ORDER ENTERS ARE TO LOAD
R0678   DATA. THE SIGN OF REQRET DETERMINES THE PASS, + FOR PASS 0,- FOR HIGHER
R0679   PASSES.


R0680   MACHINE CADR TO BE SPECIFIED (MCTBS) NOUNS DESIRE AN ECADR TO BE LOADED
R0681   WHEN USED WITH LOAD VERBS, MONITOR VERBS, OR DISPLAY VERBS (EXCEPT
R0682   VERB = FIXED MEMORY DISPLAY, WHICH REQUIRES AN FCADR).


 068301 REF   1                41,2000                          SETLOC PINBALL2
 068302                        41,2000                          BANK

 06835   REF   1                                                COUNT* $$/PIN
 0684    REF   1               41,3513              NVSUBB      EQUALS NVSUB1
 0685    REF   1               41,3001              LOADLV1     EQUALS LOADLV
 0687    REF  47  LAST  332    41,2000  3 4772 1    ENTER       CAF     ZERO
 0688    REF   8  LAST  332    41,2001  55'220 1                TS      CLPASS
 0689    REF   2  LAST  330    41,2002  3 4170 0                CAF     ENDINST
 0690    REF   3  LAST  330    41,2003  54 136 1                TS      ENTRET
 0691    REF   4  LAST  332    41,2004  11'216 1                CCS     REQRET
 0692    REF   1               41,2005  0 2040 1                TC      ENTPAS0        IF +, PASS 0
 0693    REF   2  LAST  334    41,2006  0 2040 1                TC      ENTPAS0        IF +, PASS 0
 0694                          41,2007  0 2010 1                TC      +1             IF -, NOT PASS 0
 0695    REF   1               41,2010  3 2036 0    ENTPASHI    CAF     MMADREF
 0696    REF   5  LAST  334    41,2011  6 1216 0                AD      REQRET         IF L/ 2 CHAR IN FOR MM CODE, ALARM
 0697                          41,2012  0 0006 1                EXTEND                 AND RECYCLE(DECIDE AT MMCHANG+1)
 0698    REF   1               41,2013  1 2025 0                BZF     ACCEPTWD
 0699    REF  10  LAST  331    41,2014  3 6214 0                CAF     THREE          IF DEC, L/5 CHAR IN FOR DATA MUST BE
 0700    REF  10  LAST  332    41,2015  7 1203 0                MASK    DECBRNCH       SCALED (DECEND); IF 5 CHAR IN, DATA
 0701    REF  88  LAST  331    41,2016  10 000 0                CCS     A              HAS ALREADY BEEN SCALED. ANY NUMBER
 0702                          41,2017  0 2021 0                TC      +2             OF DECIMAL CHARACTERS ARE ACCEPTABLE FOR
 0703    REF   2  LAST  334    41,2020  0 2025 1                TC      ACCEPTWD       OCTAL. ANY NUMBER OF CHAR OK.
 0704    REF  17  LAST  333    41,2021  11'202 1                CCS     DSPCOUNT
 0705    REF   1               41,2022  0 2031 1                TC      LT5
 0706    REF   2  LAST  334    41,2023  0 2031 1                TC      LT5
 0707                          41,2024  0 2025 1                TC      +1             5 CHAR IN (DSPCOUNT IS -)
 0708    REF   6  LAST  334    41,2025  4 1216 1    ACCEPTWD    CS      REQRET         5 CHAR IN (DSPCOUNT IS -)
 0709    REF   7  LAST  334    41,2026  55'216 1                TS      REQRET         SET REQRET +.
 0710    REF   2  LAST  257    41,2027  0 4417 1                TC      FLASHOFF
 0711    REF   8  LAST  334    41,2030  0 1216 0                TC      REQRET

 071108  REF  48  LAST  334    41,2031  3 4772 1    LT5         CAF     ZERO
 071109  REF  71  LAST  329    41,2032  54 154 0                TS      MPAC
 07111   REF  41  LAST  332    41,2033  0 4636 0                TC      BANKCALL
 07112   REF   2  LAST  328    41,2034   60165 0                CADR    DECEND +4
 07113   REF   3  LAST  334    41,2035  0 2025 1                TC      ACCEPTWD
 0713    REF   1               41,2036   03377 1    MMADREF     ADRES   MMCHANG +1     ASSUMES TC REQMM AT MMCHANG.

 0714                          41,2037   00034 0    LOWVERB     DEC     28             LOWER VERB THAT AVOIDS NOUN TEST
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 0715    REF  49  LAST  334   41,2040  3 4772 1  ENTPASO   CAF     ZERO                 NOUN VERB SUB ENTERS HERE
 0716    REF  11  LAST  334   41,2041  55'203 0            TS      DECBRNCH
 0717    REF   1              41,2042  0 4261 0            TC      -VD1SET
 0719    REF  10  LAST  332   41,2043  4 1204 1  TESTVB    CS      VERBREG             IF VERB IS G/E LOWVB, SKIP NOUN TEST
 0720    REF   1              41,2044  55'244 0            TS      VERBSAVE            SAVE VERB FOR POSSIBLE RECYCLE
 0721    REF   1              41,2045  6 2037 1            AD      LOWVERB             LOWVERB - VB
 0722                         41,2046  0 0006 1            EXTEND
 0723    REF   1              41,2047  6 2133 1            BZMF    VERBFAN             VERB G/E LOWVERB
 0724                         41,2050  0 0006 1  TESTNN    EXTEND                      VERB L/ LOWVERB
 0725    REF   1              41,2051  3 2115 0            DCA     LODNNLOC            SWITCH BANKS TO NOUN TABLE READING
 0726    REF   3  LAST  283   41,2052  52 006 0            DXCH    Z                   ROUTINE.
 0727    REF   3  LAST  282   41,2053  50 140 1            INDEX   MIXBR
 0728                         41,2054  0 2054 1            TC      +0
 0729                         41,2055  0 2057 1            TC      +2                  NORMAL
 0730    REF   1              41,2056  0 2220 0            TC      MIXNOUN             MIXED
 0731    REF   3  LAST  282   41,2057  10 146 0            CCS     NNADTEM             NORMAL
 0732    REF   2  LAST  335   41,2060  0 2131 0            TC      VERBFAN -2                NORMAL IF +
 0733    REF   1              41,2061  0 2350 0            TC      GODSPALM            NOT IN USE   IF +0
 0734    REF   1              41,2062  0 2066 0            TC      REQADD              SPECIFY MACHINE CADR IF -
 0735    REF   1              41,2063  25'222 1            INCR    NOUNCADR            AUGMENT MACHINE CADR IF -0
 0736    REF   1              41,2064  0 4313 1            TC      SETNADD             ECADR FROM NOUNCADR. SETS EB, NOUNADD.
 0737    REF   1              41,2065  0 2120 0            TC      INTMCTBS +2
 0738    REF  24  LAST  201   41,2066  3 4752 0  REQADD    CAF     BIT15               SET CLPASS FOR PASS0 ONLY
 0739    REF   9  LAST  334   41,2067  55'220 1            TS      CLPASS
 0740    REF   3  LAST  334   41,2070  4 4170 1            CS      ENDINST             TEST IF REACHED HERE FROM INTERNAL OR
 0741    REF   1              41,2071  6 0136 0            AD      ENTEXIT                       FROM EXTERNAL
 0742                         41,2072  0 0006 1            EXTEND
 0743                         41,2073  1 2075 0            BZF     +2                  EXTERNAL MACH CADR TO BE SPECIFIED
 0744    REF   2  LAST  335   41,2074  0 2116 0            TC      INTMCTBS
 0745    REF   1              41,2075  0 2304 1            TC      REQDATZ             EXTERNAL MACH CADR TO BE SPECIFIED
 0746    REF  12  LAST  335   41,2076  11'203 0            CCS     DECBRNCH            ALARM AND RECYCLE IF DECIMAL USED
 0747    REF   1              41,2077  0 4173 0            TC      ALMCYCLE            FOR MCTBS,
 0748    REF   2  LAST  335   41,2100  0 4261 0            TC      -VD1SET
 0750    REF   3  LAST  326   41,2101  11'245 1            CCS     CADRSTOR
 0751                         41,2102  0 2105 1            TC      +3                  EXTERNAL MCTBS DISPLAY WILL LEAVE FLASH
 0752    REF   1              41,2103  0 2106 1            TC      USEADD              ON IF ENDIDLE NOT = +0.
 0753                         41,2104  0 2105 1            TC      +1
 0754    REF   1              41,2105  0 4360 0            TC      FLASHON
 0755    REF   1              41,2106  57'210 0  USEADD    XCH     ZREG
 0756    REF   1              41,2107  0 4305 0            TC      SETNCADR            ECADR INTO NOUNCADR. SET EB, NOUNADD.
 0757                         41,2110  0 0006 1            EXTEND
 0758    REF   2  LAST  335   41,2111  3 2115 0            DCA     LODNNLOC            SWITCH BANKS TO NOUN TABLE READING
 0759    REF   4  LAST  335   41,2112  52 006 0            DXCH    Z                   ROUTINE.
 0760    REF   3  LAST  335   41,2113  0 2133 1            TC      VERBFAN

 0761    REF  18  LAST  334      1202                      EBANK=  DSPCOUNT
 0762    REF   1              41,2114   02056 0  LODNNLOC  2CADR   LODNNTAB
 0762    REF   1              41,2115   64102 0

 0764    REF  72  LAST  334   41,2116  3 0156 0  INTMCTBS  CA      MPAC     +2         INTERNAL MACH CADR TO BE SPECIFIED.
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L         PINBALL GAME  BUTTONS AND LIGHTS                                                       USER'S PAGE NO.  19        E  54

 0765   REF   2  LAST  335   41,2117  0 4305 0              TC      SETNCADR          ECADR INTO NOUNCADR. SET EB, NOUNADD.
 0766   REF   7  LAST  241   41,2120  4 4773 1      +2      CS      FIVE              NVSUB CALL LEFT CADR IN MPAC+2 FOR MACH
 0767   REF  11  LAST  335   41,2121  6 1204 0              AD      VERBREG           CADR TO BE SPECIFIED.
 0768                        41,2122  0 0006 1              EXTEND
 0769   REF   4  LAST  335   41,2123  1 2133 0              BZF     VERBFAN           DONT DISPLAY CADR IF VB = 05
 0770   REF   2  LAST  331   41,2124  3 4323 1              CAF     R3D1              VB NOT = 05. DISPLAY CADR.
 0771   REF  19  LAST  335   41,2125  55'202 1              TS      DSPCOUNT
 0772   REF   2  LAST  335   41,2126  3 1222 1              CA      NOUNCADR
 0773   REF   1              41,2127  0 3351 0              TC      DSPOCTWO
 0774   REF   5  LAST  336   41,2130  0 2133 1              TC      VERBFAN

 0775   REF  22  LAST  331   41,2131  6 4770 0      -2      AD      ONE
 0776   REF   3  LAST  336   41,2132  0 4305 0              TC      SETNCADR          ECADR INTO NOUNCADR. SETS EB, NOUNADD.
 0777   REF   1              41,2133  4 5004 1   VERBFAN    CS      LST2CON
 0778   REF  12  LAST  336   41,2134  6 1204 0              AD      VERBREG           VERB-LST2CON
 0779   REF  89  LAST  334   41,2135  10 000 0              CCS     A
 0780   REF  23  LAST  336   41,2136  6 4770 0              AD      ONE               VERB G/ LST2CON
 0781                        41,2137  0 2141 1              TC      +2
 0782   REF   1              41,2140  0 2145 0              TC      VBFANDIR          VERB L/ LST2CON
 0783   REF  73  LAST  335   41,2141  54 154 0              TS      MPAC
 0784   REF   5  LAST  221   41,2142  0 4432 0              TC      RELDSP            RELEASE DISPLAY SYST
 0785   REF  14  LAST  276   41,2143  0 4655 0              TC      POSTJUMP          GO TO GOEXTVB WITH VB-40 IN MPAC.
 0786   REF   1              41,2144   66000 1              CADR    GOEXTVB
 0788   REF   4  LAST  282      5004             LST2CON    EQUALS  OCT50             DEC40-FIRST EXTENDED VERB
 0790   REF  13  LAST  336   41,2145  51'204 0   VBFANDIR   INDEX   VERBREG
 0791   REF   1              41,2146  3 2150 1              CAF     VERBTAB
 0792   REF   2  LAST  242   41,2147  0 4660 0              TC      BANKJUMP

 0793   REF   2  LAST  335   41,2150   62350 0   VERBTAB    CADR    GODSPALM          VB00 ILLEGAL
 0794   REF   1              41,2151   62364 1              CADR    DSPA              VB01 DISPLAY OCT COMP 1 (R1)
 0795   REF   1              41,2152   62372 0              CADR    DSPB              VB02 DISPLAY OCT COMP 2 (R1)
 0796   REF   1              41,2153   62377 0              CADR    DSPC              VB03 DISPLAY OCT COMP 3 (R1)
 0797   REF   1              41,2154   62357 1              CADR    DSPAB             VB04 DISPLAY OCT COMP 1,2 (R1,R2)
 0798   REF   1              41,2155   62352 1              CADR    DSPABC            VB05 DISPLAY OCT COMP 1,2,3 (R1,R2,R3)
 0799   REF   1              41,2156   62516 1              CADR    DECDSP            VB06 DECIMAL DISPLAY
 0800   REF   1              41,2157   60657 0              CADR    DSPDPDEC          VB07 DP DECIMAL DISPLAY (R1,R2)
 0801   REF   3  LAST  336   41,2160   62350 0              CADR    GODSPALM          VB08 SPARE
 0802   REF   4  LAST  336   41,2161   62350 0              CADR    GODSPALM          VB09 SPARE
 0803   REF   1              41,2162   61261 0              CADR    DSPALARM          VB10 SPARE
 0804   REF   1              41,2163   63224 0              CADR    MONITOR           VB11 MONITOR OCT COMP 1 (R1)
 0805   REF   2  LAST  336   41,2164   63224 0              CADR    MONITOR           VB12 MONITOR OCT COMP 2 (R1)
 0806   REF   3  LAST  336   41,2165   63224 0              CADR    MONITOR           VB13 MONITOR OCT COMP 3 (R1)
 0807   REF   4  LAST  336   41,2166   63224 0              CADR    MONITOR           VB14 MONITOR OCT COMP 1,2 (R1,R2)
 0808   REF   5  LAST  336   41,2167   63224 0              CADR    MONITOR           VB15 MONITOR OCT COMP 1,2,3 (R1,R2,R3)
 0809   REF   6  LAST  336   41,2170   63224 0              CADR    MONITOR           VB16 MONITOR DECIMAL
 0810   REF   7  LAST  336   41,2171   63224 0              CADR    MONITOR           VB17 MONITOR DP DEC  (R1,R2)
 0811   REF   5  LAST  336   41,2172   62350 0              CADR    GODSPALM          VB18 SPARE
 0812   REF   6  LAST  336   41,2173   62350 0              CADR    GODSPALM          VB19 SPARE
 0813   REF   7  LAST  336   41,2174   62350 0              CADR    GODSPALM          VB20 SPARE
 0814   REF   1              41,2175   62741 1              CADR    ALOAD             VB21 LOAD COMP 1 (R1)
 0815   REF   1               41,2176   62750 1            CADR    BLOAD          V822 LOAD COMP 2 (R2)
 0816   REF   1               41,2177   62765 1            CADR    CLOAD          V823 LOAD COMP 3 (R3)
 0817   REF   1               41,2200   62716 0            CADR    ABLOAD         V824 LOAD COMP 1,2 (R1,R2)
 0818   REF   1               41,2201   62611 0            CADR    ABCLOAD        V825 LOAD COMP 1,2,3 (R1,R2,R3)
 0819   REF   8  LAST  336    41,2202   62350 0            CADR    GODSPALM       V826 SPARE
 0820   REF   1               41,2203   63341 1            CADR    DSPFMEM        V827 FIXED MEMORY DISPLAY
A0821                                                                             THE FOLLOWING VERBS MAKE NO NOUN TEST
 0822   REF   9  LAST  337    41,2204   62350 0            CADR    GODSPALM       V828 SPARE
 0823   REF  10  LAST  337    41,2205   62350 0            CADR    GODSPALM       V829 SPARE
 0824   REF   1               41,2206   63433 0  REQEXLOC  CADR    VBRQEXEC       V830 REQUEST EXECUTIVE
 0825   REF   1               41,2207   63462 1            CADR    VBRQWAIT       V831 REQUEST WAITLIST
 0826   REF   1               41,2210   61323 1            CADR    VBRESEQ        V832 RESEQUENCE
 0827   REF   1               41,2211   61301 1            CADR    VBPROC         V833 PROCEED WITHOUT DATA
 0828   REF   1               41,2212   61307 1            CADR    VBTERM         V834 TERMINATE CURRENT TEST OR LOAD REQ
 0829   REF   1               41,2213   61432 0            CADR    VBTSTLTS       V835 TEST LIGHTS
 0830   REF   1               41,2214   12367 0            CADR    SLAP1          V836 FRESH START
 0831   REF   2  LAST  334    41,2215   63376 0            CADR    MMCHANG        V837 CHANGE MAJOR MODE
 0832   REF  11  LAST  337    41,2216   62350 0            CADR    GODSPALM       V838 SPARE
 0833   REF  12  LAST  337    41,2217   62350 0            CADR    GODSPALM       V839 SPARE

R0834   THE LIST2 VERBFAN IS LOCATED IN THE EXTENDED VERB BANK.
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R0835    NNADTAB CONTAINS A RELATIVE ADDRESS, IDADDREL(IN LOW 10 BITS), REFERRING
R0836    TO WHERE 3 CONSECUTIVE ADDRESSES ARE STORED (IN IDADDTAB).
R0837    MIXNOUN GETS DATA AND STORES IN MIXTEMP,+1,+2. IT SETS NOUNADD FOR
R0838     MIXTEMP.

 0839    REF   4  LAST  335   41,2220  10 146 0  MIXNOUN  CCS     NNADTEM
 0840                         41,2221   0 2225 0          TC      +4                 +  IN USE
 0841    REF  13  LAST  337   41,2222   0 2350 0          TC      GODSPALM           +   NOT IN USE
 0842                         41,2223   0 2225 0          TC      +2                 -  IN USE
 0843                         41,2224   0 2225 0          TC      +1                 -   IN USE
 0844    REF  10  LAST  246   41,2225   4 6211 1          CS      SIX
 0845    REF  14  LAST  336   41,2226   6 1204 0          AD      VERBREG
 0846                         41,2227   0 0006 1          EXTEND
 0847                         41,2230   6 2232 0          BZMF    +2                 VERB L/E 6
 0848    REF   6  LAST  336   41,2231   0 2133 1          TC      VERBFAN            AVOID MIXNOUN SWAP IF VB NOT = DISPLAY
 0849    REF   8  LAST  333   41,2232   3 4767 0          CAF     TWO
 0850    REF   1              41,2233  54 117 1  MIXNN1   TS      DECOUNT
 0851    REF   1              41,2234   6 2257 0          AD      MIXAD
 0852    REF   1              41,2235  54 145 0          TS      NOUNADD            SET NOUNADD TO MIXTEMP + K
 0853    REF   2  LAST  338   41,2236  50 117 0          INDEX   DECOUNT            GET IDADDTAB ENTRY FOR COMPONENT K
 0854    REF   2  LAST  282   41,2237   3 0150 0          CA      IDADDTEM           OF NOUN.
 0855    REF   1              41,2240  54 122 1          TS      NOUNTEM
A0856                                                                                TEST FOR DP(FOR OCT DISPLAY). IF SO, GET
A0857                                                                                  MINOR PART ONLY.
 0858    REF   1              41,2241   0 3033 1          TC      SFRUTMIX           GET SF ROUT NUMBER IN A
 0859    REF   1              41,2242   0 2260 1          TC      DPTEST
 0860    REF   1              41,2243   0 2245 0          TC      MIXNN2             NO DP
 0861    REF   2  LAST  338   41,2244  24 122 0          INCR    NOUNTEM            DP  GET MINOR PART
 0862    REF   3  LAST  338   41,2245   3 0122 0  MIXNN2   CA      NOUNTEM
 0863    REF   3  LAST  143   41,2246   7 4347 1          MASK    LOW11              ESUBK (NO DP)  OR (ESUBK)+1    FOR DP
 0864    REF   1              41,2247   0 4315 1          TC      SETEBANK           SET EBANK, LEAVE EADRES IN A.
 0865    REF  90  LAST  336   41,2250  50 000 1          INDEX   A                  PICK UP C(ESUBK)  NOT DP
 0866                         41,2251   3 0000 1          CA      0                  OR C((ESUBK)+1)  FOR DP MINOR PART
 0867    REF   2  LAST  338   41,2252  50 145 1          INDEX   NOUNADD
 0868                         41,2253  56 000 1          XCH     0                  STORE IN MIXTEM + K
 0869    REF   3  LAST  338   41,2254  10 117 1          CCS     DECOUNT
 0870    REF   1              41,2255   0 2233 1          TC      MIXNN1
 0871    REF   7  LAST  338   41,2256   0 2133 1          TC      VERBFAN

 0872    REF   3  LAST  332   41,2257   0 0125 1  MIXAD    TC      MIXTEMP

R0873    DPTEST    ENTER WITH SF ROUT NUMBER IN A.
R0874              RETURNS TO L+1 IF NO DP.
R0875              RETURNS TO L+2 IF DP.

 0876    REF  91  LAST  338   41,2260  50 000 1  DPTEST   INDEX   A
 0877                         41,2261   1 2262 1          TCF     +1
 0878    REF  49  LAST  332   41,2262   0 0002 0          TC      Q                  OCTAL ONLY  NO DP
 0879    REF  50  LAST  338   41,2263   0 0002 0          TC      Q                  FRACT NO DP
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0880   REF  51  LAST  338   41,2264  0 0002 0              TC       Q             DEG  NO DP
0881   REF  52  LAST  339   41,2265  0 0002 0              TC       Q             ARITH  NO DP
0882   REF   1              41,2266  1 6706 1              TCF      DPTEST1       DP1OUT
0883   REF   2  LAST  339   41,2267  1 6706 1              TCF      DPTEST1       DP2OUT
0884   REF  53  LAST  339   41,2270  0 0002 0              TC       Q             OPDEG  NO DP
0885   REF   3  LAST  339   41,2271  1 6706 1              TCF      DPTEST1       DP3OUT
0886   REF  54  LAST  339   41,2272  0 0002 0              TC       Q             HMS   NO DP
0887   REF  55  LAST  339   41,2273  0 0002 0              TC       Q             M/S   NO DP
0888   REF   4  LAST  339   41,2274  1 6706 1              TCF      DPTEST1       DP4OUT
08881  REF  56  LAST  339   41,2275  0 0002 0              TC       Q             ARITH1   NO DP
08882  REF  57  LAST  339   41,2276  0 0002 0              TC       Q             2INTOUT  NO DP TO GET HI PART IN MPAC
08883  REF   5  LAST  339   41,2277  1 6706 1              TCF      DPTEST1       DPFRACOT
0889   REF   2  LAST  143       6706           DPTEST1   EQUALS   Q+1
0891   REF   4  LAST  333   41,2300  3 4321 0  REQDATX   CAF      R1D1
0892   REF   1              41,2301  1 2305 1            TCF      REQCOM
0893   REF   2  LAST  331   41,2302  3 4322 0  REQDATY   CAF      R2D1
0894   REF   2  LAST  339   41,2303  1 2305 1            TCF      REQCOM
0895   REF   3  LAST  336   41,2304  3 4323 1  REQDATZ   CAF      R3D1
0896   REF  20  LAST  336   41,2305  55'202 1  REQCOM    TS       DSPCOUNT
0897   REF  58  LAST  339   41,2306  4 0002 1            CS       Q
0898   REF   9  LAST  334   41,2307  55'216 1            TS       REQRET
0899   REF  42  LAST  334   41,2310  0 4636 0            TC       BANKCALL
0900   REF   2  LAST  332   41,2311   60431 1            CADR     5BLANK
0901   REF   2  LAST  335   41,2312  0 4360 0            TC       FLASHON
0902   REF   2  LAST  335   41,2313  0 0136 0  ENDRQDAT  TC       ENTEXIT

09025  REF  74  LAST  336   41,2314  3 0157 1    -2      CA       MPAC +3
0903   REF   8  LAST  330   41,2315  55'205 0    -1      TS       NOUNREG
0904   REF  59  LAST  339   41,2316  56 002 0  UPDATNN   XCH      Q
0905   REF   1              41,2317  54 117 1            TS       UPDATRET
0906                        41,2320  0 0006 1            EXTEND
0907   REF   3  LAST  335   41,2321  3 2115 0            DCA      LODNNLOC        SWITCH BANKS TO NOUN TABLE READING
0908   REF   5  LAST  335   41,2322  52 006 0            DXCH     Z               ROUTINE.
0909   REF   5  LAST  338   41,2323  10 146 0            CCS      NNADTEM
0910   REF  24  LAST  336   41,2324  6 4770 0            AD       ONE             NORMAL
0911   REF   1              41,2325  1 2330 1            TCF      PUTADD
0912   REF   2  LAST  339   41,2326  1 2331 0            TCF      PUTADD  +1      MCTBS  DONT CHANGE NOUNADD
0913   REF   3  LAST  339   41,2327  1 2331 0            TCF      PUTADD  +1      MCTBI  DONT CHANGE NOUNADD
0914   REF   4  LAST  336   41,2330  0 4305 0  PUTADD    TC       SETNCADR        ECADR INTO NOUNCADR. SETS EB, NOUNADD.
0915   REF   2  LAST  330   41,2331  3 4352 1            CAF      ND1
0916   REF  21  LAST  339   41,2332  55'202 1            TS       DSPCOUNT
0917   REF   9  LAST  339   41,2333  3 1205 1            CA       NOUNREG
0918   REF   1              41,2334  1 2344 1            TCF      UPDAT1

09185  REF  75  LAST  339   41,2335  3 0160 0    -2      CA       MPAC +4
0919   REF  15  LAST  338   41,2336  55'204 1    -1      TS       VERBREG
0920   REF  60  LAST  339   41,2337  56 002 0  UPDATVB   XCH      Q
0921   REF   2  LAST  339   41,2340  54 117 1            TS       UPDATRET
0922   REF   3  LAST  330   41,2341  3 4351 1            CAF      VD1
0923   REF  22  LAST  339   41,2342  55'202 1            TS       DSPCOUNT
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L        PINBALL GAME  BUTTONS AND LIGHTS                                                        USER'S PAGE NO.  23     E0 S4

 0924    REF  16  LAST  339   41,2343  3 1204 0              CA      VERBREG
 0925    REF  15  LAST  336   41,2344  0 4655 0   UPDAT1     TC      POSTJUMP          CANT USE SWCALL TO GO TO DSPDECVN,SINCE
 0926    REF   1              41,2345   61156 1              CADR    GOVNUPDT          UPDATVB CAN ITSELF BE CALLED BY SWCALL.
 0927    REF   3  LAST  339   41,2346  0 0117 0     +2       TC      UPDATRET

 0928    REF   2  LAST  335   41,2347  0 4173 0   GOALMCYC   TC      ALMCYCLE          NEEDED BECAUSE BANKJUMP CANT HANDLE F/F.


 0929    REF  16  LAST  340   41,2350  0 4655 0   GODSPALM   TC      POSTJUMP
 0930    REF   2  LAST  336   41,2351   61261 0              CADR    DSPALARM
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R0931              NOUN   TABLES
R0932    NOUN CODE L/40, NORMAL NOUN CASE.  NOUN CODE G/E 40, MIXED NOUN CASE.
R0933    FOR NORMAL CASE, NNADTAB CONTAINS ONE        ECADR      FOR EACH NOUN.
R0934    +0 INDICATES NOUN NOT USED.    - ENTRY INDICATES MACHINE CADR(E OR F) TO
R0935    BE SPECIFIED. -1 INDICATES CHANNEL TO BE SPECIFIED. -0 INDICATES AUGMENT
R0936    OF LAST MACHINE CADR SUPPLIED.

R0937    FOR MIXED CASE, NNADTAB CONTAINS ONE INDIRECT ADDRESS(IDADDREL) IN LOW
R0938    10 BITS, AND THE COMPONENT CODE NUMBER IN THE HIGH 5 BITS.

R0939    NNTYPTAB IS A PACKED TABLE OF THE FORM MMMMMNNNNNPPPPP.

R0940    FOR THE NORMAL CASE, M-S ARE THE COMPONENT CODE NUMBER.
R0941                         N-S ARE THE SF ROUTINE CODE NUMBER.
R0942                         P-S ARE THE SF CONSTANT CODE NUMBER.

R0943    MIXED CASE,M-S ARE THE SF CONSTANT3 CODE NUMBER      3 COMPONENT CASE
R0944               N-S ARE THE SF CONSTANT2 CODE NUMBER
R0945               P-S ARE THE SF CONSTANT1 CODE NUMBER
R0946               N-S ARE THE SF CONSTANT2 CODE NUMBER      2 COMPONENT CASE
R0947               P-S ARE THE SF CONSTANT1 CODE NUMBER
R0948               P-S ARE THE SF CONSTANT1 CODE NUMBER       1 COMPONENT CASE

R0949    THERE IS ALSO AN INDIRECT ADDRESS TABLE(IDADDTAB) FOR MIXED CASE ONLY.
R0950    EACH ENTRY CONTAINS ONE ECADR.     IDADDREL IS THE RELATIVE ADDRESS OF
R0951    THE FIRST OF THESE ENTRIES.
R0952    THERE IS ONE ENTRY IN THIS TABLE FOR EACH COMPONENT OF A MIXED NOUN
R0953    THEY ARE LISTED IN ORDER OF ASCENDING K.

R0954    THERE IS ALSO A SCALE FACTOR ROUTINE NUMBER TABLE( RUTMXTAB ) FOR MIXED
R0955    CASE ONLY. THERE IS ONE ENTRY PER MIXED NOUN. THE FORM IS,
R0956          QQQQQRRRRRSSSSS
R0957    Q-S ARE THE SF ROUTINE 3 CODE NUMBER     3 COMPONENT CASE
R0958    R-S ARE THE SF ROUTINE 2 CODE NUMBER
R0959    S-S ARE THE SF ROUTINE 1 CODE NUMBER
R0960    R-S ARE THE SF ROUTINE 2 CODE NUMBER     2 COMPONENT CASE
R0961    S-S ARE THE SF ROUTINE 1 CODE NUMBER


R0962    IN OCTAL DISPLAY AND LOAD (OCT OR DEC) VERBS, EXCLUDE USE OF VERBS WHOSE
R0963    COMPONENT NUMBER IS GREATER THAN THE NUMBER OF COMPONENTS IN NOUN.
R0964    (ALL MACHINE ADDRESS TO BE SPECIFIED NOUNS ARE 3 COMPONENT.)

R0967    IN MULTI-COMPONENT LOAD VERBS, NO MIXING OF OCTAL AND DECIMAL DATA
R0968    COMPONENT WORDS IS ALLOWED. ALARM IF VIOLATION.

R0969    IN DECIMAL LOADS OF DATA, 5 NUMERICAL CHARACTERS MUST BE KEYED IN
R0970    BEFORE EACH ENTER. IF NOT, ALARM.
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P0971                  DISPLAY  VERBS
 0972   REF   9  LAST  338   41,2352  4 4767 1  DSPABC     CS      TWO
 0973   REF   1              41,2353  0 2423 0             TC      COMPTEST
 0974   REF   3  LAST  338   41,2354  50 145 1             INDEX   NOUNADD
 0975                        41,2355  4 0002 1             CS      2
 0976   REF  36  LAST  317   41,2356  56 132 1             XCH     BUF        +2
 0977   REF  25  LAST  339   41,2357  4 4770 1  DSPAB      CS      ONE
 0978   REF   2  LAST  342   41,2360  0 2423 0             TC      COMPTEST
 0979   REF   4  LAST  342   41,2361  50 145 1             INDEX   NOUNADD
 0980                        41,2362  4 0001 1             CS      1
 0981   REF  37  LAST  342   41,2363  56 131 1             XCH     BUF        +1
 0982   REF  50  LAST  335   41,2364  4 4772 0  DSPA       CS      ZERO
 09825  REF   1              41,2365  0 2436 1             TC      DCOMPTST
 0983   REF   1              41,2366  0 2461 0             TC      TSTFORDP
 0984   REF   5  LAST  342   41,2367  50 145 1             INDEX   NOUNADD
 0985                        41,2370  4 0000 0             CS      0
 0986   REF   1              41,2371  0 2403 1             TC      DSPCOM1
 0988   REF  26  LAST  342   41,2372  4 4770 1  DSPB       CS      ONE
 0989   REF   2  LAST  342   41,2373  0 2436 1             TC      DCOMPTST
 0990   REF   6  LAST  342   41,2374  50 145 1             INDEX   NOUNADD
 0991                        41,2375  4 0001 1             CS      1
 0992   REF   2  LAST  342   41,2376  0 2403 1             TC      DSPCOM1
 0993   REF  10  LAST  342   41,2377  4 4767 1  DSPC       CS      TWO
 0994   REF   3  LAST  342   41,2400  0 2436 1             TC      DCOMPTST
 0995   REF   7  LAST  342   41,2401  50 145 1             INDEX   NOUNADD
 0996                        41,2402  4 0002 1             CS      2
 0997   REF  38  LAST  342   41,2403  56 130 0  DSPCOM1    XCH     BUF
 0998   REF  11  LAST  342   41,2404  4 4767 1  DSPCOM2    CS      TWO                  A  B  C  AB  ABC
 0999   REF  17  LAST  340   41,2405  6 1204 0             AD      VERBREG              -1 -0 +1 +2  +3    IN A
 1000   REF  92  LAST  338   41,2406  10 0000 0    +2      CCS     A                    +0 +0 +0 +1  +2    IN A AFTER CCS
 1001   REF   1              41,2407  0 2412 1             TC      DSPCOM3
 1002   REF   3  LAST  339   41,2410  0 0136 0             TC      ENTEXIT
 1003                        41,2411  0 2412 1             TC      +1
 1004   REF   1              41,2412  54 122 1  DSPCOM3    TS      DISTEM               +0,+1,+2 INTO DISTEM
 1005   REF  93  LAST  342   41,2413  50 0000 1            INDEX   A
 1006   REF   5  LAST  339   41,2414  3 4321 0             CAF     R1D1
 1007   REF  23  LAST  339   41,2415  55'202 1             TS      DSPCOUNT
 1008   REF   2  LAST  342   41,2416  50 122 0             INDEX   DISTEM
 1009   REF  39  LAST  342   41,2417  4 0130 1             CS      BUF
 1010   REF   2  LAST  336   41,2420  0 3351 0             TC      DSPOCTWO
 1011   REF   3  LAST  342   41,2421  56 122 0             XCH     DISTEM
 1012   REF   1              41,2422  0 2406 1             TC      DSPCOM2 +2

R1013   COMPTEST ALARMS IF COMPONENT NUMBER OF VERB(LOAD OR OCT DISPLAY) IS
R1014   GREATER THAN THE HIGHEST COMPONENT NUMBER OF NOUN.
 1016   REF   4  LAST  283   41,2423  54 123 0  COMPTEST   TS      SFTEMP1              - VERB COMP
 1017   REF  61  LAST  339   41,2424  22 0002 0            LXCH    Q
 1022   REF   1              41,2425  0 2510 1  COMPTST1   TC      GETCOMP
 1023   REF   1              41,2426  0 4333 0             TC      LEFT5
 1024   REF  11  LAST  334   41,2427  7 6214 1             MASK    THREE                NOUN COMP
 1025    REF   5  LAST  342   41,2430  6 0123 1            AD       SFTEMP1         NOUN COMP - VERB COMP
 1026    REF  94  LAST  342   41,2431  10 000 0            CCS      A
 1027    REF  33  LAST  333   41,2432  0 0001 0            TC       L               NOUN COMP G/ VERB COMP
 1028    REF   1              41,2433   04151 0  MONBACK   ADRES    PASTEVB         CANNOT GET HERE
 1029    REF  14  LAST  338   41,2434  0 2350 0            TC       GODSPALM        NOUN COMP L/ VERB COMP
 1030    REF  34  LAST  343   41,2435  0 0001 0  NDCMPTST  TC       L               NOUN COMP = VERB COMP


R1031    DCOMPTST ALARMS IF DECIMAL ONLY BIT (BIT4 OF COMP CODE NUMBER) = 1.
R1032    IF NOT, IT PERFORMS REGULAR COMPTEST.
 1033    REF   6  LAST  343   41,2436  54 123 0  DCOMPTST  TS       SFTEMP1         - VERB COMP
 1034    REF  62  LAST  342   41,2437  22 002 0            LXCH     Q
 1039    REF   2  LAST  342   41,2440  0 2510 1            TC       GETCOMP
 1040    REF  21  LAST  262   41,2441  7 4753 0            MASK     BIT14
 1041    REF  95  LAST  343   41,2442  10 000 0            CCS      A
 1042    REF  15  LAST  343   41,2443  0 2350 0            TC       GODSPALM
 1043    REF   1              41,2444  0 2425 0            TC       COMPTST1
 1044    REF  63  LAST  343   41,2445  22 002 0  DCTSTCYC  LXCH     Q               ALARMS AND RECYCLES IF DEC ONLY BIT = 1
 1045    REF   3  LAST  343   41,2446  0 2510 1            TC       GETCOMP         ( BIT4 OF COMP CODE NUMBER). RETURNS
 1046    REF  22  LAST  343   41,2447  7 4753 0            MASK     BIT14           IF NOT.  USED BY LOAD VERBS.
 1047    REF  96  LAST  343   41,2450  10 000 0            CCS      A
 1048    REF   3  LAST  340   41,2451  0 4173 0            TC       ALMCYCLE
 1049    REF  35  LAST  343   41,2452  0 0001 0            TC       L


R1050    NCUNTEST ALARMS IF NO-LOAD BIT (BIT5 OF COMP CODE NUMBER) = 1.
R1051    IF NOT, IT RETURNS.
 1052    REF  64  LAST  343   41,2453  22 002 0  NOUNTEST  LXCH     Q
 1053    REF   4  LAST  343   41,2454  0 2510 1            TC       GETCOMP
 1054    REF  97  LAST  343   41,2455  10 000 0            CCS      A
 1055    REF  36  LAST  343   41,2456  0 0001 0            TC       L
 1056    REF  37  LAST  343   41,2457  0 0001 0            TC       L
 1057    REF  16  LAST  343   41,2460  0 2350 0            TC       GODSPALM


 1058    REF  65  LAST  343   41,2461  22 002 0  TSTFORDP  LXCH     Q               TEST FOR DP. IF SO, GET MINOR PART ONLY.
 1059    REF   6  LAST  339   41,2462  3 0146 1            CA       NNADTEM
 1060    REF  27  LAST  342   41,2463  6 4770 0            AD       ONE             IF NNADTEM = -1, CHANNEL TO BE SPECIFIED
 1061                         41,2464  0 0006 1            EXTEND
 1062    REF   1              41,2465  1 2477 0            BZF      CHANDSP
 1063    REF   4  LAST  335   41,2466  50 140 1            INDEX    MIXBR
 1064                         41,2467  0 2467 0            TC       +0
 1065                         41,2470  0 2472 1            TC       +2              NORMAL
 1066    REF  38  LAST  343   41,2471  0 0001 0            TC       L               MIXED CASE ALREADY HANDLED IN MIXNOUN
 1067    REF   1              41,2472  0 3025 0            TC       SFRUTNOR
 1068    REF   2  LAST  338   41,2473  0 2260 1            TC       DPTEST
 1069    REF  39  LAST  343   41,2474  0 0001 0            TC       L               NO DP
 1070    REF   8  LAST  342   41,2475  24 145 1            INCR     NOUNADD         DP    E+1 INTO NOUNADD FOR MINOR PART.
 1071    REF  40  LAST  343   41,2476  0 0001 0            TC       L
 1072   REF   3  LAST  336   41,2477  3 1222 1  CHANDSP   CA       NOUNCADR
 1073   REF   2  LAST  160   41,2500  7 5021 0            MASK     LOW9
 10731                       41,2501  0 0006 1            EXTEND
 10732  REF  98  LAST  343   41,2502  5 0000 1            INDEX    A
 1074                        41,2503  00 000 1            READ     0
 1075   REF  99  LAST  344   41,2504  4 0000 0            CS       A
 1076   REF   3  LAST  342   41,2505  1 2403 0            TCF      DSPCOM1


 1077   REF   2  LAST  292   41,2506   00147 0  COMPICK   ADRES    NNTYPTEM
 1078   REF   7  LAST  343   41,2507   00146 1            ADRES    NNADTEM

 1079   REF   5  LAST  343   41,2510  50 140 1  GETCOMP   INDEX    MIXBR                   NORMAL                 MIXED
 1080   REF   1              41,2511  3 2505 0            CAF      COMPICK -1              ADRES NNTYPTEM         ADRES NNADTEM
 1081   REF 100  LAST  344   41,2512  50 000 1            INDEX    A
 1082                        41,2513  3 0000 1            CA       0                       C(NNTYPTEM)            C(NNADTEM)
 1083   REF   4  LAST  221   41,2514  7 4344 1            MASK     HI5                     GET HI5 OF NNTYPTAB(NORM)OF NNADTAB(MIX)
 1084   REF  66  LAST  343   41,2515  0 0002 0            TC       Q


 1085   REF   5  LAST  343   41,2516  0 2510 1  DECDSP    TC       GETCOMP
 1086   REF   2  LAST  342   41,2517  0 4333 0            TC       LEFT5
 1087   REF  12  LAST  342   41,2520  7 6214 1            MASK     THREE
 1088   REF   4  LAST  338   41,2521  54 117 1            TS       DECOUNT                 COMP NUMBER INTO DECOUNT
 1089   REF   1              41,2522  54 122 1  DSPDCGET  TS       DECTEM                  PICKS UP DATA
 1090   REF   9  LAST  343   41,2523  6 0145 1            AD       NOUNADD                 DECTEM  1COMP +0, 2COMP +1, 3COMP +2
 1091   REF 101  LAST  344   41,2524  50 000 1            INDEX    A
 1092                        41,2525  4 0000 0            CS       A
 1093   REF   2  LAST  344   41,2526  50 122 0            INDEX    DECTEM
 1094   REF   2  LAST  283   41,2527  57'206 1            XCH      XREG                    CANT USE BUF SINCE DMP USES IT.
 1095   REF   3  LAST  344   41,2530  10 122 1            CCS      DECTEM
 1096   REF   1              41,2531  0 2522 0            TC       DSPDCGET                MORE TO GET
 1097   REF  51  LAST  342   41,2532  3 4772 1  DSPDCPUT  CAF      ZERO                    DISPLAYS DATA
 1098   REF  76  LAST  339   41,2533  54 155 1            TS       MPAC     +1             DECOUNT 1COMP +0, 2COMP +1, 3COMP +2
 1099   REF  77  LAST  344   41,2534  54 156 1            TS       MPAC     +2
 1100   REF   5  LAST  344   41,2535  50 117 0            INDEX    DECOUNT
 1101   REF   6  LAST  342   41,2536  3 4321 0            CAF      R1D1
 1102   REF  24  LAST  342   41,2537  55'202 1            TS       DSPCOUNT
 1103   REF   6  LAST  344   41,2540  50 117 0            INDEX    DECOUNT
 1104   REF   3  LAST  344   41,2541  4 1206 0            CS       XREG
 1105   REF  78  LAST  344   41,2542  54 154 0            TS       MPAC
 1106   REF   1              41,2543  0 3042 1            TC       SFCONUM                 2X( SF CON NUMB ) IN A
 1107   REF   7  LAST  343   41,2544  54 123 0            TS       SFTEMP1
 1108                        41,2545  0 0006 1            EXTEND                           SWITCH BANKS TO SF CONSTANT TABLE
 1109   REF   1              41,2546  3 2560 0            DCA      GTSFOUTL                   READING ROUTINE.
 1110   REF   6  LAST  339   41,2547  52 006 0            DXCH     Z                       LOADS SFTEMP1, SFTEMP2.
 1111   REF   6  LAST  344   41,2550  50 140 1            INDEX    MIXBR
 1112                        41,2551  0 2551 1            TC       +0
 1113   REF   1              41,2552  0 2555 0            TC       DSPSFNOR
 1114   REF   2  LAST  338   41,2553  0 3033 1            TC       SFRUTMIX
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L        PINBALL GAME  BUTTONS AND LIGHTS                                             USER'S PAGE NO. 28     E0 54

  1115   REF   1              41,2554  0 2570 1             TC      DECDSP3

  1116   REF   2  LAST  343   41,2555  0 3025 0  DSPSFNOR TC      SFRUTNOR
  1117   REF   2  LAST  345   41,2556  0 2570 1             TC      DECDSP3

  1118   REF  25  LAST  344      1202                       EBANK=  DSPCOUNT
  1119   REF   1              41,2557   02114 1  GTSFOUTL 2CADR   GTSFOUT
  1119   REF   1              41,2560   64102 0

  1120   REF  43  LAST  339   41,2561  0 4636 0  DSPDCEND TC      BANKCALL          ALL SFOUT ROUTINES END HERE
  1121   REF   1              41,2562   61072 0             CADR    DSPDECWD
  1122   REF   7  LAST  344   41,2563  10 117 1     +2      CCS     DECOUNT
  1123                        41,2564  0 2566 0             TC      +2
  1124   REF   4  LAST  342   41,2565  0 0136 0             TC      ENTEXIT
  1125   REF   8  LAST  345   41,2566  54 117 1             TS      DECOUNT
  1126   REF   1              41,2567  0 2532 1             TC      DSPDCPUT          MORE TO DISPLAY

  1127   REF 102  LAST  344   41,2570  50 000 1  DECDSP3  INDEX   A
  1128   REF   1              41,2571  3 2573 1             CAF     SFOUTABR
  1129   REF   3  LAST  336   41,2572  0 4660 0             TC      BANKJUMP

  1130   REF   1              41,2573   61260 1  SFOUTABR CADR    PREDSPAL          ALARM IF DEC DISP WITH OCTAL ONLY NOUN
  1131   REF   1              41,2574   62561 1             CADR    DSPDCEND
  1132   REF   1              41,2575   60531 0             CADR    DEGOUTSF
  1133   REF   1              41,2576   60563 1             CADR    ARTOUTSF
  1134   REF   1              41,2577   60574 1             CADR    DP1OUTSF
  1135   REF   1              41,2600   60601 0             CADR    DP2OUTSF
  1136   REF   1              41,2601   60505 1             CADR    OPDEGOUT
  1137   REF   1              41,2602   60603 1             CADR    DP3OUTSF
  1138   REF   1              41,2603   65137 1             CADR    HMSOUT
  1139   REF   1              41,2604   65212 0             CADR    M/SOUT
  1140   REF   2  LAST  345   41,2605   60601 0             CADR    DP2OUTSF
  11401  REF   1              41,2606   60570 0             CADR    ARTOUTSF
  11402  REF   1              41,2607   60616 0             CADR    2INTOUT
  11403  REF   1              41,2610   60633 1             CADR    DPFRACOT
 R1142          THE FOLLOWING IS ATYPICAL SF ROUTINE . IT USES MPAC. LEAVES RESU
 R1143   LTS IN MPAC, MPAC+1. ENDS WITH TC DSPDCEND

  1144   REF   2  LAST  326   40,2000                       SETLOC  PINBALL1
  11441                       40,2505                       BANK
  11445  REF   2 LAST  326 TO  334:    325    325           COUNT*  $$/PIN
 R1153   OPDEGOUT SCALES BY .45 (THE RANGE IS 90 DEGREES) AND ADDS A 20 DEG BIAS.

  1154   REF  79  LAST  344   40,2505  10 154 0  OPDEGOUT CCS     MPAC              RANGE IS 90 DEG
  1155   REF  80  LAST  345   40,2506  56 154 1             XCH     MPAC              IF POS OR POS 0 THEN ADD BIAS AND
  1156                        40,2507  0 2512 0             TC      +3                CORRECT FOR POSSIBLE OVERFLOW
  1157   REF   1              40,2510  0 2521 0             TC      NEGOPT            IF NEG NON ZERO
 1158   REF   4  LAST  332   40,2511  6 7702 0             AD     NEG1            IF NEG ZERO SUBTRACT 1
 1159   REF   1              40,2512  6 2562 1             AD     20BIAS
 1160   REF  81  LAST  345   40,2513  54 154 0  BIASCOM    TS     MPAC            TEST FOR OVERFLOW
 1161                        40,2514  0 2517 0             TC     +3              NO OVFLOW
 1162   REF  25  LAST  335   40,2515  3 4752 0             CAF    BIT15           IF OVFLOW
 1163   REF  82  LAST  346   40,2516  26 154 0             ADS    MPAC
 1164   REF  12  LAST  342   40,2517  3 4767 0             CAF    TWO             SET MULTIPLIER TO .45
 1165   REF   2  LAST  345   40,2520  0 2532 1             TC     DEGOUTSF +1

 1166   REF  83  LAST  346   40,2521  56 154 1  NEGOPT     XCH    MPAC            NEGATIVE CASE
 1167   REF   2  LAST  346   40,2522  6 2562 1             AD     20BIAS
 1168   REF 103  LAST  345   40,2523  10 000 0             CCS    A
 1169   REF   1              40,2524  0 2513 1             TC     BIASCOM         IF POS THEN SUBTRACT 1 BECAUSE OF 2SCOM
 1170                        40,2525   71527 1  NEG.2      OCT    -06250          =.197753906 TRUN BIAS (CANNOT GET HERE)
 1171   REF  28  LAST  343   40,2526  6 4770 0             AD     ONE             IF NEG RESTORE SUM
 1172                        40,2527  4 0000 0             COM                    IF NEG 0 LEAVE NEG 0
 1173   REF   2  LAST  346   40,2530  0 2513 1             TC     BIASCOM

R1174      DEGOUTSF SCALES BY .18 THE LOW 14 BITS OF ANGLE, ADDING .18 FOR
R11745  NUMBERS IN THE NEGATIVE (AGC) RANGE
 1175   REF  52  LAST  344   40,2531  3 4772 1  DEGOUTSF   CAF    ZERO
 1176   REF  84  LAST  346   40,2532  54 156 1    +1       TS     MPAC +2         SET INDEX FOR FULL SCALE
 1177   REF  85  LAST  346   40,2533  10 154 0             CCS    MPAC
 1178   REF   1              40,2534  1 2546 0             TCF    DEGCOM          NO AUGMENT NEEDED (SFTEMP1,SFTEMP2 ARE 0
 1179   REF   2  LAST  346   40,2535  1 2546 0             TCF    DEGCOM          MPAC IS +)
 1180                        40,2536  1 2537 0             TCF    +1
 1181   REF  26  LAST  346   40,2537  4 4752 1             CS     BIT15           MPAC IS -, MASK OUT SIGN BIT AND ADD
 1182   REF  86  LAST  346   40,2540  7 0154 0             MASK   MPAC            AUGMENTER ACCORDING TO C(MPAC +2)
 1183   REF  87  LAST  346   40,2541  54 154 0             TS     MPAC
 1184                        40,2542  0 0006 1             EXTEND
 1185   REF  88  LAST  346   40,2543  5 0156 0             INDEX  MPAC +2
 1186   REF   1              40,2544  3 2557 1             DCA    DEGTAB          LOAD SFTEMP1,SFTEMP2 WITH DP AUGMENTER
 1187   REF   8  LAST  344   40,2545  52 124 1             DXCH   SFTEMP1         CONSTANT
 1188                        40,2546  0 0006 1  DEGCOM     EXTEND                 LOADS MULTIPLIER , DOES SHORTMP, AND
 1189   REF  89  LAST  346   40,2547  5 0156 0             INDEX  MPAC      +2    ADDS AUGMENTER.
 1190   REF   2  LAST  346   40,2550  3 2557 1             DCA    DEGTAB
 1191   REF  90  LAST  346   40,2551  52 155 1             DXCH   MPAC            ADJUSTED ANGLE IN A
 1192   REF   4  LAST  328   40,2552  0 7256 1             TC     SHORTMP
 1193   REF   9  LAST  346   40,2553  52 124 1             DXCH   SFTEMP1
 1194   REF  91  LAST  346   40,2554  20 155 1             DAS    MPAC
 1195   REF   1              40,2555  0 2566 0             TC     SCOUTEND


 1196                        40,2556   05605 1  DEGTAB     OCT    05605           HI PART OF      .18
 1197                        40,2557   03656 1             OCT    03656           LOW PART OF     .18
 1198                        40,2560   16314 0             OCT    16314           HI PART OF      .45
 1199                        40,2561   31463 1             OCT    31463           LO PART OF      .45

 1200                        40,2562   16040 1  20BIAS     OCT    16040           20 DEG BIAS FOR OPTICS
 1201     REF  10  LAST  346   40,2563  52 124 1  ARTOUTSF DXCH    SFTEMP1              ASSUMES POINT AT LEFT OF DP SFCON
 1202     REF  92  LAST  346   40,2564  52 155 1           DXCH    MPAC
 1203     REF   1              40,2565   0 4403 1          TC      PRSHRTMP             IF C(A) = -0, SHORTMP FAILS TO GIVE -0.
 1204     REF  17  LAST  340   40,2566   0 4655 0 SCOUTEND TC      POSTJUMP
 1205     REF   2  LAST  345   40,2567    62561 1          CADR    DSPDCEND

 12051    REF  11  LAST  347   40,2570  52 124 1  AROUT1SF DXCH    SFTEMP1              ASSUMES POINT BETWEEN HI AND LO PARTS OF
 12052    REF  93  LAST  347   40,2571  52 155 1           DXCH    MPAC                 DP SFCON. SHIFTS RESULTS LEFT 14, BY
 12053    REF   2  LAST  347   40,2572   0 4403 1          TC      PRSHRTMP             TAKING RESULTS FROM MPAC+1, MPAC+2.
 12054    REF   1              40,2573   0 2575 1          TC      L14/OUT


 1206     REF   1              40,2574   0 2607 1 DP1OUTSF TC      DPOUT                SCALES MPAC, MPAC +1 BY DP SCALE FACTOR
 1207     REF  94  LAST  347   40,2575  56 156 0  L14/OUT  XCH     MPAC      +2         IN SFTEMP1, SFTEMP2. THEN SCALE RESULT
 1208     REF  95  LAST  347   40,2576  56 155 0           XCH     MPAC      +1         BY B14.
 1209     REF  96  LAST  347   40,2577  54 154 0           TS      MPAC
 1210     REF   2  LAST  346   40,2600   0 2566 0          TC      SCOUTEND


 1211     REF   2  LAST  347   40,2601   0 2607 1 DP2OUTSF TC      DPOUT                SCALES MPAC , MPAC +1 BY DP SCALE FACTOR
 1212     REF   3  LAST  347   40,2602   0 2566 0          TC      SCOUTEND


 1213     REF   3  LAST  347   40,2603   0 2607 1 DP3OUTSF TC      DPOUT                ASSUMES POINT BETWEEN BITS 7-8 OF HIGH
 1214     REF  11  LAST  338   40,2604   3 6211 0          CAF     SIX                  LEFT BY 7, ROUNDS MPAC+2 INTO MPAC+1.
 1215     REF   1              40,2605   0 3034 0          TC      TPLEFTN              SHIFT LEFT 7.
 1216     REF   4  LAST  347   40,2606   0 2566 0          TC      SCOUTEND


 12165    REF  97  LAST  347       0162               MPAC+6   =       MPAC +6              USE MPAC +6 INSTEAD OF OVFIND

 1217     REF  67  LAST  344   40,2607  56 002 0  DPOUT    XCH     Q
 1218     REF   1              40,2610  54 162 0           TS      MPAC+6
 1219     REF   1              40,2611   0 2635 0          TC      READLO               GET FRESH DATA FOR BOTH HI AND LO.
 1220     REF   1              40,2612   0 7226 0          TC      TPAGREE              MAKE DP DATA AGREE
 1221     REF   2  LAST  328   40,2613   0 7052 1          TC      DMP
 1222     REF  12  LAST  347   40,2614    00123 1          ADRES   SFTEMP1
 1223     REF   2  LAST  347   40,2615   0 0162 1          TC      MPAC+6
R12231    THE FOLLOWING ROUTINE DISPLAYS TWO CONTIGUOUS SP POSITIVE INTEGERS
R12232    AS TWO POSITIVE DECIMAL INTEGERS IN RXD1-RXD2 AND RXD4-RXD5 (RXD3 IS
R12233    BLANKED). THE INTEGER IN THE LOWER NUMBERED ADDRESS IS DISPLAYED IN
R12234    RXD1-RXD2.

 12235    REF   3  LAST  339   40,2616   0 2431 0  2INTOUT TC      5BLANK               TO BLANK RXD3
 122355   REF   2  LAST  330   40,2617   0 2310 1          TC      +ON                  TURN ON + SIGN
 12236    REF  98  LAST  347   40,2620   3 0154 1          CA      MPAC
 12237    REF   1              40,2621   0 3146 1          TC      GSPDECVN             DISPLAY 1ST INTEGER (LIKE VERB AND NOUN)
 122371   REF  13  LAST  344   40,2622   4 6214 1          CS      THREE
 122372   REF   9  LAST  345   40,2623  50 117 0           INDEX   DECOUNT
 122373   REF   7  LAST  344   40,2624   6 4321 0          AD      R1D1                 RXD4
 122374 REF  26  LAST  345    40,2625  55'202 1             TS      DSPCOUNT
 122375 REF   2  LAST  347    40,2626  0 2635 0             TC      READLO            GET 2ND INTEGER
 122376 REF  99  LAST  347    40,2627  3 0155 0             CA      MPAC +1
 122377 REF   2  LAST  347    40,2630  0 3146 1             TC      DSPDECVN          DISPLAY 2ND INTEGER (LIKE VERB AND NOUN)
 122378 REF  18  LAST  347    40,2631  0 4655 0             TC      POSTJUMP
 122379 REF   3  LAST  347    40,2632    62563 0            CADR    DSPDCEND +2


 122380 REF   3  LAST  348    40,2633  0 2635 0  DPFRACOT TC      READLO            DP FRACTION TO MPAC,+1
 122381 REF   5  LAST  347    40,2634  0 2566 0             TC      SCOUTEND


R1224   READLO PICKS UP FRESH DATA FOR BOTH HI AND LO AND LEAVES IT IN
R1225   MPAC, MPAC+1. THIS IS NEEDED FOR TIME DISPLAY. IT ZEROES MPAC+2, BUT
R1226   DOES NOT FORCE TPAGREE.

 1227   REF  68  LAST  347    40,2635  56 002 0  READLO   XCH     Q
 1228   REF   6  LAST   72    40,2636  54 144 1             TS      TEM4
 1229   REF   7  LAST  344    40,2637  50 140 1             INDEX   MIXBR
 1230                         40,2640  0 2640 1             TC      +0
 1231   REF   1               40,2641  0 2655 0             TC      RDLONOR
 1232   REF  10  LAST  347    40,2642  50 117 0             INDEX   DECOUNT
 1233   REF   3  LAST  338    40,2643  3 0150 0             CA      IDADITEM          GET IDADDTAB ENTRY FOR COMP K OF NOUN.
 1234   REF   4  LAST  338    40,2644  7 4347 1             MASK    LOW11             E SUBK
 1235   REF   2  LAST  338    40,2645  0 4315 1             TC      SETEBANK          SET EB, LEAVE EADRES IN A.
 1236                         40,2646  0 0006 1  READLO1  EXTEND                    MIXED           NORMAL
 1237   REF 104  LAST  346    40,2647  5 0000 1             INDEX   A                 C(ESUBK)        C(E)
 1238                         40,2650  3 0001 0             DCA     0                 C((E SUBK)+1)       C(E+1)
 1239   REF 100  LAST  348    40,2651  52 155 1             DXCH    MPAC
 1240   REF  53  LAST  346    40,2652  3 4772 1             CAF     ZERO
 1241   REF 101  LAST  348    40,2653  54 156 1             TS      MPAC     +2
 1242   REF   7  LAST  348    40,2654  0 0144 0             TC      TEM4

 1243   REF  10  LAST  344    40,2655  3 0145 1  RDLONOR  CA      NOUNADD           E
 1244   REF   1               40,2656  0 2646 1  ENDRDLO  TC      READLO1


 124501 REF   2  LAST  282    42,2000                       SETLOC  PINBALL3
 124502                       42,3137                       BANK

 12455  REF   1                                             COUNT*  $$/PIN
 1246   REF  44  LAST  345    42,3137  0 4636 0  HMSOUT   TC      BANKCALL          READ FRESH DATA FOR HI AND LO INTO MPAC,
 1247   REF   4  LAST  348    42,3140    60635 1            CADR    READLO            MPAC+1.
 1248   REF   2  LAST  347    42,3141  0 7226 0             TC      TPAGREE           MAKE DP DATA AGREE
 1249   REF   1               42,3142  0 3326 0             TC      SEPSECNR          LEAVE FRACT SEC/60 IN MPAC, MPAC+1.LEAVE
A1250                                                                                 WHOLE MIN IN BIT13 OF LOTEMOUT AND ABOVE
 1251   REF   3  LAST  347    42,3143  0 7052 1             TC      DMP               USE ONLY FRACT SEC/60 MOD 60
 1252   REF   1               42,3144    03200 0            ADRES   SECON2            MULT BY .06
 1253   REF   4  LAST  339    42,3145  3 4323 1             CAF     R3D1              GIVES CENTI-SEC/10EXP5 MOD 60
 1254   REF  27  LAST  348    42,3146  55'202 1             TS      DSPCOUNT
 1255   REF  45  LAST  348   42,3147  0 4636 0             TC       BANKCALL          DISPLAY SEC MOD 60
 1256   REF   2  LAST  345   42,3150   61072 0             CADR     DSPDECWD
 1257   REF   1              42,3151  0 3344 1             TC       SEPMIN            REMOVE REST OF SECONDS
 1258   REF   1              42,3152  3 3202 1             CAF      MINCON2           LEAVE FRACT MIN/60 IN MPAC+1. LEAVE
 1259   REF 102  LAST  348   42,3153  56 154 1             XCH      MPAC              WHOLE HOURS IN MPAC.
 1260   REF   1              42,3154  55'212 0             TS       HITEMOUT          SAVE WHOLE HOURS.
 1261   REF   2  LAST  349   42,3155  3 3203 0             CAF      MINCON2 +1
 1262   REF 103  LAST  349   42,3156  56 155 0             XCH      MPAC     +1       USE ONLY FRACT MIN/60 MOD 60
 1263   REF   3  LAST  347   42,3157  0 4403 1             TC       PRSHRTMP          IF C(A) = -0, SHORTMP FAILS TO GIVE -0.
A1264                                                                                 MULT BY .0006
 1265   REF   3  LAST  339   42,3160  3 4322 0             CAF      R201              GIVES MIN/10EXP5 MOD 60
 1266   REF  28  LAST  348   42,3161  55'202 1             TS       DSPCOUNT
 1267   REF  46  LAST  349   42,3162  0 4636 0             TC       BANKCALL          DISPLAY MIN MOD 60
 1268   REF   3  LAST  349   42,3163   61072 0             CADR     DSPDECWD
 1269                         42,3164  0 0006 1             EXTEND                     MINUTES, SECONDS HAVE BEEN REMOVED
 1270   REF   1              42,3165  3 3207 1             DCA      HRCON1
 1271   REF 104  LAST  349   42,3166  52 155 1             DXCH     MPAC
 1272   REF   2  LAST  349   42,3167  3 1212 1             CA       HITEMOUT          USE WHOLE HOURS
 1273   REF   4  LAST  349   42,3170  0 4403 1             TC       PRSHRTMP          IF C(A) = -0, SHORTMP FAILS TO GIVE -0.
A1274                                                                                 MULT BY .16384
 1275   REF   8  LAST  347   42,3171  3 4321 0             CAF      R101              GIVES HOURS/10EXP5
 1276   REF  29  LAST  349   42,3172  55'202 1             TS       DSPCOUNT
 1277   REF  47  LAST  349   42,3173  0 4636 0             TC       BANKCALL          USE REGULAR DSPDECWD, WITH ROUND OFF.
 1278   REF   4  LAST  349   42,3174   61072 0             CADR     DSPDECWD
 1279   REF   5  LAST  345   42,3175  0 0136 0             TC       ENTEXIT

 1280                         42,3176   25660 0  SECON1     2DEC*    1.666666666 E-4 B12*  2EXP12/6000
 1280                         42,3177   31742 1
 1281                         42,3200   01727 1  SECON2     OCT      01727             .06 FOR SECONDS DISPLAY
 1282                         42,3201   01217 1             OCT      01217
 1283                         42,3202   00011 1  MINCON2    OCT      00011             .0006 FOR MINUTES DISLPAY
 1284                         42,3203   32445 0    +1       OCT      32445
 1285                         42,3204   02104 0  MINCON1    OCT      02104             .066..66 UPPED BY 2EXP-28
 1286                         42,3205   10422 1             OCT      10422
 1287                         42,3206   05174 0  HRCON1     2DEC     .16384
 1287                         42,3207   13261 0
 1288                         42,3210   00000 1    -1       OCT      00000
 1289                         42,3211   00062 0  RNDCON     DEC      50                *** USED DP WITH PRECEDING ZERO ***
 1290   REF  48  LAST  349   42,3212  0 4636 0  M/SOUT     TC       BANKCALL          READ FRESH DATA FOR HI AND LO INTO MPAC,
 1291   REF   5  LAST  348   42,3213   60635 1             CADR     READLO            MPAC+1.
 1292   REF   3  LAST  348   42,3214  0 7226 0             TC       TPAGREE           MAKE DP DATA AGREE
 1293   REF 105  LAST  349   42,3215  10 154 0             CCS      MPAC              IF MAG OF (MPAC, MPAC+1) G/ 59 M 59 S,
 1294                         42,3216  0 3220 1             TC       +2                DISPLAY 59B59, WITH PROPER SIGN.
 1295   REF   1              42,3217  0 3251 1             TC       M/SNORM           MPAC = +0. L/ 59M58.5S
 1296   REF   1              42,3220  6 3306 1             AD       M/SCON1           - HI PART OF (59M58.5S) +1  FOR CCS
 1297   REF 105  LAST  348   42,3221  10 000 0             CCS      A                 MAG OF MPAC - HI PART OF (59M58.5S)
 1298   REF   1              42,3222  0 3235 0             TC       M/SLIMIT          G/ 59M58.5S
 1299   REF   2  LAST  349   42,3223  0 3251 1             TC       M/SNORM           ORIGINAL MPAC = -0. L/ 59M58.5S
 1300   REF   3  LAST  349   42,3224  0 3251 1             TC       M/SNORM           L/ 59M58.5S
 1301   REF 106  LAST  349   42,3225  10 155 1             CCS      MPAC     +1       MAG OF MPAC = HI PART OF 59M58.5S
 1302                        42,3226  0 3230 0            TC       +2
 1303   REF   4  LAST  349   42,3227  0 3251 1            TC       M/SNORM            MPAC+1 = +0. L/ 59M58.5S
 1304   REF   1              42,3230  6 3307 0            AD       M/SCON2            - LO PART OF (59M58.5S) +1  FOR CCS
 1305   REF 106  LAST  349   42,3231  10 000 0            CCS      A                  MAG OF MPAC+1 - LO PART OF (59M58.5S)
 1306   REF   2  LAST  349   42,3232  0 3235 0            TC       M/SLIMIT           G/ 59M58.5S
 1307   REF   5  LAST  350   42,3233  0 3251 1            TC       M/SNORM            ORIGINAL MPAC+1 = -0. L/ 59M58.5S
 1308   REF   6  LAST  350   42,3234  0 3251 1            TC       M/SNORM            L/ 59M58.5S
 1309   REF 107  LAST  349   42,3235  10 154 0  M/SLIMIT  CCS      MPAC               = 59M58.5S    LIMIT
 1310   REF   1              42,3236  3 3311 1            CAF      M/SCON3            MPAC CANNOT BE +/- 0 AT THIS POINT.
 1311   REF   1              42,3237  0 3246 1            TC       +LIMIT             FORCE MPAC, MPAC+1 TO +/- 59M59.5S
 1312   REF   2  LAST  350   42,3240  4 3311 0            CS       M/SCON3
 1313   REF 108  LAST  350   42,3241  54 154 0            TS       MPAC               WILL DISPLAY 59M59S IN DSPDECNR
 1314   REF   3  LAST  350   42,3242  4 3312 0            CS       M/SCON3 +1
 1315   REF 109  LAST  350   42,3243  54 155 1  LIMITCOM  TS       MPAC     +1
 1316   REF   1              42,3244  3 3310 0            CAF      NORMADR            SET RETURN TO M/SNORM+1.
 1317   REF   2  LAST  348   42,3245  0 3327 1            TC       SEPSECNR +1
 1318   REF 110  LAST  350   42,3246  54 154 0  +LIMIT    TS       MPAC
 1319   REF   4  LAST  350   42,3247  3 3312 1            CAF      M/SCON3 +1
 1320   REF   1              42,3250  0 3243 1            TC       LIMITCOM
 1321   REF   1              42,3251  0 3313 0  M/SNORM   TC       SEPSEC             LEAVE FRACT SEC/60 IN MPAC,MPAC+1. LEAVE
A1322                                                                                 WHOLE MIN IN BIT13 OF LOTEMOUT AND ABOVE
 1323   REF   1              42,3252  3 3304 0    +1      CAF      HISECON            USE ONLY FRACT SEC/60 MOD 60
 1324   REF   5  LAST  346   42,3253  0 7256 1            TC       SHORTMP            MULT BY .6 + 2EXP-14
 1325   REF  14  LAST  347   42,3254  4 6214 1            CS       THREE              GIVES SEC/100 MOD 60
 1326   REF  30  LAST  349   42,3255  27'202 1            ADS      DSPCOUNT           DSPCOUNT ALREADY SET TO RXD1
 1327   REF  49  LAST  349   42,3256  0 4636 0            TC       BANKCALL           DISPLAY SEC MOD 60 IN D4D5.
 1328   REF   1              42,3257   61126 0            CADR     DSPDC2NR
 1329   REF  54  LAST  348   42,3260  3 4772 1            CAF      ZERO
 1330   REF   4  LAST  332   42,3261  54 124 1            TS       CODE
 1331   REF  13  LAST  346   42,3262  4 4767 1            CS       TWO
 1332   REF  11  LAST  348   42,3263  50 117 0            INDEX    DECOUNT
 1333   REF   9  LAST  349   42,3264  6 4321 0            AD       R1D1               RXD3
 1334   REF   2  LAST  332   42,3265  54 143 0            TS       COUNT
 1335   REF  50  LAST  350   42,3266  0 4636 0            TC       BANKCALL           BLANK MIDDLE CHAR
 1336   REF   3  LAST  332   42,3267   61161 0            CADR     DSPIN
 1337   REF   2  LAST  349   42,3270  0 3344 1            TC       SEPMIN             REMOVE REST OF SECONDS
 1338   REF 111  LAST  350   42,3271  56 155 0            XCH      MPAC     +1        LEAVE FRACT MIN/60 IN MPAC+1
 1339                        42,3272  0 0006 1            EXTEND                      USE ONLY FRACT MIN/60 MOD 60
 1340   REF   1              42,3273  7 3305 0            MP       HIMINCON           MULT BY .6 + 2EXP-7
 1341   REF 112  LAST  350   42,3274  52 155 1            DXCH     MPAC               GIVES MIN/100 MOD 60
 1342   REF  12  LAST  350   42,3275  50 117 0            INDEX    DECOUNT
 1343   REF  10  LAST  350   42,3276  3 4321 0            CAF      R1D1               RXD1
 1344   REF  31  LAST  350   42,3277  55'202 1            TS       DSPCOUNT
 1345   REF  51  LAST  350   42,3300  0 4636 0            TC       BANKCALL           DISPLAY MIN MOD 60 IN D1D2.
 1346   REF   2  LAST  350   42,3301   61126 0            CADR     DSPDC2NR
 1347   REF  19  LAST  348   42,3302  0 4655 0            TC       POSTJUMP
 1348   REF   4  LAST  348   42,3303   62563 0            CADR     DSPDCEND +2

 1349                        42,3304   23147 1  HISECON   OCT      23147              .6 + 2EXP-14
 1350                        42,3305   23346 1  HIMINCON  OCT      23346              .6 + 2EXP-7
 1351                          42,3306   77753 0  M/SCON1   OCT     77753           - HI PART OF (59M58.5S) +1
 1352                          42,3307   41126 1  M/SCON2   OCT     41126           - LO PART OF (59M58.5S) +1
 1353   REF   7  LAST  350     42,3310   03252 1  NORMADR   ADRES   M/SNORM +1
 1354                          42,3311   00025 0  M/SCON3   OCT     00025           59M 59.5S
 1355                          42,3312   37016 1    +1      OCT     37016
 1356   REF 113  LAST  350     42,3313  10 155 1  SEPSEC    CCS     MPAC     +1     IF +, ROUND BY ADDING .5 SEC
 1357   REF   1                42,3314  1 3323 1            TCF     POSEC           IF -, ROUND BY SUBTRACTING .5 SEC
 1358   REF   2  LAST  351     42,3315  1 3323 1            TCF     POSEC           FINDS TIME IN MPAC, MPAC+1
 1359                          42,3316  1 3317 0            TCF     +1              ROUNDS OFF BY +/- .5 SEC
 1360                          42,3317  0 0006 1            EXTEND                  LEAVES WHOLE MIN IN BIT13 OF
 1361   REF   1                42,3320  4 3211 1            DCS     RNDCON   -1     LOTEMOUT AND ABOVE.
 1362   REF 114  LAST  351     42,3321  20 155 1  SEPSEC1   DAS     MPAC            LEAVES FRACT SEC/60 IN MPAC, MPAC+1.
 1363   REF   3  LAST  350     42,3322  1 3326 1            TCF     SEPSECNR
 1364                          42,3323  0 0006 1  POSEC     EXTEND
 1365   REF   2  LAST  351     42,3324  3 3211 0            DCA     RNDCON   -1
 1366   REF   1                42,3325  1 3321 0            TCF     SEPSEC1
 1367   REF  69  LAST  348     42,3326  56 002 0  SEPSECNR  XCH     Q               THIS ENTRY AVOIDS ROUNDING BY .5 SEC
 1368   REF   1                42,3327  54 144 1    +1      TS      SEPSCRET
 1369   REF   4  LAST  348     42,3330  0 7052 1            TC      DMP             MULT BY 2EXP12/6000
 1370   REF   1                42,3331   03176 1            ADRES   SECON1          GIVES FRACT SEC/60 IN BIT12 OF MPAC+1
 1371                          42,3332  0 0006 1            EXTEND                  AND BELOW.
 1372   REF 115  LAST  351     42,3333  3 0155 0            DCA     MPAC            SAVE MINUTES AND HOURS
 1373   REF   3  LAST  349     42,3334  53'213 1            DXCH    HITEMOUT
 1374   REF   1                42,3335  0 4372 0            TC      TPSL1
 1375   REF   2  LAST  351     42,3336  0 4372 0            TC      TPSL1           GIVES FRACT SEC/60 IN MPAC+1, MPAC+2.
 1376   REF  55  LAST  350     42,3337  3 4772 1            CAF     ZERO
 1377   REF 116  LAST  351     42,3340  56 156 0            XCH     MPAC     +2     LEAVE FRACT SEC/60 IN MPAC, MPAC+1.
 1378   REF 117  LAST  351     42,3341  56 155 0            XCH     MPAC     +1
 1379   REF 118  LAST  351     42,3342  56 154 1            XCH     MPAC
 1380   REF   2  LAST  351     42,3343  0 0144 0            TC      SEPSCRET


 1381   REF  70  LAST  351     42,3344  56 002 0  SEPMIN    XCH     Q               FINDS WHOLE MINUTES IN BIT13
 1382   REF   1                42,3345  54 144 1            TS      SEPMNRET        OF LOTEMOUT AND ABOVE.
 1383   REF   1                42,3346  3 1213 0            CA      LOTEMOUT        REMOVES REST OF SECONDS.
 1384                          42,3347  0 0006 1            EXTEND                  LEAVES FRACT MIN/60 IN MPAC+1.
 1385   REF  18  LAST  308     42,3350  7 4766 0            MP      BIT3            LEAVES WHOLE HOURS IN MPAC.
 1386                          42,3351  0 0006 1            EXTEND                  SR 12, THROW AWAY LP.
 1387   REF  21  LAST  206     42,3352  7 4754 1            MP      BIT13           SR 2, TAKE FROM LP. = SL 12.
 1388   REF 119  LAST  351     42,3353  22 155 0            LXCH    MPAC     +1     THIS FORCES BITS 12-1 TO 0 IF +,
A1389                                                                               FORCES BITS 12-1 TO 1 IF -.
 1390   REF   4  LAST  351     42,3354  3 1212 1            CA      HITEMOUT
 1391   REF 120  LAST  351     42,3355  54 154 0            TS      MPAC
 1392   REF   5  LAST  351     42,3356  0 7052 1            TC      DMP             MULT BY 1/15
 1393   REF   1                42,3357   03204 1            ADRES   MINCON1         GIVES FRACT MIN/60 IN MPAC+1.
 1394   REF   2  LAST  351     42,3360  0 0144 0  ENDSPMIN  TC      SEPMNRET        GIVES WHOLE HOURS IN MPAC.


R1395   THIS IS A SPECIAL PURPOSE VERB FOR DISPLAYING A DOUBLE PRECISION AGC
R1396   WORD AS 10 DECIMAL DIGITS ON THE AGC DISPLAY PANEL.  IT CAN BE USED WITH
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R1397   ANY NOUN, EXCEPT MIXED NOUNS. IT DISPLAYS THE CONTENTS
R1398   OF THE REGISTER NOUNADD IS POINTING TO .  IF USED WITH NOUNS WHICH ARE
R1399   INHERENTLY NOT DP SUCH AS THE CDU COUNTERS THE DISPLAY WILL BE GARBAGE.
R1400   DISPLAY IS IN R1 AND R2 ONLY WITH THE SIGN IN R1.


 1401   REF   3  LAST  345   40,2000                        SETLOC  PINBALL1
 14011                       40,2657                        BANK
 14015  REF   3 LAST  345 TO  348:   106    431*            COUNT*  $$/PIN
 1402   REF   8  LAST  348   40,2657  50 140 1  DSPDPDEC  INDEX   MIXBR
 1403                        40,2660  0 2660 0            TC      +0
 1404                        40,2661  0 2663 0            TC      +2                       NORMAL NOUN
 1405   REF   3  LAST  340   40,2662  0 3261 1            TC      DSPALARM
 1406                        40,2663  0 0006 1            EXTEND
 1407   REF  11  LAST  348   40,2664  5 0145 1            INDEX   NOUNADD
 1408                        40,2665  3 0001 0            DCA     0
 1409   REF 121  LAST  351   40,2666  52 155 1            DXCH    MPAC
 1410   REF  11  LAST  350   40,2667  3 4321 0            CAF     R1D1
 1411   REF  32  LAST  350   40,2670  55'202 1            TS      DSPCOUNT
 1414   REF   2  LAST  258   40,2671  0 7224 1            TC      DPAGREE
 1415   REF   1              40,2672  0 3133 0            TC      DSP2DEC
 1416   REF   6  LAST  349   40,2673  0 0136 0  ENDDPDEC  TC      ENTEXIT
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L        PINBALL GAME  BUTTONS AND LIGHTS                                                  USER'S PAGE NO. 36      EO S4

R1417    LOAD VERBS              IF ALARM CONDITION IS DETECTED DURING EXECUTE,
R1418    CHECK FAIL LIGHT IS TURNED ON AND ENDOFJOB. IF ALARM CONDITION IS
R1419    DETECTED DURING ENTER OF DATA, CHECK FAIL IS TURNED ON AND IT RECYCLES
R1420    TO EXECUTE  OF ORIGINAL LOAD VERB. RECYCLE CAUSED BY  1) DECIMAL MACHINE
R1421    CADR  2) MIXTURE OF OCTAL/DECIMAL DATA  3) OCTAL DATA INTO DECIMAL
R1422    ONLY NOUN  4) DEC DATA INTO OCT ONLY NOUN  5) DATA TOO LARGE FOR SCALE
R1423    6) FEWER THAN 3 DATA WORDS LOADED FOR HRS, MIN, SEC NOUN.(2)-(6) ALARM
R1424    AND RECYCLE OCCUR AT FINAL ENTER OF SET. (1) ALARM AND RECYCLE OCCUR AT
R1425    ENTER OF CADR.


  1426   REF   2  LAST  334    41,2000                        SETLOC  PINBALL2
  14261                        41,2611                        BANK
  14265  REF   2 LAST  334 TO  345:    393    393*            COUNT*  $$/PIN
  1427   REF  14  LAST  350    41,2611  4 4767 1  ABCLOAD     CS      TWO
  1428   REF   3  LAST  342    41,2612  0 2423 0              TC      COMPTEST
  1429   REF   1               41,2613  0 2453 1              TC      NOUNTEST         TEST IF NOUN CAN BE LOADED.
  1430   REF   1               41,2614  3 4353 0              CAF     VBSP1LD
  1431   REF   2  LAST  332    41,2615  0 2336 0              TC      UPDATVB  -1
  1432   REF   1               41,2616  0 2300 0              TC      REQDATX
  1433   REF   1               41,2617  3 4354 1              CAF     VBSP2LD
  1434   REF   3  LAST  353    41,2620  0 2336 0              TC      UPDATVB  -1
  1435   REF   1               41,2621  0 2302 1              TC      REQDATY
  1436   REF   1               41,2622  3 4615 1              CAF     VBSP3LD
  1437   REF   4  LAST  353    41,2623  0 2336 0              TC      UPDATVB -1
  1438   REF   2  LAST  335    41,2624  0 2304 1              TC      REQDATZ


  1439   REF  12  LAST  347    41,2625  4 6211 1  PUTXYZ      CS      SIX              TEST THAT THE 3 DATA WORDS LOADED ARE
  1440   REF   1               41,2626  0 3011 1              TC      ALLDC/OC         ALL DEC OR ALL OCT.
  1441                         41,2627  0 0006 1              EXTEND
  1442   REF   4  LAST  339    41,2630  3 2115 0              DCA     LODNNLOC         SWITCH BANKS TO NOUN TABLE READING
  1443   REF   7  LAST  344    41,2631  52 006 0              DXCH    Z                ROUTINE.
  1444   REF  56  LAST  351    41,2632  3 4772 1              CAF     ZERO             X COMP
  1445   REF   1               41,2633  0 3071 1              TC      PUTCOM
  1446   REF  12  LAST  352    41,2634  50 145 1              INDEX   NOUNADD
  1447                         41,2635  54 000 0              TS      0
  1448   REF  29  LAST  346    41,2636  3 4770 0              CAF     ONE              Y COMP
  1449   REF   2  LAST  353    41,2637  0 3071 1              TC      PUTCOM
  1450   REF  13  LAST  353    41,2640  50 145 1              INDEX    NOUNADD
  1451                         41,2641  54 001 1              TS      1
  1452   REF  15  LAST  353    41,2642  3 4767 0              CAF     TWO              Z COMP
  1453   REF   3  LAST  353    41,2643  0 3071 1              TC      PUTCOM
  1454   REF  14  LAST  353    41,2644  50 145 1              INDEX   NOUNADD
  1455                         41,2645  54 002 1              TS      2
  145501 REF   5  LAST  248    41,2646  4 4774 0              CS      SEVEN            IF NOUN 7 HAS JUST BEEN LOADED, SET
  145502 REF  10  LAST  339    41,2647  6 1205 1              AD      NOUNREG           FLAG BITS AS SPECIFIED.
  145503                       41,2650  0 0006 1              EXTEND
  145504                       41,2651  1 2653 1              BZF     +2
  145505 REF   2  LAST  334    41,2652  0 3001 0              TC      LOADLV
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 145506                      41,2653  0 0004 0            INHINT
 145508 REF   1              41,2654  4 5001 1            CS      OCT30             IS IT A CHANNEL (30 OR UNDER)
 14551  REF   4  LAST  344   41,2655  6 1206 1            AD      XREG
 145512                      41,2656  0 0006 1            EXTEND
 145514 REF   1              41,2657  6 2667 1            BZMF    CHANBITS          YES

 145516 REF   5  LAST  354   41,2660  3 1206 1            CA      XREG              ECADR OF ERASABLE CELL
 145518 REF   5  LAST  339   41,2661  0 4306 0            TC      SETNCADR +1       SET EBANK, NOUNADD

 14552  REF  15  LAST  353   41,2662  50 145 1            INDEX   NOUNADD
 145522                      41,2663  3 0000 1            CA      0
 145524 REF  41  LAST  343   41,2664  54 001 1            TS      L
 145526 REF  30  LAST  353   41,2665  3 4770 0            CAF     ONE
 145528 REF   6  LAST  354   41,2666  55'206 0            TS      XREG              MAKE IT LOOK LIKE A CHANNEL FOR A WHILE

 14553  REF   1              41,2667  6 4352 1  CHANBITS  AD      OCT21
 145532                      41,2670  0 0006 1            EXTEND
 145534 REF   1              41,2671  1 2714 0            BZF     BITSOFF2          DONT TOUCH CHAN7 (SUPERBANK)

 145536 REF   2  LAST  335   41,2672  3 1210 0            CA      ZREG
 145538                      41,2673  0 0006 1            EXTEND
 14554  REF   1              41,2674  6 2702 0            BZMF    BITSOFF           R3 IS ZERO FOR OFF, NONZERO FOR ON

 145542 REF   1              41,2675  3 1207 0            CA      YREG
 145544                      41,2676  0 0006 1            EXTEND
 145546 REF   7  LAST  354   41,2677  5 1206 1            INDEX   XREG
 145548                      41,2700  05 000 1            WOR     0
 14555  REF   1              41,2701  1 2706 0            TCF     BITSOFF1

 145552 REF   2  LAST  354   41,2702  4 1207 1  BITSOFF   CS      YREG
 145553                      41,2703  0 0006 1            EXTEND
 145554 REF   8  LAST  354   41,2704  5 1206 1            INDEX   XREG
 145556                      41,2705  03 000 1            WAND    0

 145558 REF   9  LAST  354   41,2706  11'206 0  BITSOFF1  CCS     XREG              WAS IT REALLY A CHANNEL
 14556  REF 107  LAST  350   41,2707  10 000 0            CCS     A
 145562 REF   2  LAST  354   41,2710  1 2714 0            TCF     BITSOFF2          YES

 145563 REF 108  LAST  354   41,2711  22 000 1            LXCH    A
 145564 REF  16  LAST  354   41,2712  50 145 1    -2      INDEX   NOUNADD
 145566                      41,2713  54 000 0            TS      0
 145568                      41,2714  0 0003 1  BITSOFF2  RELINT
 1456   REF   3  LAST  353   41,2715  0 3001 0            TC      LOADLV

 14565  REF   6  LAST  260      5001            OCT30     =       BITS4&5
 14566  REF   3  LAST  339      4352            OCT21     =       ND1

 1457   REF  31  LAST  354   41,2716  4 4770 1  ABLOAD    CS      ONE
 1458   REF   4  LAST  353   41,2717  0 2423 0            TC      COMPTEST
 1459   REF   2  LAST  353   41,2720  0 2453 1            TC      NOUNTEST          TEST IF NOUN CAN BE LOADED.
 1460   REF   2  LAST  353    41,2721  3 4353 0            CAF     VBSP1LD
 1461   REF   5  LAST  353    41,2722  0 2336 0            TC      UPDATVB -1
 1462   REF   2  LAST  353    41,2723  0 2300 0            TC      REQDATX
 1463   REF   2  LAST  353    41,2724  3 4354 1            CAF     VBSP2LD
 1464   REF   6  LAST  355    41,2725  0 2336 0            TC      UPDATVB -1
 1465   REF   2  LAST  353    41,2726  0 2302 1            TC      REQDATY
 1466   REF   8  LAST  336    41,2727  4 4773 1  PUTXY     CS      FIVE                TEST THAT THE 2 DATA WORDS LOADED ARE
 1467   REF   2  LAST  353    41,2730  0 3011 1            TC      ALLDC/OC            ALL DEC OR ALL OCT.
 1468                         41,2731  0 0006 1            EXTEND
 1469   REF   5  LAST  353    41,2732  3 2115 0            DCA     LODNNLOC            SWITCH BANKS TO NOUN TABLE READING
 1470   REF   8  LAST  353    41,2733  52 006 0            DXCH    Z                   ROUTINE.
 1471   REF  57  LAST  353    41,2734  3 4772 1            CAF     ZERO                X COMP
 1472   REF   4  LAST  353    41,2735  0 3071 1            TC      PUTCOM
 1473   REF  17  LAST  354    41,2736  50 145 1            INDEX   NOUNADD
 1474                         41,2737  54 000 0            TS      0
 1475   REF   1               41,2740  1 2760 0            TCF     COMBLOAD            Y COMP
 1481   REF   3  LAST  355    41,2741  0 2300 0  ALOAD     TC      REQDATX
 1482                         41,2742  0 0006 1            EXTEND
 1483   REF   6  LAST  355    41,2743  3 2115 0            DCA     LODNNLOC            SWITCH BANKS TO NOUN TABLE READING
 1484   REF   9  LAST  355    41,2744  52 006 0            DXCH    Z                   ROUTINE.
 1485   REF  58  LAST  355    41,2745  3 4772 1            CAF     ZERO                X COMP
 1486   REF   5  LAST  355    41,2746  0 3071 1            TC      PUTCOM
 1487   REF   3  LAST  354    41,2747  1 2712 0            TCF     BITSOFF2 -2
 1490   REF  32  LAST  354    41,2750  4 4770 1  BLOAD     CS      ONE
 1491   REF   5  LAST  354    41,2751  0 2423 0            TC      COMPTEST
 1493   REF  27  LAST  346    41,2752  3 4752 0            CAF     BIT15               SET CLPASS FOR PASS0 ONLY
 1494   REF  10  LAST  335    41,2753  55'220 1            TS      CLPASS
 1495   REF   3  LAST  355    41,2754  0 2302 1            TC      REQDATY
 1496                         41,2755  0 0006 1            EXTEND
 1497   REF   7  LAST  355    41,2756  3 2115 0            DCA     LODNNLOC            SWITCH BANKS TO NOUN TABLE READING
 1498   REF  10  LAST  355    41,2757  52 006 0            DXCH    Z                   ROUTINE.
 1499   REF  33  LAST  355    41,2760  3 4770 0  COMBLOAD  CAF     ONE
 1500   REF   6  LAST  355    41,2761  0 3071 1            TC      PUTCOM
 1501   REF  18  LAST  355    41,2762  50 145 1            INDEX   NOUNADD
 1502                         41,2763  54 001 1            TS      1
 1503   REF   4  LAST  354    41,2764  0 3001 0            TC      LOADLV

 1504   REF  16  LAST  353    41,2765  4 4767 1  CLOAD     CS      TWO
 1505   REF   6  LAST  355    41,2766  0 2423 0            TC      COMPTEST
 1507   REF  28  LAST  355    41,2767  3 4752 0            CAF     BIT15               SET CLPASS FOR PASS0 ONLY
 1508   REF  11  LAST  355    41,2770  55'220 1            TS      CLPASS
 1509   REF   3  LAST  353    41,2771  0 2304 1            TC      REQDATZ
 1510                         41,2772  0 0006 1            EXTEND
 1511   REF   8  LAST  355    41,2773  3 2115 0            DCA     LODNNLOC            SWITCH BANKS TO NOUN TABLE READING
 1512   REF  11  LAST  355    41,2774  52 006 0            DXCH    Z                   ROUTINE.
 1513   REF  17  LAST  355    41,2775  3 4767 0            CAF     TWO
 1514   REF   7  LAST  355    41,2776  0 3071 1            TC      PUTCOM
 1515   REF  19  LAST  355    41,2777  50 145 1            INDEX   NOUNADD
 1516                         41,3000  54 002 1            TS      2
 1518   REF  59  LAST  355    41,3001  3 4772 1  LOADLV    CAF     ZERO
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  1519    REF  13  LAST  335    41,3002  55'203 0               TS      DECBRNCH
  1520    REF  60  LAST  355    41,3003  4 4772 0               CS      ZERO
  1521    REF   1               41,3004  55'217 0               TS      LOADSTAT
  15215   REF   6  LAST  336    41,3005  0 4432 0               TC      RELDSP          RELEASE FOR PRIORITY DISPLAY PROBLEM
  1522    REF   3  LAST  335    41,3006  0 4261 0               TC      -VD1SET
  1524    REF  20  LAST  350    41,3007  0 4655 0               TC      POSTJUMP        AFTER COMPLETED LOAD, GO TO RECALTST
  1525    REF   1               41,3010   61412 1               CADR    RECALTST        TO SEE IF THERE IS RECALL FROM ENDIDLE.

  1529    REF  13  LAST  350    41,3011  54 117 1   ALLDC/OC TS      DECOUNT         TESTS THAT DATA WORDS LOADED ARE EITHER
  1530    REF  14  LAST  356    41,3012  4 1203 0               CS      DECBRNCH        ALL DEC OR ALL OCT. ALARMS IF NOT.
  1531    REF   3  LAST  333    41,3013  54 021 0               TS      SR
  1532    REF   4  LAST  356    41,3014  4 0021 0               CS      SR
  1533    REF   5  LAST  356    41,3015  4 0021 0               CS      SR              SHIFTED RIGHT 2
  1534    REF 109  LAST  354    41,3016  10 000 0               CCS     A               DEC COMP BITS IN LOW 3
  1535                          41,3017  1 3021 0               TCF     +2              SOME ONES IN LOW 3
  1536    REF  71  LAST  351    41,3020  0 0002 0   GOQ         TC      Q               ALL ZEROS. ALL OCTAL. OK.
  1537    REF  14  LAST  356    41,3021  6 0117 0               AD      DECOUNT         DEC COMP = 7 FOR 3COMP, =6 FOR 2COMP
  1538                          41,3022  0 0006 1               EXTEND                  (BUT IT HAS BEEN DECREMENTED BY CCS)
  1539    REF   5  LAST  271    41,3023  1 6711 1               BZF     TCQ             MUST MATCH 6 FOR 3COMP, 5 FOR 2COMP
  1540    REF   4  LAST  343    41,3024  0 4173 0               TC      ALMCYCLE        ALARM AND RECYCLE.
  1542    REF  72  LAST  356    41,3025  56 002 0   SFRUTNOR    XCH     Q               GETS SF ROUTINE NUMBER FOR NORMAL CASE
  1543    REF   1               41,3026  54 114 1               TS      EXITEM          CANT USE L FOR RETURN. TSTFORDP USES L.
  1544    REF   1               41,3027  3 4343 1               CAF     MID5
  1545    REF   3  LAST  344    41,3030  7 0147 1               MASK    NNTYPTEM
  1546    REF   1               41,3031  0 4324 0               TC      RIGHT5
  1547    REF   2  LAST  356    41,3032  0 0114 0               TC      EXITEM          SF ROUTINE NUMBER IN A

  1548    REF  73  LAST  356    41,3033  56 002 0   SFRUTMIX    XCH     Q               GETS SF ROUTINE NUMBER FOR MIXED CASE
  1549    REF   3  LAST  356    41,3034  54 114 1               TS      EXITEM
  1550    REF   1               41,3035  0 3063 1               TC      GETTCRLQ
  1555    REF   2  LAST  282    41,3036  7 0153 1               MASK    RUTMXTEM        GET HI5, MID5, OR LOW5 OF RUTMXTAB ENTRY
  1556    REF  42  LAST  354    41,3037  50 001 0               INDEX   L
  1557                          41,3040  0 0000 1               TC      L
R 1558    DO TC GOQ(DECOUNT=0), DO TC RIGHT5(DECOUNT=1), DO TC LEFT5(DECOUNT=2).
  1559    REF   4  LAST  356    41,3041  0 0114 0   SFRET1      TC      EXITEM          SF ROUTINE NUMBER IN A

  1560    REF  74  LAST  356    41,3042  56 002 0   SFCONUM     XCH     Q               GETS 2X( SF CONSTANT NUMBER)
  1561    REF   5  LAST  356    41,3043  54 114 1               TS      EXITEM
  1562    REF   9  LAST  352    41,3044  50 140 1               INDEX   MIXBR
  1563                          41,3045  0 3045 0               TC      +0
  1564    REF   1               41,3046  0 3060 1               TC      CONUMNOR        NORMAL NOUN
  1565    REF   2  LAST  356    41,3047  0 3063 1               TC      GETTCRLQ
  1570    REF   4  LAST  356    41,3050  7 0147 1               MASK    NNTYPTEM
  1571    REF  43  LAST  356    41,3051  50 001 0               INDEX   L
  1572                          41,3052  0 0000 1               TC      L
R 1573    DO TC GOQ(DECOUNT=0), DO TC RIGHT5(DECOUNT=1), DO TC LEFT5(DECOUNT=2).
  1574                          41,3053  6 0000 1   SFRET       DOUBLE                  2X(SF CONSTANT NUMBER ) IN A
  1575    REF   6  LAST  356    41,3054  0 0114 0               TC      EXITEM

  1576    REF   1               41,3055  0 3020 0   DISPLACE    TC      GOQ
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 1577   REF   2  LAST  356   41,3056  0 4324 0            TC      RIGHT5
 1578   REF   3  LAST  344   41,3057  0 4333 0            TC      LEFT5

 1579   REF   2  LAST  214   41,3060  3 4342 0  CONUMNOR CAF     LOW5              NORMAL NOUN ALWAYS GETS LOW 5 OF
 1580   REF   5  LAST  356   41,3061  7 0147 1           MASK    NNTYPTEM          NNTYPTAB FOR SF CONUM.
 1581   REF   1              41,3062  1 3053 0           TCF     SFRET
 15821  REF  15  LAST  356   41,3063  50 117 0  GETTCRLQ INDEX   DECOUNT
 15822  REF   1              41,3064  3 3055 1           CAF     DISPLACE
 15823  REF  44  LAST  356   41,3065  54 001 1           TS      L                 PUT TC GOQ, TC RIGHT5, TC LEFT5 IN L
 15824  REF  16  LAST  357   41,3066  50 117 0           INDEX   DECOUNT
 15825  REF   3  LAST  357   41,3067  3 4342 0           CAF     LOW5              LOW5, MID5, HI5 IN A
 15826  REF  75  LAST  356   41,3070  0 0002 0           TC      Q
 1583   REF  17  LAST  357   41,3071  54 117 1  PUTCOM   TS      DECOUNT
 1584   REF  76  LAST  357   41,3072  56 002 0           XCH     Q
 1585   REF   1              41,3073  54 115 0           TS      DECRET
 1586   REF  61  LAST  356   41,3074  3 4772 1           CAF     ZERO
 1587   REF   3  LAST  347   41,3075  54 162 0           TS      MPAC+6
 1588   REF  18  LAST  357   41,3076  50 117 0           INDEX   DECOUNT
 1589   REF   3  LAST  332   41,3077  57'211 1           XCH     XREGLP
 1590   REF 122  LAST  352   41,3100  54 155 1           TS      MPAC  +1
 1591   REF  19  LAST  357   41,3101  50 117 0           INDEX   DECOUNT
 1592   REF  10  LAST  354   41,3102  57'206 1           XCH     XREG
 1593   REF 123  LAST  357   41,3103  54 154 0           TS      MPAC
 1594   REF  10  LAST  356   41,3104  50 140 1           INDEX   MIXBR
 1595                        41,3105  0 3105 0           TC      +0
 1596   REF   1              41,3106  0 3133 0           TC      PUTNORM           NORMAL NOUN
R1597   IF MIXNOUN, PLACE ADDRESS FOR COMPONENT K INTO NOUNADD, SET EBANK BITS.
 1598   REF  20  LAST  357   41,3107  50 117 0           INDEX   DECOUNT           GET IDADDTAB ENTRY FOR COMPONENT K
 1599   REF   4  LAST  348   41,3110  3 0150 0           CA      IDADITEM                 OF NOUN.
 1600   REF   5  LAST  348   41,3111  7 4347 1           MASK    LOW11             (ECADR)SUBK FOR CURRENT COMP OF NOUN
 1601   REF   6  LAST  354   41,3112  0 4305 0           TC      SETNCADR          ECADR INTO NOUNCADR. SETS EB, NOUNADD
 1602                        41,3113  0 0006 1           EXTEND                    C(NOUNADD) IN A UPON RETURN
 1603   REF  21  LAST  357   41,3114  60 117 0           SU      DECOUNT           PLACE (ESUBK)-K INTO NOUNADD
 1604   REF  20  LAST  355   41,3115  54 145 0           TS      NOUNADD
 1605   REF  15  LAST  356   41,3116  11'233 0           CCS     DECBRNCH
 1606   REF   1              41,3117  0 3170 1           TC      PUTDECSF          +  DEC
 1607   REF   1              41,3120  0 2445 0           TC      OCTSTCYC          +0 OCTAL
 1608   REF   3  LAST  344   41,3121  0 3033 1           TC      SFRUTMIX          TEST IF DEC ONLY BIT = 1. IF SO,
 1609   REF   3  LAST  343   41,3122  0 2260 1           TC      DPTEST            ALARM AND RECYCLE. IF NOT, CONTINUE
 1610   REF   1              41,3123  0 3151 1           TC      PUTCOM2           NO DP
A1611                                                                              TEST FOR DP SCALE FOR OCT LOAD. IF SO,
A1612                                                                              +0 INTO MAJOR PART. SET NOUNADD FOR
A1613                                                                              LOADING OCTAL WORD INTO MINOR PART
 1614   REF  21  LAST  357   41,3124  24 145 1  PUTDPCOM INCR    NOUNADD           DP  (ESUBK)-K+1  OR  E+1
 1615   REF  22  LAST  357   41,3125  3 0145 1           CA      NOUNADD           NOUNADD NOW SET FOR MINOR PART
 1616   REF  22  LAST  357   41,3126  26 117 1           ADS     DECOUNT           (ESUBK)+1  OR  E+1  INTO DECOUNT
 1617   REF  62  LAST  357   41,3127  3 4772 1           CAF     ZERO              NOUNADD SET FOR MINOR PART
 1618   REF  23  LAST  357   41,3130  50 117 0           INDEX   DECOUNT
 1619                        41,3131  53'777 0           TS               -1       ZERO MAJOR PART(ESUBK OR E)
 1620   REF   2  LAST  357   41,3132  0 3151 1           TC      PUTCOM2
 1621    REF   2  LAST  335   41,3133  0 4313 1  PUTNORM  TC       SETNADD           ECADR FROM NOUNCADR. SETS EB, NOUNADD.
 1622    REF  16  LAST  357   41,3134  11'203 0           CCS      DECBRNCH
 1623    REF   2  LAST  357   41,3135  0 3170 1           TC       PUTDECSF          +  DEC
 1624    REF   2  LAST  357   41,3136  0 2445 0           TC       DCTSTCYC          +0 OCTAL
 1625    REF   3  LAST  345   41,3137  0 3025 0           TC       SFRUTNOR          TEST IF DEC ONLY BIT = 1. IF SO,
 1626    REF   4  LAST  357   41,3140  0 2260 1           TC       DPTEST            ALARM AND RECYCLE. IF NOT, CONTINUE.
 1627    REF   3  LAST  357   41,3141  0 3145 1           TC       PUTCOM2 -4        NO DP
 1628    REF  63  LAST  357   41,3142  3 4772 1           CAF      ZERO              DP
 1629    REF  24  LAST  357   41,3143  54 117 1           TS       DECOUNT
 1630    REF   1              41,3144  0 3124 0           TC       PUTDPCOM

 1631    REF   8  LAST  344   41,3145  3 0146 1    -4     CA       NNADTEM
 1632    REF  34  LAST  355   41,3146  6 4770 0           AD       ONE               IF NNADTEM = -1, CHANNEL TO BE SPECIFIED
 1633                         41,3147  0 0006 1           EXTEND
 1634    REF   1              41,3150  1 3155 1           BZF      CHANLOAD
 1635    REF 124  LAST  357   41,3151  56 154 1  PUTCOM2  XCH      MPAC
 1636    REF   2  LAST  357   41,3152  0 0115 1           TC       DECRET

 1637    REF  33  LAST  352     1202                      EBANK=   DSPCOUNT
 1638    REF   1              41,3153   02122 1  GTSFINLC 2CADR    GTSFIN
 1638    REF   1              41,3154   64102 0


 1639    REF   6  LAST  353   41,3155  4 4774 0  CHANLOAD CS       SEVEN             DONT LOAD CHAN 7. (IT = SUPERBANK)
 16391   REF   4  LAST  344   41,3156  6 1222 1           AD       NOUNCADR
 16392                        41,3157  0 0006 1           EXTEND
 16393   REF   5  LAST  355   41,3160  1 3001 1           BZF      LOADLV
 16394   REF   5  LAST  358   41,3161  3 1222 1           CA       NOUNCADR
 1640    REF   3  LAST  344   41,3162  7 5021 0           MASK     LOW9
 1641    REF 125  LAST  358   41,3163  56 154 1           XCH      MPAC
 16411                        41,3164  0 0006 1           EXTEND
 16412   REF 126  LAST  358   41,3165  5 0154 1           INDEX    MPAC
 1642                         41,3166  01 000 0           WRITE    0
 1643    REF   6  LAST  358   41,3167  0 3001 0           TC       LOADLV

R1644    PUTDECSF FINDS MIXBR AND DECOUNT STILL SET FROM PUTCOM

 1645    REF   2  LAST  344   41,3170  0 3042 1  PUTDECSF TC       SFCONUM           2X(SF CON NUMB) IN A.
 1646    REF  13  LAST  347   41,3171  54 123 0           TS       SFTEMP1
 1647                         41,3172  0 0006 1           EXTEND                     SWITCH BANKS TO SF CONSTANT TABLE
 1648    REF   1              41,3173  3 3154 1           DCA      GTSFINLC          READING ROUTINE.
 1649    REF  12  LAST  355   41,3174  52 006 0           DXCH     Z                 LOADS SFTEMP1, SFTEMP2.
 1650    REF  11  LAST  357   41,3175  50 140 1           INDEX    MIXBR
 1651                         41,3176  0 3176 1           TC       +0
 1652    REF   1              41,3177  0 3202 1           TC       PUTSFNOR
 1653    REF   4  LAST  357   41,3200  0 3033 1           TC       SFRUTMIX
 1654    REF   1              41,3201  0 3203 0           TC       PUTDCSF2
 1655    REF   4  LAST  358   41,3202  0 3025 0  PUTSFNOR TC       SFRUTNOR
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  1656    REF 110  LAST  356   41,3203  50 0000 1  PUTDCSF2 INDEX  A
  1657    REF   1              41,3204   3 3206 0           CAF    SFINTABR
  1658    REF   4  LAST  345   41,3205   0 4660 0           TC     BANKJUMP        SWITCH BANKS FOR EXPANSHION ROOM
  1659    REF   1              41,3206    62347 0  SFINTABR CADR   GOALMCYC        ALARM AND RECYCLE IF DEC LOAD
A 1660                                                                             WITH OCTAL ONLY NOUN
  1661    REF   1              41,3207    60753 0           CADR   BINROUND
  1662    REF   1              41,3210    60674 1           CADR   DEGINSF
  1663    REF   1              41,3211    60743 1           CADR   ARTHINSF
  1664    REF   1              41,3212    60776 1           CADR   DPINSF
  1665    REF   1              41,3213    61023 1           CADR   DPINSF2
  1666    REF   1              41,3214    60761 1           CADR   DPTDEGIN
  1667    REF   2  LAST  359   41,3215    60776 1           CADR   DPINSF          SAME AS ARITHDP1
  1668    REF   1              41,3216    65361 0           CADR   HMSIN
  1669    REF   4  LAST  352   41,3217    61261 0           CADR   DSPALARM        MIN/SEC CANT BE LOADED.
  1671    REF   1              41,3220    61027 0           CADR   DPINSF4
  16711   REF   1              41,3221    60756 0           CADR   ARTINISF
  16712   REF   5  LAST  359   41,3222    61261 0           CADR   DSPALARM        2INTOUT CANT BE LOADED.
  16713   REF   1              41,3223    61007 1           CADR   DPFRACIN
R 1673    SCALE FACTORS FOR THOSE ROUTINES NEEDING THEM ARE AVAILABLE IN SFTEMP1.
R 1674    ALL SFIN ROUTINES USE MPAC MPAC+1. LEAVE RESULT IN A. END WITH TC DECRET

  1675    REF   4  LAST  352   40,2000                      SETLOC PINBALL1
  16751                        40,2674                      BANK
  16755   REF   4 LAST  352 TO  353:    13   444*           COUNT* $$/PIN
R 1676    DEGINSF APPLIES 1000/180 =5.55555(10) = 5.43434(8)

  1677    REF   6  LAST  351   40,2674   0 7052 1  DEGINSF  TC     DMP             SF ROUTINE FOR DEC DEGREES
  1678    REF   1              40,2675    02737 0           ADRES  DEGCON1         MULT BY 5.5  5(10)X2EXP-3
  1679    REF 127  LAST  358   40,2676  10 0155 1           CCS    MPAC      +1    THIS ROUNDS OFF MPAC+1 BEFORE SHIFT
  1680    REF  16  LAST  330   40,2677   3 4756 1           CAF    BIT11           LEFT 3, AND CAUSES 360.00 TO OF/UF
  1681                         40,2700   0 2702 0           TC     +2              WHEN SHIFTED LEFT AND ALARM.
  1682    REF  17  LAST  359   40,2701   4 4756 0           CS     BIT11
  1683    REF 128  LAST  359   40,2702   6 0155 0           AD     MPAC      +1
  1684    REF   1              40,2703   0 3046 0           TC     2ROUND    +2
  1685    REF   3  LAST  351   40,2704   0 4372 0           TC     TPSL1           LEFT 1
  1686    REF   4  LAST  359   40,2705   0 4372 0  DEGINSF2 TC     TPSL1           LEFT 2
  1687    REF   1              40,2706   0 3051 0           TC     TESTOFUF
  1688    REF   5  LAST  359   40,2707   0 4372 0           TC     TPSL1           RETURNS IF NO OF/UF (LEFT3)
  1689    REF 129  LAST  359   40,2710  10 0154 0           CCS    MPAC
  1690    REF   1              40,2711   0 2715 0           TC     SIGNFIX         IF+, GO TO SIGNFIX
  1691    REF   2  LAST  359   40,2712   0 2715 0           TC     SIGNFIX         IF +0, GO TO SIGNFIX
  1692                         40,2713   4 0000 0           COM                    IF - , USE -MAGNITUDE +1
  1693    REF 130  LAST  359   40,2714  54 0154 0           TS     MPAC            IF -0, USE +0
  1694    REF   4  LAST  357   40,2715  10 0162 0  SIGNFIX  CCS    MPAC+6
  1695    REF   1              40,2716   0 2733 1           TC     SGNTO1          IF OVERFLOW
  1696    REF   1              40,2717   0 2727 1           TC     ENDSCALE        NO OVERFLOW/UNDERFLOW
  1697    REF 131  LAST  359   40,2720  10 0154 0           CCS    MPAC            IF UF FORCE SIGN TO 0 EXCEPT -180
  1698    REF   2  LAST  343   40,2721    04151 0  MONADR   GENADR PASTEVB         CANNOT GET HERE
  1699    REF   1              40,2722   0 2731 0           TC     NEG180
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 1700                          40,2723  0 2724 1           TC      +1
 1701    REF 132  LAST  359    40,2724  56 154 1           XCH     MPAC
 1702    REF   8  LAST  315    40,2725  7 4750 0           MASK    POSMAX
 1703    REF 133  LAST  360    40,2726  54 154 0    -1     TS      MPAC
 1704    REF  21  LAST  356    40,2727  0 4655 0  ENDSCALE TC      POSTJUMP
 1705    REF   4  LAST  358    40,2730   63151 1           CADR    PUTCOM2

 1706    REF   9  LAST  360    40,2731  4 4750 0  NEG180   CS      POSMAX
 1707    REF   2  LAST  359    40,2732  0 2726 0           TC      ENDSCALE  -1

 1708    REF 134  LAST  360    40,2733  4 0154 0  SGNTO1   CS      MPAC               IF OF FORCE SIGN TO 1
 1709    REF  10  LAST  360    40,2734  7 4750 0           MASK    POSMAX
 1710    REF 111  LAST  359    40,2735  4 0000 0           CS      A
 1711    REF   3  LAST  360    40,2736  0 2726 0           TC      ENDSCALE  -1

 1712                          40,2737   26161 0  DEGCON1  2DEC    5.555555555 B-3
 1712                          40,2740   30707 1

 1713                          40,2741   21616 0  DEGCON2  2DEC    2.222222222 B-2
 1713                          40,2742   07071 0
 1715    REF   7  LAST  359    40,2743  0 7052 1  ARTHINSF TC      DMP                SCALES MPAC, +1 BY SFTEMP1, SFTEMP2
 1716    REF  14  LAST  358    40,2744   00123 1           ADRES   SFTEMP1            ASSUMES POINT BETWEEN HI AND LO PARTS
 1717    REF 135  LAST  360    40,2745  56 156 0           XCH     MPAC      +2       OF SFCON. SHIFTS RESULTS LEFT BY 14
 1718    REF 136  LAST  360    40,2746  56 155 0           XCH     MPAC      +1       (BY TAKING RESULTS FROM MPAC+1, MPAC+2)
 1719    REF 137  LAST  360    40,2747  56 154 1           XCH     MPAC
 1720                          40,2750  0 0006 1           EXTEND
 1721    REF   2  LAST  359    40,2751  1 2753 0           BZF     BINROUND
 1722    REF   5  LAST  356    40,2752  0 4173 0           TC      ALMCYCLE           TOO LARGE A LOAD. ALARM AND RECYCLE.
 1723    REF   2  LAST  359    40,2753  0 3044 1  BINROUND TC      2ROUND
 1724    REF   2  LAST  359    40,2754  0 3051 0           TC      TESTOFUF
 1725    REF   4  LAST  360    40,2755  0 2727 1           TC      ENDSCALE           RETURNS IF NO OF/UF


 17251   REF   8  LAST  360    40,2756  0 7052 1  ARTINISF TC      DMP                SCALES MPAC, +1 BY SFTEMP1, SFTEMP2
 17252   REF  15  LAST  360    40,2757   00123 1           ADRES   SFTEMP1            ROUNDS MPAC+1 INTO MPAC.
 17253   REF   3  LAST  360    40,2760  0 2753 1           TC      BINROUND


 1726    REF 138  LAST  360    40,2761  10 154 0  OPTDEGIN CCS     MPAC               OPTICS SCALING ROUTINE
 1727                          40,2762  0 2766 1           TC      +4
 1728                          40,2763  0 2766 1           TC      +3
 1729    REF   6  LAST  360    40,2764  0 4173 0           TC      ALMCYCLE           REJECT - INPUT. ALARM AND RECYCLE.
 1730    REF   7  LAST  360    40,2765  0 4173 0           TC      ALMCYCLE           REJECT - INPUT. ALARM AND RECYCLE.
 1731    REF   1               40,2766  3 2525 1  OPDEGIN2 CAF     NEG.2              RANGE IS 90 DEG
 1732    REF 139  LAST  360    40,2767  26 154 0           ADS     MPAC               SUBTRACT BIAS
 1733    REF   9  LAST  360    40,2770  0 7052 1           TC      DMP                MULT BY 100 / 45  B-2
 1734    REF   1               40,2771   02741 1           ADRES   DEGCON2
 1735    REF  19  LAST  333    40,2772  3 4755 1           CAF     BIT12              ROUND AS IN DEGINSF
 1736    REF 140  LAST  360    40,2773  6 0155 0           AD      MPAC      +1
 1737    REF   3  LAST  360    40,2774  0 3046 0           TC      2ROUND    +2
 1738   REF   1                40,2775  0 2705 1           TC       BEGINSF2

 1739   REF  10  LAST  360     40,2776  0 7052 1  DPINSF   TC       DMP               SCALES MPAC, MPAC +1 BY SFTEMP1,
 1740   REF  16  LAST  360     40,2777   00123 1           ADRES    SFTEMP1           SFTEMP2.  STORES LOW PART OF RESULT
 1741   REF 141  LAST  360     40,3000  56 156 0    +2     XCH      MPAC +2           IN (E SUBK) +1 OR E+1
 1742                          40,3001  6 0000 1           DOUBLE
 1743   REF 142  LAST  361     40,3002  54 156 1           TS       MPAC     +2
 1744   REF  64  LAST  358     40,3003  3 4772 1           CAF      ZERO
 1745   REF 143  LAST  361     40,3004  6 0155 0           AD       MPAC     +1
 1746   REF   4  LAST  360     40,3005  0 3046 0           TC       2ROUND   +2
 1747   REF   3  LAST  360     40,3006  0 3051 0           TC       TESTOFUF
 1748   REF  12  LAST  358     40,3007  50 140 1  DPFRACIN INDEX    MIXBR             RETURNS IF NO OF/UF
 1749                          40,3010  0 3010 0           TC       +0
 1750   REF   1                40,3011  0 3021 1           TC       DPINORM
 1751   REF  25  LAST  358     40,3012  3 0117 0           CA       DECOUNT           MIXEDNOUN
 1752   REF  23  LAST  357     40,3013  6 0145 1  DPINCOM  AD       NOUNADD              MIXED              NORMAL
 1753   REF  77  LAST  357     40,3014  54 002 1           TS       Q                   E SUBK            E
 1754   REF 144  LAST  361     40,3015  56 155 0           XCH      MPAC     +1
 1755   REF  78  LAST  361     40,3016  50 002 0           INDEX    Q
 1756                          40,3017  54 001 1           TS       1                 PLACE LOW PART IN
 1757   REF   5  LAST  360     40,3020  0 2727 1           TC       ENDSCALE          (E SUBK) +1    MIXED
 1758   REF  65  LAST  361     40,3021  3 4772 1  DPINORM  CAF      ZERO              E +1           NORMAL
 1759   REF   1                40,3022  0 3013 0           TC       DPINCOM


 1760   REF  11  LAST  361     40,3023  0 7052 1  DPINSF2  TC       DMP               ASSUMES POINT BETWEEN BITS 7-9 OF HIGH
 1761   REF  17  LAST  361     40,3024   00123 1           ADRES    SFTEMP1           PART OF SF CONST. DPINSF2 SHIFTS RESULTS
 1762   REF  13  LAST  353     40,3025  3 6211 0           CAF      SIX               LEFT BY 7, ROUNDS MPAC+2 INTO MPAC+1
 1763                          40,3026  1 3032 1           TCF      +4                SHIFT LEFT 7
 1765   REF  12  LAST  361     40,3027  0 7052 1  DPINSF4  TC       DMP               ASSUMES POINT BETWEEN BITS 11-12 OF HIGH
 1766   REF  18  LAST  361     40,3030   00123 1           ADRES    SFTEMP1           PART OF SF CONST. DPINSF2 SHIFTS RESULTS
 1767   REF  18  LAST  355     40,3031  3 4767 0           CAF      TWO               LEFT BY 3, ROUNDS MPAC+2 INTO MPAC+1.
 1768   REF   2  LAST  347     40,3032  0 3034 0           TC       TPLEFTN           SHIFT LEFT 3.
 1769   REF   3  LAST  359     40,3033  0 3000 1           TC       DPINSF   +2


 1770   REF  79  LAST  361     40,3034  56 002 0  TPLEFTN  XCH      Q                 SHIFTS MPAC, +1, +2 LEFT N. SETS OVFIND
 1771   REF   1                40,3035  54 124 1           TS       SFTEMP2           TO +1 FOR OF, -1 FOR UF.
 1772   REF  80  LAST  361     40,3036  56 002 0           XCH      Q                 CALL WITH N-1 IN A.
 1773   REF  19  LAST  361     40,3037  54 123 0  LEFTNCOM TS       SFTEMP1               LOOP TIME .37 MSEC.
 1774   REF   6  LAST  359     40,3040  0 4372 0           TC       TPSL1
 1775   REF  20  LAST  361     40,3041  10 123 0           CCS      SFTEMP1
 1776   REF   1                40,3042  0 3037 0           TC       LEFTNCOM
 1777   REF   2  LAST  361     40,3043  0 0124 0           TC       SFTEMP2


 1778   REF 145  LAST  361     40,3044  56 155 0  2ROUND   XCH      MPAC     +1
 1779                          40,3045  6 0000 1           DOUBLE
 1780   REF 146  LAST  361     40,3046  54 155 1    +2     TS       MPAC +1
 1781   REF  81  LAST  361     40,3047  0 0002 0           TC       Q                 IF MPAC+1 DOES NOT OF/UF
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  1782   REF   7  LAST  361   40,3050  1 4376 0             TCF     TPSL1 +4      CHECK FOR MPAC UF/OF
  1787   REF   5  LAST  359   40,3051  3 0162 1  TESTOFUF CA      MPAC+6        RETURNS IF NO UF/OF
  1788                        40,3052  0 0006 1             EXTEND
  1789   REF   6  LAST  356   40,3053  1 6711 1             BZF     TCQ
  1790   REF   8  LAST  360   40,3054  0 4173 0             TC      ALMCYCLE      UF   ALARM AND RECYCLE.


  1791   REF   3  LAST  348   42,2000                       SETLOC  PINBALL3
  17911                       42,3361                       BANK
  17915  REF   2 LAST  348 TO  352:    146    146*          COUNT*  $$/PIN
  1792   REF  17  LAST  358   42,3361  4 1203 0  HMSIN      CS      DECBRNCH      CHECK FOR ALL 3.COMPS DEC
  17923  REF   3  LAST  248   42,3362  7 4172 0             MASK    OCT34         BITS 3,4,5
  17925  REF 112  LAST  360   42,3363  10 000 0             CCS     A
  17927  REF   1              42,3364  0 3501 0             TC      FORCEV25
  1793   REF  13  LAST  361   42,3365  0 7052 1             TC      DMP           XREG, XREGLP (=HOURS) WERE ALREADY PUT
  1794   REF   1              42,3366   03444 0             ADRES   WHOLECON      INTO MPAC, MPAC+1.
  1795   REF   1              42,3367  0 3453 0             TC      RND/TST       ROUND OFF TO WHOLE HRS IN MPAC+1
  1796   REF  66  LAST  361   42,3370  3 4772 1             CAF     ZERO          ALARM IF MPAC NON ZERO (G/ 16383 )
  1797   REF 147  LAST  361   42,3371  54 156 1             TS      MPAC    +2
  1798   REF   1              42,3372  3 3446 1             CAF     HRCON
  1799   REF 148  LAST  362   42,3373  54 154 0             TS      MPAC
  1800   REF   2  LAST  362   42,3374  3 3447 0             CAF     HRCON   +1
  1801   REF 149  LAST  362   42,3375  56 155 0             XCH     MPAC    +1
  1802   REF   6  LAST  350   42,3376  0 7256 1             TC      SHORTMP
  1803   REF   1              42,3377  0 3464 1             TC      MPACTST       ALARM IF MPAC NON ZERO (G/ 745)
  1804   REF 150  LAST  362   42,3400  52 156 1             DXCH    MPAC    +1    STORE HOURS CONTRIBUTION
  1805   REF   1              42,3401  52 124 1             DXCH    HITEMIN
  1806   REF   3  LAST  354   42,3402  3 1207 0             CA      YREG          PUT YREG, YREGLP INTO MPAC, +1.
  1807   REF   2  LAST   82   42,3403  23'212 1             LXCH    YREGLP
  1808   REF 151  LAST  362   42,3404  52 155 1             DXCH    MPAC
  1809   REF  14  LAST  362   42,3405  0 7052 1             TC      DMP
  1810   REF   2  LAST  362   42,3406   03444 0             ADRES   WHOLECON
  1811   REF   2  LAST  362   42,3407  0 3453 0             TC      RND/TST       ROUND OFF TO WHOLE MIN IN MPAC+1
  1812   REF   1              42,3410  4 3451 0             CS      59MIN         ALARM IF MPAC NON ZERO (G/16383)
  1813   REF   1              42,3411  0 3470 1             TC      SIZETST       ALARM IF MPAC+1 G/ 59MIN
  1814   REF 152  LAST  362   42,3412  56 155 0             XCH     MPAC    +1
  1815                        42,3413  0 0006 1             EXTEND
  1816   REF   1              42,3414  7 3450 1             MP      MINCON        LEAVES MINUTES CONTRIBUTION IN A,L
  1817   REF   2  LAST  362   42,3415  20 124 1             DAS     HITEMIN       ADD IN MINUTES CONTRIBUTION
  1818                        42,3416  0 0006 1             EXTEND                IF THIS DAS OVERFLOWS, G/ 745HR,39MIN
  1819                        42,3417  1 3421 1             BZF     +2
  1820   REF   9  LAST  362   42,3420  0 4173 0             TC      ALMCYCLE
  1821   REF   3  LAST  354   42,3421  3 1210 0             CA      ZREG          PUT ZREG, ZREGLP INTO MPAC, +1.
  1822   REF   2  LAST   82   42,3422  23'213 0             LXCH    ZREGLP
  1823   REF 153  LAST  362   42,3423  52 155 1             DXCH    MPAC
  1824   REF  15  LAST  362   42,3424  0 7052 1             TC      DMP
  1825   REF   3  LAST  362   42,3425   03444 0             ADRES   WHOLECON
  1826   REF   3  LAST  362   42,3426  0 3453 0             TC      RND/TST       ROUND OFF TO WHOLE CENTI-SEC IN MPAC+1
  1827   REF   1              42,3427  4 3452 0             CS      59.99SEC      ALARM IF MPAC NON ZERO (G/163.83 SEC)
  1828   REF   2  LAST  362   42,3430  0 3470 1             TC      SIZETST       ALARM IF MPAC+1 G/59.99 SEC
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 1829    REF   3  LAST  362    42,3431  52 124 1             DXCH    HITEMIN                 ADD IN SECONDS CONTRIBUTION
 1830    REF 154  LAST  362    42,3432  20 155 1             DAS     MPAC                    IF THIS DAS OVERFLOWS,
 1831                          42,3433  0 0006 1             EXTEND                          G/ 745 HR, 39 MIN, 14.55 SEC
 1832                          42,3434  1 3436 1             BZF     +2
 1833    REF  10  LAST  362    42,3435  0 4173 0             TC      ALMCYCLE                ALARM AND RECYCLE
 1836    REF   3  LAST  352    42,3436  0 7224 1             TC      DPAGREE
 1837    REF 155  LAST  363    42,3437  52 155 1             DXCH    MPAC
 1838    REF  24  LAST  361    42,3440  50 145 1             INDEX   NOUNADD
 1839                          42,3441  52 001 1             DXCH    0
 1840    REF  22  LAST  360    42,3442  0 4655 0             TC      POSTJUMP
 1841    REF   7  LAST  358    42,3443   63001 0             CADR    LOADLV

 1842                          42,3444   00006 1  WHOLECON   OCT     00006                   (10EXP5/2EXP14)2EXP14
 1843                          42,3445   03240 1             OCT     03240
 1844                          42,3446   00025 0  HRCON      OCT     00025                   1 HOUR IN CENTI-SEC
 1845                          42,3447   37100 1     +1      OCT     37100
 1846                          42,3450   13560 0  MINCON     OCT     13560                   1 MINUTE IN CENTI-SEC
 1847                          42,3451   00073 0  59MIN      OCT     00073                   59 AS WHOLE
 1848                          42,3452   13557 1  59.99SEC   OCT     13557                   5999 CENTI-SEC


 1849    REF 156  LAST  363    42,3453  56 156 0  RND/TST    XCH     MPAC      +2            ROUNDS MPAC+2 INTO MPAC+1.
 1850                          42,3454  6 0000 1             DOUBLE                          ALARMS IF MPAC NOT 0
 1851    REF 157  LAST  363    42,3455  54 156 1             TS      MPAC      +2
 1852    REF  67  LAST  362    42,3456  3 4772 1             CAF     ZERO
 1853    REF 158  LAST  363    42,3457  6 0155 0             AD      MPAC      +1
 1854    REF 159  LAST  363    42,3460  54 155 1             TS      MPAC      +1
 1855    REF  68  LAST  363    42,3461  3 4772 1             CAF     ZERO
 1856    REF 160  LAST  363    42,3462  6 0154 1             AD      MPAC                    CANT OVFLOW
 1857    REF 161  LAST  363    42,3463  56 154 1             XCH     MPAC
 1858    REF 162  LAST  363    42,3464  3 0154 1  MPACTST    CA      MPAC                    ALARM IF MPAC NON ZERO
 1859                          42,3465  0 0006 1             EXTEND
 1860    REF   7  LAST  362    42,3466  1 6711 1             BZF     TCQ
 1861    REF  11  LAST  363    42,3467  0 4173 0             TC      ALMCYCLE                ALARM AND RECYCLE.
 1863    REF 163  LAST  363    42,3470  54 156 1  SIZETST    TS      MPAC      +2            CALLED WITH - CON IN A
 1864    REF 164  LAST  363    42,3471  10 155 1             CCS     MPAC      +1            GET MAG OF MPAC+1
 1865    REF  35  LAST  358    42,3472  6 4770 0             AD      ONE
 1866                          42,3473  1 3475 0             TCF     +2
 1867    REF  36  LAST  363    42,3474  6 4770 0             AD      ONE
 1868    REF 165  LAST  363    42,3475  6 0156 0             AD      MPAC      +2
 1869                          42,3476  0 0006 1             EXTEND                          MAG OF MPAC+1 - CON
 1870    REF   6  LAST  363    42,3477  6 6711 0             BZMF    TCQ
 1871    REF  12  LAST  363    42,3500  0 4173 0             TC      ALMCYCLE                MAG OF MPAC+1 G/ CON. ALARM AND RECYCLE.
 18825   REF   1               42,3501  4 4125 1  FORCEV25   CS      OCT31                   FORCE VERB 25 TO BE EXECUTED BY RECYCLE
 18826   REF   2  LAST  335    42,3502  55'244 0             TS      VERBSAVE                 IN CASE OPERATOR EXECUTED A LOWER LOAD
 18827   REF  13  LAST  363    42,3503  0 4173 0             TC      ALMCYCLE                 VERB.  ALARM AND RECYCLE.
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R1884    MONITOR ALLOWS OTHER KEYBOARD ACTIVITY. IT IS ENDED BY VERB TERMINATE,
R1885    VERB PROCEED WITHOUT DATA, VERB RESEQUENCE,
R1886    ANOTHER MONITOR, OR ANY NVSUB CALL THAT PASSES THE DSPLOCK (PROVIDED
R18861   THAT THE OPERATOR HAS SOMEHOW ALLOWED THE ENDING OF A MONITOR WHICH
R18862   HE HAS INITIATED THROUGH THE KEYBOARD).

R1887    MONITOR ACTION IS SUSPENDED, BUT NOT ENDED, BY ANY KEYBOARD ACTION,
R1888    EXCEPT ERROR LIGHT RESET. IT BEGINS AGAIN WHEN KEY RELEASE IS PERFORMED.
R1889    MONITOR SAVES THE NOUN AND APPROPRIATE DISPLAY VERB IN MONSAVE. IT SAVES
R1890    NOUNCADR IN MONSAVE1, IF NOUN = MACHINE CADR TO BE SPECIFIED. BIT 15 OF
R1891    MONSAVE1 IS THE KILL MONITOR SIGNAL (KILLER BIT). BIT 14 OF MONSAVE1
R18911   INDICATES THE CURRENT MONITOR WAS EXTERNALLY INITIATED (EXTERNAL
R18912   MONITOR BIT). IT IS TURNED OFF BY RELDSP AND KILMONON.

R1892    MONSAVE INDICATES IF MONITOR IS ON(+=ON, +0=OFF)
R1893    IF MONSAVE IS +, MONITOR ENTERS NO REQUEST, BUT TURNS KILLER BIT OFF.
R1894    IF MONSAVE IS +0, MONITOR ENTERS REQUEST AND TURNS KILLER BIT OFF.

R1895    NVSUB (IF EXTERNAL MONITOR BIT IS OFF), VB=PROCEED WITHOUT DATA,
R1896    VB=RESEQUENCE, AND VB=TERMINATE TURN KILL MONITOR BIT ON.

R1897    IF KILLER BIT IS ON, MONREQ ENTERS NO FURTHER REQUESTS, ZEROS MONSAVE
R1898    AND MONSAVE1 (TURNING OFF KILLER BIT AND EXTERNAL MONITOR BIT).

R1899    MONITOR COSENT TEST FOR MATBS SINCE NVSUB CAN HANDLE INTERNAL MATBS NOW
 1900    REF   3  LAST  353    41,2000                       SETLOC PINBALL2
 19001                         41,3224                       BANK
 19005   REF   3 LAST  353 TO  359:    267    660*           COUNT* $$/PIN
 1901    REF   1               41,3224  4 4076 0  MONITOR    CS     BIT15/14
 1902    REF   6  LAST  358    41,3225  7 1222 0             MASK   NOUNCADR
 1903    REF 166  LAST  363    41,3226  54 155 1  MONIT1     TS     MPAC     +1        TEMP STORAGE
 19031   REF   7  LAST  352    41,3227  4 0136 1             CS     ENTEXIT
 19032   REF   4  LAST  335    41,3230  6 4170 0             AD     ENDINST
 19033   REF 113  LAST  362    41,3231  10 000 0             CCS    A
 19034   REF   1               41,3232  0 3241 0             TC     MONIT2
 19035                         41,3233   75377 0  MONREF     OCT    75377              -DEC10,STARTING IN BIT8. CANNOT GET HERE
 19036   REF   2  LAST  364    41,3234  0 3241 0             TC     MONIT2
 19037   REF  23  LAST  343    41,3235  3 4753 1             CAF    BIT14              EXTERNALLY INITIATED MONITOR,
 19038   REF 167  LAST  364    41,3236  26 155 1             ADS    MPAC +1            SET BIT 14 FOR MONSAVE1.
 190381  REF  69  LAST  363    41,3237  3 4772 1             CAF    ZERO
 190382  REF   1               41,3240  55'225 1             TS     MONSAVE2           ZERO NVMONOPT OPTIONS
 1904    REF   3  LAST  221    41,3241  3 6043 0  MONIT2     CAF    LOW7
 1905    REF  18  LAST  342    41,3242  7 1204 1             MASK   VERBREG
 1906    REF   4  LAST  357    41,3243  0 4333 0             TC     LEFT5
 1907    REF   9  LAST  327    41,3244  54 022 0             TS     CYL
 1908    REF  10  LAST  364    41,3245  4 0022 0             CS     CYL
 1909    REF  11  LAST  364    41,3246  56 022 1             XCH    CYL
 1910    REF  11  LAST  353    41,3247  6 1205 1             AD     NOUNREG
 1911    REF 168  LAST  364    41,3250  54 154 0             TS     MPAC               TEMP STORAGE
 1912    REF  70  LAST  364    41,3251  3 4772 1             CAF    ZERO
 1913   REF   3  LAST  326   41,3252  55'215 1             TS      DSPLOCK         +  INTO DSPLOCK SO MONITOR CAN RUN.
 1914   REF   4  LAST  335   41,3253  11'245 1             CCS     CADRSTOR        TURN OFF KR LITE IF CADRSTOR AND DSPLIST
 1915                        41,3254  0 3256 0             TC      +2              ARE BOTH EMPTY. (LITE COMES ON IF NEW
 1916   REF   1              41,3255  0 4455 1             TC      RELDSP1         MONITOR IS KEYED IN OVER OLD MONITOR )
 1917                        41,3256  0 0004 0             INHINT
 1918   REF   2  LAST  204   41,3257  11'223 1             CCS     MONSAVE
 1919                        41,3260  0 3263 0             TC      +3              IF MONSAVE WAS +, NO REQUEST
 1921   REF   1              41,3261  0 5222 0             TC      TWIDBIT1        IF MONSAVE WAS 0, REQUEST MONREQ
 1923   REF   1              41,3262   03267 1             ADRES   MONREQ
 1924   REF 169  LAST  364   41,3263  52 155 1             DXCH    MPAC            PLACE MONITOR VERB AND NOUN INTO MONSAVE
 1925   REF   3  LAST  365   41,3264  53'224 0             DXCH    MONSAVE         ZERO THE KILL MONITOR BIT
 1926                        41,3265  0 0003 1             RELINT                  SET UP EXTERNAL MONITOR BIT
 1927   REF   4  LAST  334   41,3266  0 0136 0             TC      ENTRET


 1928   REF   1              41,3267  0 4366 0  MONREQ     TC      LODSAMPT        CALLED BY WAITLIST
 1929   REF   1              41,3270  0 3307 0             TC      B15MONCK        CHECK FOR KILLER BIT
 1933   REF   1              41,3271  0 3303 1             TC      KILLMON         IF KILLER BIT = 1, NO REQUESTS
 1934   REF   1              41,3272  3 5016 0             CAF     MONDEL
 1935   REF   7  LAST  244   41,3273  0 5233 0  TCWAIT     TC      WAITLIST        ENTER WAITLIST REQUEST FOR MONREQ
 1936   REF  34  LAST  358      1202                       EBANK=  DSPCOUNT
 1937   REF   2  LAST  365   41,3274   03267 1             2CADR   MONREQ
 1937                        41,3275   62102 0
 1938   REF   1              41,3276  3 4346 1             CAF     CHRPRIO
 1939   REF   7  LAST  312   41,3277  0 5121 0  TCNOVAC    TC      NOVAC           ENTER EXEC REQUEST FOR MONDO
 1940   REF  35  LAST  365      1202                       EBANK=  DSPCOUNT
 1941   REF   1              41,3300   03314 1             2CADR   MONDO
 1941   REF   1              41,3301   62102 0
 1942   REF  11  LAST  261   41,3302  0 5314 1             TC      TASKOVER

 1943   REF  71  LAST  364   41,3303  3 4772 1  KILLMON    CAF     ZERO            ZERO MONSAVE AND TURN KILLER BIT OFF
 1944   REF   4  LAST  365   41,3304  55'223 1             TS      MONSAVE
 1945   REF   2  LAST  204   41,3305  55'224 0             TS      MONSAVE1        TURN OFF KILL MONITOR BIT.
 1946   REF  12  LAST  365   41,3306  0 5314 1             TC      TASKOVER        TURN OFF EXTERNAL MONITOR BIT.
 1947   REF   1                 5016            MONDEL     EQUALS  1SEC
 19471  REF   3  LAST  365   41,3307  11'224 0  B15MONCK   CCS     MONSAVE1        CHECK FOR KILLER BIT=1
 19473                       41,3310  1 3311 0             TCF     +1              =0
 19475  REF  82  LAST  361   41,3311  24 0002 0            INCR    Q               =0
 19477  REF  83  LAST  365   41,3312  0 0002 0             TC      Q               =1
 19479  REF  84  LAST  365   41,3313  0 0002 0             TC      Q               =1
 1948   REF   2  LAST  365   41,3314  0 3307 0  MONDO      TC      B15MONCK        CHECK FOR KILLER BIT
 1952   REF  31  LAST  332   41,3315  0 5205 0             TC      ENDOFJOB        IN CASE TERMINATE CAME SINCE LAST MONREQ
 1953   REF   4  LAST  365   41,3316  11'215 1             CCS     DSPLOCK
 1954   REF   1              41,3317  0 3337 0             TC      MONBUSY         NVSUB IS BUSY
 1955   REF   4  LAST  364   41,3320  3 6043 0             CAF     LOW7
 1956   REF   5  LAST  365   41,3321  7 1223 1             MASK    MONSAVE
 1958   REF   1              41,3322  0 2315 1             TC      UPDATNN -1      PLACE NOUN INTO NOUNREG AND DISPLAY IT
 1960   REF   1              41,3323  3 4171 1             CAF     MID7
 1961   REF   6  LAST  365   41,3324  7 1223 1             MASK    MONSAVE         CHANGE MONITOR VERB TO DISPLAY VERB
 1962   REF   1              41,3325  6 3233 0             AD      MONREF          -DEC10, STARTING IN BIT8
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  1963    REF   1                41,3326  54 023 1            TS      EDOP           RIGHT 7
  1964    REF   2  LAST  366     41,3327  3 0023 0            CA      EDOP
  1965    REF  19  LAST  364     41,3330  55'204 1            TS      VERBREG
  1966    REF   1                41,3331  3 2433 1            CAF     MONBACK        SET RETURN TO PASTEVB AFTER DATA DISPLAY
  1967    REF   5  LAST  365     41,3332  54 136 1            TS      ENTRET
  1968    REF   2  LAST  364     41,3333  4 4076 0            CS      BIT15/14
  1969    REF   4  LAST  365     41,3334  7 1224 0            MASK    MONSAVE1       PUT ECADR INTO MPAC +2. INTMCTBS WILL
  1970    REF 170  LAST  365     41,3335  54 156 1            TS      MPAC     +2    DISPLAY IT AND SET NOUNCADR, NOUNADD,
  1971    REF   1                41,3336  0 2050 0  ENDMONDO  TC      TESTNN         EBANK.

  19715   REF   2  LAST  142        4076            BIT15/14  EQUALS  RELTAB11       OCT 60000
  197201  REF   1                   4000                      SETLOC  FFTAG8
  197202                            4151                      BANK

  19725   REF   2 LAST  141 TO  142:      12      12*         COUNT*  $$/PIN
  1973    REF   2  LAST  365        4151  3 4171 1  PASTEVB   CAF     MID7
  1974    REF   2  LAST  364        4152  7 1225 1            MASK    MONSAVE2       NVMONOPT PASTE OPTION
  1975                              4153  0 0006 1            EXTEND
  1976                              4154  1 4156 0            BZF     +2
  1977    REF   1                   4155  0 4157 0            TC      PASTEOPT       PASTE PLEASE VERB FOR NVMONOPT
  1978    REF   7  LAST  365        4156  3 1223 0            CA      MONSAVE        PASTE MONITOR VERB - PASTE OPTION IS 0
  19782   REF   3  LAST  366        4157  54 023 1  PASTEOPT  TS      EDOP           RIGHT 7
  19783   REF   4  LAST  366        4160  3 0023 0            CA      EDOP           PLACE MONITOR VERB OR PLEASE VERB INTO
  197832  REF  52  LAST  350        4161  0 4636 0            TC      BANKCALL        VERBREG AND DISPLAY IT.
  197833  REF   7  LAST  355        4162   62336 0            CADR    UPDATVB -1
  197835  REF  72  LAST  365        4163  3 4772 1            CAF     ZERO           ZERO REQRET SO THAT PASTED VERBS CAN
  197838  REF  10  LAST  339        4164  55'216 1            TS      REQRET          BE EXECUTED BY OPERATOR.
  19784   REF   3  LAST  366        4165  3 1225 0            CA      MONSAVE2
  19785   REF   1                   4166  0 4264 0            TC      BLANKSUB       PROCESS NVMONOPT BLANK OPTION IF ANY
  19786                             4167  0 4170 0            TC      +1
  19787   REF  32  LAST  365        4170  0 5205 0  ENDPASTE  TC      ENDOFJOB

  19788   REF   1                   4170            ENDINST   EQUALS  ENDPASTE
  1979                              4171   37600 0  MID7      OCT     37600


  19795                             4172   00034 0  OCT34     OCT     34
  1980    REF   4  LAST  364     41,2000                      SETLOC  PINBALL2
  19801                          41,3337                      BANK
  19805   REF   4 LAST  364 TO  366:      75     735*         COUNT*  $$/PIN
  1983    REF   2  LAST  326     41,3337  0 4356 0  MONBUSY   TC      RELDSPON       TURN KEY RELEASE LIGHT
  1984    REF  33  LAST  366     41,3340  0 5205 0            TC      ENDOFJOB


  R1985   DSPFMEM IS USED TO DISPLAY (IN OCTAL) ANY FIXED REGISTER.
  R1986   IT IS USED WITH NOUN = MACHINE CADR TO BE SPECIFIED. THE FCADR OF THE
  R1987   DESIRED LOCATION IS THEN PUNCHED IN. IT HANDLES F/F ( FCADR 4000-7777)

  R19871  FOR BANKS L/E 27, THIS IS ENOUGH.
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R19872  FOR BANKS G/E 30, THE THIRD COMPONENT OF NOUN 26 (PRIO, ADRES, BBCON)
R19873  MUST BE PRELOADED WITH THE DESIRED SUPERBANK BITS (BITS 5,6,7).
R19874          V23N26 SHOULD BE USED.

R19875  SUMMARY
R19876  FOR BANKS L/E 27,                               V27N01E(FCADR)E
R19877  FOR BANKS G/E 30,      V23N26E(SUPERBITS)E     V27N01E(FCADR)E

  1988  REF  12  LAST  352   41,3341  3 4321 0  DSPFMEM  CAF     R1D1            IF F/F, DATACALL USES BANK 02 OR 03.
  1989  REF  36  LAST  365   41,3342  55'202 1           TS      DSPCOUNT
 19891  REF  13  LAST  295   41,3343  3 1252 0           CA      DSPTEM1 +2      SUPERBANK BITS WERE PRELOADED INTO
 19892  REF  45  LAST  357   41,3344  54 001 1           TS      L               3RD COMPONENT OF NOUN 26.
  1990  REF   7  LAST  364   41,3345  3 1222 1           CA      NOUNCADR        ORIGINAL FCADR LOADED STILL IN NOUNCADR.
  1991  REF   1              41,3346  0 4671 0           TC      SUPDACAL        CALL WITH FCADR IN A, SUPERBITS IN L.
  1992  REF   3  LAST  342   41,3347  0 3351 0           TC      DSPOCTWD
  1993  REF  34  LAST  366   41,3350  0 5205 0  ENDSPF   TC      ENDOFJOB
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P1994   WORD DISPLAY ROUTINES

 1995   REF   5  LAST  359   40,2000                       SETLOC PINBALL1
 19951                       40,3055                       BANK
 19955  REF   5 LAST  359 TO  362:   113    557*           COUNT* $$/PIN
 1996   REF  85  LAST  365   40,3055  56 002 0  DSPSIGN    XCH    Q
 1997   REF   1              40,3056  54 144 1             TS     DSPWDRET
 1998   REF 171  LAST  366   40,3057  10 154 0             CCS    MPAC
 1999   REF   1              40,3060  1 3070 1             TCF    TCPLON
 2000   REF   2  LAST  368   40,3061  1 3070 1             TCF    TCPLON
 2001   REF  37  LAST  363   40,3062  6 4770 0             AD     CNE
 2002   REF 172  LAST  368   40,3063  54 154 0             TS     MPAC
 2003   REF   3  LAST  331   40,3064  0 2330 0             TC     -ON
 2004   REF 173  LAST  368   40,3065  4 0155 1             CS     MPAC  +1
 2005   REF 174  LAST  368   40,3066  54 155 1             TS     MPAC      +1
 2006   REF   2  LAST  368   40,3067  0 0144 0             TC     DSPWDRET
 2007   REF   3  LAST  347   40,3070  0 2310 1  TCPLON     TC     +ON
 2008   REF   3  LAST  368   40,3071  0 0144 0             TC     DSPWDRET

R2018   DSPDECWD CONVERTS C( MPAC, MPAC+1) INTO A SIGN AND 5 CHAR DECIMAL
R2019   STARTING IN LOC SPECIFIED IN DSPCOUNT. IT ROUNDS BY 5 EXP-6.

 2020   REF  86  LAST  368   40,3072  56 002 0  DSPDECWD XCH    Q
 2021   REF   1              40,3073  54 115 0             TS     WDRET
 2022   REF   1              40,3074  0 3055 1             TC     DSPSIGN
 20222                       40,3075  0 0006 1             EXTEND                       ROUND BY 5 EXP-6
 20225  REF   1              40,3076  3 2343 1             DCA    DECROUND -1
 20227  REF 175  LAST  368   40,3077  20 155 1             DAS    MPAC
 2023                        40,3100  0 0006 1             EXTEND
 20232                       40,3101  1 3105 1             BZF    +4
 20235                       40,3102  0 0006 1             EXTEND
 20237  REF   1              40,3103  3 4750 1             DCA    DPOSMAX
 20239  REF 176  LAST  368   40,3104  52 155 1             DXCH   MPAC
 2024   REF   4  LAST  314   40,3105  3 4766 1             CAF    FOUR
 2025   REF   1              40,3106  54 137 0  DSPDCWD1 TS     WDCNT
 2026   REF   2  LAST  143   40,3107  3 4355 0             CAF    BINCON
 2027   REF   7  LAST  362   40,3110  0 7256 1             TC     SHORTMP
 2028   REF 177  LAST  368   40,3111  3 0154 1             CA     MPAC
 2029   REF   2  LAST  327   40,3112  0 4423 0             TC     CODSTOR
 2032   REF  73  LAST  366   40,3113  3 4772 1             CAF    ZERO
 2033   REF 178  LAST  368   40,3114  56 156 0             XCH    MPAC      +2
 2034   REF 179  LAST  368   40,3115  56 155 0             XCH    MPAC      +1
 2035   REF 180  LAST  368   40,3116  54 154 0             TS     MPAC
 2038   REF   3  LAST  350   40,3117  10 143 0             CCS    COUNT
 2039   REF  37  LAST  367   40,3120  55'202 1             TS     DSPCOUNT
 2040   REF   4  LAST  350   40,3121  0 3161 1             TC     DSPIN
 2041   REF   2  LAST  368   40,3122  10 137 0             CCS    WDCNT
 2042   REF   1              40,3123  0 3106 0             TC     DSPDCWD1
 2043   REF   4  LAST  356   40,3124  0 4261 0             TC     -VD1SET
 2045   REF   2  LAST  368   40,3125  0 0115 1             TC     WDRET
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R2054    DSPDC2NR CONVERTS C( MPAC,MPAC+1) INTO A SIGN AND 2 CHAR DECIMAL
R2055    STARTING IN LOC SPECIFIED IN DSPCOUNT. IT DOES NOT ROUND

 2056    REF  87  LAST  368    40,3126  56 002 0  DSPDC2NR XCH     Q
 2057    REF   3  LAST  368    40,3127  54 115 0           TS      WDRET
 2058    REF   2  LAST  368    40,3130   0 3055 1           TC      DSPSIGN
 2059    REF  38  LAST  368    40,3131   3 4770 0    +3     CAF     ONE
 2060    REF   2  LAST  368    40,3132   0 3106 0           TC      DSPDCWD1

R2061    DSP2DEC CONVERTS C(MPAC) AND C(MPAC+1) INTO A SIGN AND 10 CHAR DECIMAL
R2062    STARTING IN THE LOC SPECIFIED IN DSPCOUNT.

 2063    REF  88  LAST  369    40,3133  56 002 0  DSP2DEC  XCH     Q
 2064    REF   4  LAST  369    40,3134  54 115 0           TS      WDRET
 2065    REF  74  LAST  368    40,3135   3 4772 1           CAF     ZERO
 2066    REF   5  LAST  350    40,3136  54 124 1           TS      CODE
 2067    REF  15  LAST  350    40,3137   3 6214 0           CAF     THREE
 2068    REF   3  LAST  330    40,3140   0 3247 0           TC      11DSPIN          -R2 OFF
 2069    REF   5  LAST  368    40,3141   3 4766 1           CAF     FOUR
 2070    REF   4  LAST  369    40,3142   0 3247 0           TC      11DSPIN          +R2 OFF
 2071    REF   3  LAST  369    40,3143   0 3055 1           TC      DSPSIGN
 2072    REF   4  LAST  349    40,3144   3 4322 0           CAF     R2D1
 2073    REF   3  LAST  369    40,3145   0 3106 0  END2DEC  TC      DSPDCWD1

R2074    DSPDECVN DISPLAYS C(A) UPON ENTRY AS A 2 CHAR DECIMAL BEGINNING IN THE
R2075    DSP LOC SPECIFIED IN DSPCOUNT.
R2076    C(A) SHOULD BE IN FORM N X 2EXP-14. THIS IS SCALED TO FORM N/100 BEFORE
R2077    DISPLAY CONVERSION.

 2078                          40,3146   0 0006 1  DSPDECVN EXTEND
 2079    REF   1               40,3147   7 2244 0           MP      VNDSPCON         MULT BY .01
 2080    REF 181  LAST  368    40,3150  22 154 1           LXCH    MPAC             TAKE RESULTS FROM L.(MULT BY 2EXP14).
 2081    REF  75  LAST  369    40,3151   3 4772 1           CAF     ZERO
 2082    REF 182  LAST  369    40,3152  54 155 1           TS      MPAC     +1
 2083    REF  89  LAST  369    40,3153  56 002 0           XCH     Q
 2084    REF   5  LAST  369    40,3154  54 115 0           TS      WDRET
 2085    REF   3  LAST  350    40,3155   0 3131 1           TC      DSPDC2NR +3      NO SIGN, NO ROUND, 2 CHAR

 2087    REF   3  LAST  348    40,3156   0 3146 1  GOVNUPDT TC      DSPDECVN         THIS IS NOT FOR GENERAL USE. REALLY PART
 2088    REF  23  LAST  363    40,3157   0 4655 0           TC      POSTJUMP         OF UPDATVB.
 2089    REF   2  LAST  339    40,3160    62346 1           CADR    UPDAT1   +2

 2091    REF   5  LAST  366    41,2000                      SETLOC  PINBALL2
 20911                         41,3351                      BANK
 20915   REF   5 LAST  366 TO  368:    10    745*           COUNT*  $$/PIN
R2092    DSPOCTWD DISPLAYS C(A) UPON ENTRY AS A 5 CHAR OCT STARTING IN THE DSP
R2093    CHAR SPECIFIED IN DSPCOUNT. IT STOPS AFTER 5 CHAR HAVE BEEN DISPLAYED.
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  2094    REF  12  LAST  364    41,3351  54 022 0  DSPOCTWD TS      CYL
  2095    REF  90  LAST  369    41,3352  56 002 0           XCH     Q
  2096    REF   6  LAST  369    41,3353  54 115 0           TS      WDRET                 MUST USE SAME RETURN AS DSP2BIT.
  2097    REF  24  LAST  364    41,3354  3 4753 1           CAF     BIT14                 TO BLANK SIGNS
  2098    REF  38  LAST  368    41,3355  27'202 1           ADS     DSPCOUNT
  2099    REF   6  LAST  369    41,3356  3 4766 1           CAF     FOUR
  2100    REF   3  LAST  368    41,3357  54 137 0  WDAGAIN  TS      WDCNT
  2101    REF  13  LAST  370    41,3360  4 0022 0           CS      CYL
  2102    REF  14  LAST  370    41,3361  4 0022 0           CS      CYL
  2103    REF  15  LAST  370    41,3362  4 0022 0           CS      CYL
  2104    REF 114  LAST  364    41,3363  4 0000 0           CS      A
  2105    REF   1               41,3364  7 4774 0           MASK    DSPMSK
  2106    REF   3  LAST  368    41,3365  0 4423 0           TC      CODSTOR
  2112    REF 115  LAST  370    41,3366  10 000 0           CCS     A                     DECREMENT DSPCOUNT EXCEPT AT +0
  2113    REF  39  LAST  370    41,3367  55'202 1           TS      DSPCOUNT
  2114    REF  24  LAST  369    41,3370  0 4655 0           TC      POSTJUMP
  2115    REF   1               41,3371   61255 1           CADR    DSPOCTIN
  2116    REF   4  LAST  370    41,3372  10 137 0  OCTBACK  CCS     WDCNT
  2117    REF   1               41,3373  0 3357 0           TC      WDAGAIN               +
  2118    REF   5  LAST  368    41,3374  0 4261 0  DSPLV    TC      -VD1SET
  2120    REF   7  LAST  370    41,3375  0 0115 1           TC      WDRET

  2121    REF   7  LAST  358      4774             DSPMSK   =       SEVEN


 R2135    FOR DSPIN PLACE 0/25 OCT INTO COUNT, 5 BIT RELAY CODE INTO CODE. BOTH
 R2136    ARE DESTROYED. IF BIT14 OF COUNT IS 1, SIGN IS BLANKED WITH LEFT CHAR.
 R2137    FOR DSPIN1 PLACE 0,1 INTO BIT11 OF CODE, 2 INTO COUNT, REL ADDRESS OF
 R2138    DSPTAB ENTRY INTO DSREL.

  2139    REF   6  LAST  368    40,2000                     SETLOC  PINBALL1
  21391                         40,3161                     BANK
  21395   REF   6 LAST  368 TO  369:      68   625*         COUNT*  $$/PIN
  2140    REF  91  LAST  370    40,3161  56 002 0  DSPIN    XCH     Q                     CANT USE L FOR RETURN, SINCE MANY OF THE
  2141    REF   1               40,3162  54 114 1           TS      DSEXIT                ROUTINES CALLING DSPIN USE L AS RETURN.
  2142    REF   4  LAST  357    40,3163  3 4342 0           CAF     LOW5
  2143    REF   4  LAST  368    40,3164  7 0143 0           MASK    COUNT
  2144    REF   6  LAST  356    40,3165  54 021 0           TS      SR
  2145    REF   7  LAST  370    40,3166  56 021 1           XCH     SR
  2146    REF   1               40,3167  54 141 1           TS      DSREL
  2147    REF  22  LAST  279    40,3170  3 4770 0           CAF     BIT1
  2148    REF   5  LAST  370    40,3171  7 0143 0           MASK    COUNT
  2149    REF 116  LAST  370    40,3172  10 000 0           CCS     A
  2150                          40,3173  0 3175 1           TC      +2                    LEFT IF COUNT IS ODD
  2151    REF   1               40,3174  0 3211 0           TC      DSPIN1  -1            RIGHT IF COUNT IS EVEN
  2152    REF   6  LAST  369    40,3175  56 124 0           XCH     CODE
  21523                         40,3176  6 0000 1           DOUBLE                        SHIFT LEFT 5 (DON'T USE CYL)
  21526                         40,3177  6 0000 1           DOUBLE
  2153                          40,3200  6 0000 1           DOUBLE
  21533                         40,3201  6 0000 1           DOUBLE
  2153                          40,3202  6 0000 1             DOUBLE
  2154   REF   7  LAST  370     40,3203  54 124 1             TS       CODE
  2155   REF  25  LAST  370     40,3204  3 4753 1             CAF      BIT14
  2156   REF   6  LAST  370     40,3205  7 0143 0             MASK     COUNT
  2157   REF 117  LAST  370     40,3206  10 000 0             CCS      A
  2158   REF  19  LAST  361     40,3207  3 4767 0             CAF      TWO               BIT14 = 1, BLANK SIGN
  2159   REF  39  LAST  369     40,3210  6 4770 0             AD       ONE               BIT14 = 0, LEAVE SIGN ALONE
  2160   REF   7  LAST  371     40,3211  54 143 0     -1      TS       COUNT             +0 INTO COUNT FOR RIGHT
 A2161                                                                                   +1 INTO COUNT FOR LEFT(SIGN LEFT ALONE)
 A2162                                                                                   +3 INTO COUNT FOR LEFT(TO BLANK SIGN)
  2163                          40,3212  0 0004 0  DSPIN1     INHINT
  2164   REF   2  LAST  370     40,3213  50 141 0             INDEX    DSREL
  2165   REF  26  LAST  333     40,3214  11'226 1             CCS      DSPTAB
  2166                          40,3215  0 3217 0             TC       +2                IF +
  2167                          40,3216   00104 1  ERCON      OCT      104               CHAN 11, BITS 3,7.  CANNOT GET HERE
  2168   REF  40  LAST  371     40,3217  6 4770 0             AD       ONE               IF-
  2169   REF   1                40,3220  54 142 1             TS       DSMAG
  2170   REF   8  LAST  371     40,3221  50 143 1             INDEX    COUNT
  2171   REF   1                40,3222  7 3243 0             MASK     DSMSK
  2172                          40,3223  0 0006 1             EXTEND
  2173   REF   8  LAST  371     40,3224  60 124 0             SU       CODE
  2174                          40,3225  0 0006 1             EXTEND
  2175   REF   1                40,3226  1 3241 1             BZF      DSLV              SAME
  2176   REF   9  LAST  371     40,3227  50 143 1  DFRNT      INDEX    COUNT
  2177   REF   2  LAST  371     40,3230  4 3243 0             CS       DSMSK             MASK WITH 77740,76037,75777, OR 74037
  2178   REF   2  LAST  371     40,3231  7 0142 1             MASK     DSMAG
  2179   REF   9  LAST  371     40,3232  6 0124 0             AD       CODE
  2180   REF 118  LAST  371     40,3233  4 0000 0             CS       A
  2181   REF   3  LAST  371     40,3234  50 141 0             INDEX    DSREL
  2182   REF  27  LAST  371     40,3235  57'226 0             XCH      DSPTAB
  2183                          40,3236  0 0006 1             EXTEND
  2184   REF   2  LAST  371     40,3237  6 3241 0             BZMF     DSLV              DSPTAB ENTRY WAS -
  2185   REF   7  LAST  333     40,3240  25'221 1             INCR     NOUT              DSPTAB ENTRY WAS +
  2186                          40,3241  0 0003 1  DSLV       RELINT
  2187   REF   2  LAST  370     40,3242  0 0114 0             TC       DSEXIT

  2188                          40,3243   00037 0  DSMSK      OCT      37
  2189                          40,3244   01740 0             OCT      1740
  2190                          40,3245   02000 0             OCT      2000
  2191                          40,3246   03740 1             OCT      3740

 R2192   FOR 11DSPIN, PUT REL ADDRESSS OF DSPTAB ENTRY INTO A, 1 IN BIT11 OR 0 IN
 R2193   BIT11 OF CODE.

  2194   REF   4  LAST  371     40,3247  54 141 1  11DSPIN    TS       DSREL
  2195   REF  20  LAST  371     40,3250  3 4767 0             CAF      TWO
  2196   REF  10  LAST  371     40,3251  54 143 0             TS       COUNT
  2197   REF  92  LAST  370     40,3252  56 002 0             XCH      Q                 MUST USE SAME RETURN AS DSPIN
  2198   REF   3  LAST  371     40,3253  54 114 1             TS       DSEXIT
 2199   REF   2  LAST  370  40,3254  0 3212 0                TC      DSPIN1

 2200   REF   5  LAST  368  40,3255  0 3161 1  DSPOCTIN TC      DSPIN             SO DSPOCTWD DOESNT USE SWCALL
 2202   REF  25  LAST  370  40,3256  0 4655 0           TC      POSTJUMP
 2203   REF   1             40,3257   63372 1  ENDSPOCT CADR    OCTBACK


R2204   DSPALARM FINDS TC NVSUBEND IN ENTRET FOR NVSUB INITIATED ROUTINES.
R2205   ABORT WITH 21501
R2206   DSPALARM FINDS TC ENDOFJOB IN ENTRET FOR KEYBOARD INITIATED ROUTINES.
R2207   DC TC ENTRET.

 22075  REF   6  LAST  370  40,3260  0 4261 0  PREDSPAL TC      -VDISET
 2208   REF   1             40,3261  4 3431 0  DSPALARM CS      NVSBENDL
 2209   REF   8  LAST  364  40,3262  6 0136 0           AD      ENTEXIT
 2210                       40,3263  0 0006 1           EXTEND
 2211   REF  16  LAST  327  40,3264  1 3277 1           BZF     CHARALRM +2
 22111  REF   1             40,3265  4 2721 0           CS      MONADR            IF THIS IS A MONITOR, KILL IT
 22112  REF   9  LAST  372  40,3266  6 0136 0           AD      ENTEXIT
 22113                      40,3267  0 0006 1           EXTEND
 22114                      40,3270  1 3272 1           BZF     +2
 22115  REF  17  LAST  372  40,3271  0 3275 1           TC      CHARALRM
 22116  REF   1             40,3272  0 4235 1           TC      KILMONON
 22117  REF   5  LAST  257  40,3273  0 4362 1           TC      FALTON
 22118  REF   3  LAST  359  40,3274  0 4151 0           TC      PASTEVB           PUT MONITOR VERB BACK IN VERBREG
 2212   REF   6  LAST  372  40,3275  0 4362 1  CHARALRM TC      FALTON            NOT NVSUB INITIATED. TURN ON OPR ERROR
 2213   REF  35  LAST  367  40,3276  0 5205 0           TC      ENDOFJOB
 2214   REF   1             40,3277  0 5726 1     +2    TC      POODOO
 2217                       40,3300   21501 0           OCT     21501             KEYBOARD + ALARM DISPLAY DURING NVSUB.

R2219   ALMCYCLE TURNS ON CHECK FAIL LIGHT, REDISPLAYS THE ORIGINAL VERB THAT
R2220   WAS EXECUTED, AND RECYCLES TO EXECUTE THE ORIGINAL VERB/NOUN COMBINATION
R2221   THAT WAS LAST EXECUTED. USED FOR BAD DATA DURING LOAD VERBS AND BY
R2222   MCTBS. ALSO BY MMCHANG IF 2 NUMERICAL CHARACTERS WERE NOT PUNCHED IN
R2223   FOR MM CODE.

 2224   REF   2  LAST  366      4000                    SETLOC FFTAG8
 22241                          4173                    BANK
 22245  REF   3 LAST  366 TO  366:      18     30*      COUNT* $$/PIN
 2225   REF   7  LAST  372      4173  0 4362 1  ALMCYCLE TC      FALTON            TURN ON CHECK FAIL LIGHT.
 2228   REF   3  LAST  363      4174  4 1244 0           CS      VERBSAVE          GET ORIGINAL VERB THAT WAS EXECUTED
 2229   REF  11  LAST  366      4175  55'216 1           TS      REQRET            SET FOR ENTPAS
 2230   REF  53  LAST  366      4176  0 4636 0           TC      BANKCALL          PUTS ORIGINAL VERB INTO VERBREG AND
 2231   REF   3  LAST  366      4177   62336 0           CADR    UPDATVB -1        DISPLAYS IT IN VERB LIGHTS.
 2232   REF  26  LAST  372      4200  0 4655 0  ENTERJMP TC      POSTJUMP
 2233   REF   1                 4201   62000 0  ENDALM   CADR    ENTER


R2234   MMCHANG USES NOUN DISPLAY UNTIL ENTER. THEN IT USES MODE DISP.
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R2235   IT GOES TO MODROUT WITH THE NEW M M CODE IN A, BUT NOT DISPLAYED IN
R2236   MM LIGHTS.
R2237   IT DEMANDS 2 NUMERICAL CHARACTERS BE PUNCHED IN FOR NEW MM CODE.
R2238   IF NOT, IT RECYCLES.

 2239   REF   6  LAST  369   41,2000                         SETLOC PINBALL2
 22391                       41,3376                         BANK
 22395  REF   6 LAST  369 TO  370:     21    766*            COUNT* $$/PIN
 2240   REF   1              41,3376  0 3417 0  MMCHANG      TC     REQMM           ENTPASHI ASSUMES THE TC REQMM AT MMCHANG
A2241                                                                               IF THIS MOVES AT ALL, MUST CHANGE
A2242                                                                               MMADREF AT ENTPASHI.
 2243   REF  16  LAST  261   41,3377  3 4764 0    +1         CAF    BIT5            OCT20 = ND2.
 2244   REF  40  LAST  370   41,3400  6 1202 0               AD     DSPCOUNT        DSPCOUNT MUST = -ND2.
 2245                        41,3401  0 0006 1               EXTEND                 DEMAND THAT 2 NUM CHAR WERE PUNCHED IN.
 2246                        41,3402  1 3404 0               BZF    +2
 2247   REF  14  LAST  363   41,3403  0 4173 0               TC     ALMCYCLE        DSPCOUNT NOT= -ND2. ALARM AND RECYCLE.
 2248   REF  76  LAST  369   41,3404  3 4772 1               CAF    ZERO            DSPCOUNT = -ND2.
 2249   REF  12  LAST  364   41,3405  57'205 1               XCH    NOUNREG
 2250   REF 183  LAST  369   41,3406  54 154 0               TS     MPAC
 2251   REF   4  LAST  354   41,3407  3 4352 1               CAF    ND1
 2252   REF  41  LAST  373   41,3410  55'202 1               TS     DSPCOUNT
 2253   REF  54  LAST  372   41,3411  0 4636 0               TC     BANKCALL
 2254   REF   4  LAST  333   41,3412   60473 1               CADR   2BLANK
 2255   REF   7  LAST  372   41,3413  0 4261 0               TC     -VD1SET
 2257   REF 184  LAST  373   41,3414  3 0154 1               CA     MPAC
 2258   REF  27  LAST  372   41,3415  0 4655 0               TC     POSTJUMP
 2259   REF   1              41,3416   10007 1               CADR   MODROUTB        GO THRU STANDARD LOC.


 2260   REF   2  LAST  276   04,2007            MODROUTB =          V37
 2261   REF  93  LAST  371   41,3417  4 0002 1  REQMM        CS     Q
 2262   REF  12  LAST  372   41,3420  55'216 1               TS     REQRET
 2263   REF   5  LAST  373   41,3421  3 4352 1               CAF    ND1
 2264   REF  42  LAST  373   41,3422  55'202 1               TS     DSPCOUNT
 2265   REF  77  LAST  373   41,3423  3 4772 1               CAF    ZERO
 2266   REF  13  LAST  373   41,3424  55'205 0               TS     NOUNREG
 2267   REF  55  LAST  373   41,3425  0 4636 0               TC     BANKCALL
 2268   REF   5  LAST  373   41,3426   60473 1               CADR   2BLANK
 2269   REF   3  LAST  339   41,3427  0 4360 0               TC     FLASHON
 2270   REF  41  LAST  371   41,3430  3 4770 0               CAF    ONE
 2271   REF  18  LAST  362   41,3431  55'203 0               TS     DECBRNCH        SET FOR DEC
 2272   REF  10  LAST  372   41,3432  0 0136 0               TC     ENTEXIT


R2273   VBRQEXEC ENTERS REQUEST TO EXEC     FOR ANY ADDRESS WITH ANY PRIORITY.
R2274   IT DOES ENDOFJOB AFTER ENTERING REQUEST. DISPLAY SYST IS RELEASED.
R2275   IT ASSUMES NOUN 26 HAS BEEN PRELOADED WITH
R2276   COMPONENT 1  PRIORITY(BITS 10-14) BIT1=0 FOR NOVAC, BIT1=1 FOR FINDVAC.
R2277   COMPONENT 2  JOB ADRES (12 BIT )
R2278   COMPONENT 3  BBCON
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 2279   REF  23  LAST  370   41,3433  3 4770 0  VBRQEXEC CAF    BIT1
 2280   REF   2  LAST  283   41,3434  7 1016 0           MASK   N26/PRI
 2281   REF 119  LAST  371   41,3435  10 000 0           CCS    A
 2282   REF   1              41,3436  0 3460 0           TC     SETVAC           IF BIT1 = 1, FINDVAC
 2283   REF   1              41,3437  3 3277 0           CAF    TCNOVAC          IF BIT1 = 0, NOVAC
 2284   REF 185  LAST  373   41,3440  54 154 0  REQEX1   TS     MPAC             TC NOVAC  OR  TC FINDVAC INTO MPAC
 2285   REF   2  LAST  205   41,3441  3 7660 0           CA     PRIO37
 2286   REF   3  LAST  374   41,3442  7 1016 0           MASK   N26/PRI
 2287   REF 186  LAST  374   41,3443  54 160 1     -1    TS     MPAC +4          PRIO INTO MPAC +4 AS A TEMP
 2288   REF   7  LAST  356   41,3444  0 4432 0  REQUESTC TC     RELDSP
 22881  REF   4  LAST  374   41,3445  3 1016 1           CA     N26/PRI
 22882                       41,3446  0 0006 1           EXTEND
 22883  REF  17  LAST  343   41,3447  1 2350 1           BZF    GODSPALM         OP ERROR AND EOJ IF R1 OF N26 = 0
 2289   REF   5  LAST  364   41,3450  3 4170 0           CA     ENDINST
 2290   REF 187  LAST  374   41,3451  54 157 0           TS     MPAC      +3     TC ENDOFJOB INTO MPAC+3
 2291                        41,3452  0 0006 1           EXTEND
 2292   REF   1              41,3453  3 1020 1           DCA    N26/2CAD         JOB ADRES INTO MPAC +1
 2293   REF 188  LAST  374   41,3454  52 156 1           DXCH   MPAC      +1     BBCON INTO MPAC+2
 2294   REF 189  LAST  374   41,3455  3 0160 0           CA     MPAC      +4     PRIO IN A
 2295                        41,3456  0 0004 0           INHINT
 2296   REF 190  LAST  374   41,3457  0 0154 1           TC     MPAC

 2297   REF   1              41,3460  3 4345 1  SETVAC   CAF    TCFINDVC
 2298   REF   1              41,3461  0 3440 1           TC     REQEX1

R2299   VBRQWAIT ENTERS REQUEST TO WAITLIST FOR ANY ADDRESS WITH ANY DELAY.
R2300   IT DOES ENDOFJOB AFTER ENTERING REQUEST.DISPLAY SYST IS RELEASED.
R2301   IT ASSUMES NOUN 26 HAS BEEN PRELOADED WITH
R2302   COMPONENT 1  DELAY (LOW BITS)
R2303   COMPONENT 2  TASK ADRES (12 BIT)
R2304   COMPONENT 3  BBCON

 2305   REF   1              41,3462  3 3273 1  VBRQWAIT CAF    TCWAIT
 2306   REF 191  LAST  374   41,3463  54 154 0           TS     MPAC             TC WAITLIST INTO MPAC
 2307   REF   5  LAST  374   41,3464  3 1016 1           CA     N26/PRI          TIME DELAY
 2308   REF   1              41,3465  0 3443 1  ENDRQWT  TC     REQUESTC -1

R2309   REQUESTC WILL PUT TASK ADRES INTO MPAC+1, BBCON INTO MPAC+2,
R2310   TC ENDOFJOB INTO MPAC+3. IT WILL TAKE TIME DELAY OUT OF MPAC+4 AND
R2311   LEAVE IT IN A, INHINT AND TC MPAC.

 2312   REF   7  LAST  370   40,2000                     SETLOC PINBALL1
 23121                       40,3301                     BANK
 23125  REF   7 LAST  370 TO  372:     80   705*         COUNT* $$/PIN
 2313   REF  42  LAST  373   40,3301  4 4770 1  VBPROC   CS     ONE
 2314   REF   2  LAST  356   40,3302  55'217 0     +1    TS     LOADSTAT
 2315   REF   2  LAST  372   40,3303  0 4235 1           TC     KILMONON         TURN ON KILL MONITOR BIT
 2316   REF   8  LAST  374   40,3304  0 4432 0           TC     RELDSP
 2317   REF   3  LAST  334   40,3305  0 4417 1           TC     FLASHOFF
```

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  2318    REF   2  LAST  356   40,3306  0 3412 0              TC       RECALTST         SEE IF THERE IS ANY RECALL FROM ENDIDLE

  2319    REF  21  LAST  371   40,3307  4 4767 1  VBTERM      CS       TWO
  2320    REF   2  LAST  337   40,3310  0 3302 0              TC       VBPROC  +1       TERM VERB SETS LOADSTAT NEG

R23201   PROCKEY PERFORMS THE SAME FUNCTION AS VBPROC.  IT MUST BE CALLED UNDER
R23202   EXECUTIVE CONTROL, WITH CHRPRIO.
 232033 REF  20  LAST  366   40,3311  4 1204 1  PROCKEY     CS       VERBREG          DONT ALLOW PROCEED DURING LOAD.
 232036 REF   3  LAST  355   40,3312  6 4354 1              AD       VBSP2LD
 23204                       40,3313  0 0006 1              EXTEND
 232043 REF 120  LAST  374   40,3314  26 000 0              DIM      A
 232046                      40,3315  0 0006 1              EXTEND
 23205   REF  19  LAST  372   40,3316  1 3275 0              BZF      CHARALRM
 232053 REF  78  LAST  373   40,3317  3 4772 1  PROCKEY1    CAF      ZERO             SET REQRET FOR ENTER PASS 0.
 23206   REF  13  LAST  373   40,3320  55'216 1              TS       REQRET
 23207   REF   8  LAST  373   40,3321  0 4261 0              TC       -VD1SET
 23209   REF   3  LAST  375   40,3322  0 3301 0              TC       VBPROC

R2321    VBRESEQ WAKES ENDIDLE AT SAME LINE AS FINAL ENTER OF LOAD (L+3).
R2322    (MAIN USE IS INTENDED AS RESPONSE TO INTERNALLY INITIATED FLASHING
R2323     DISPLAYS IN ENDIDLE. SHOULD NOT BE USED WITH LOAD VERBS,PLEASE PERFORM,
R2324     OR PLEASE MARK VERBS BECAUSE THEY ALREADY USE L+3 IN ANOTHER CONTEXT.)

  2325    REF  79  LAST  375   40,3323  4 4772 0  VBRESEQ     CS       ZERO             MAKE IT LOOK LIKE DATA IN.
  2326    REF   4  LAST  375   40,3324  0 3302 0              TC       VBPROC +1

R2327    FLASH IS TURNED OFF BY PROCEED WITHOUT DATA, TERMINATE, RESEQUENCE,
R2328    END OF LOAD.
```

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P2329    KEY RELEASE ROUTINE

R2330    THIS ROUTINE ALWAYS TURNS OFF THE UPACT LIGHT AND ALWAYS CLEARS DSPLOCK.

R2331    THE HIGHEST PRIORITY FUNCTION OF THE KEY RELEASE BUTTON IS THE
R2332    UNSUSPENDING OF A SUSPENDED MONITOR WHICH WAS EXTERNALLY INITIATED.
R2333    THIS FUNCTION IS ACCOMPLISHED BY CLEARING DSPLOCK AND TURNING OFF
R2334    THE KEY RELEASE LIGHT IF BOTH DSPLIST AND CADRSTOR ARE EMPTY.

R2335    IF NO SUCH MONITOR EXISTS, THEN RELDSP IS EXECUTED TO CLEAR DSPLOCK
R2336    AND THE EXTERNAL MONITOR BIT (FREEING THE DISPLAY SYSTEM FOR INTERNAL
R2337    USE), TURN OFF THE KEY RELEASE LIGHT, AND WAKE UP ANY JOB IN DSPLIST.

R2338    IN ADDITION IF THERE IS A JOB IN ENDIDLE, THEN CONTROL IS TRANSFERRED
R2339    TO PINBRNCH (IN DISPLAY INTERFACE ROUTINE) TO RE-EXECUTE THE SERIES OF
R23391   NVSUB CALLS ETC. THAT PRECEDED THE ENDIDLE CALL STILL AWAITING RESPONSE.
R2340    THIS FEATURE IS INTENDED FOR USE WHEN THE OPERATOR HAS BEEN REQUESTED TO
R2341    RESPOND TO SOME INTERNAL ACTION THAT USED ENDIDLE, BUT HE HAS WRITTEN
R2342    OVER THE INFORMATION ON THE DISPLAY PANEL BY SOME DISPLAYS OF HIS OWN
R2343    INITIATION WHICH DO NOT SERVE AS RESPONSES. HITTING KEY RLSE WILL
R2344    RE-ESTABLISH THE DISPLAYS TO THE STATE THEY WERE IN BEFORE HE OBSCURED
R2345    THEM, SO THAT HE CAN SEE THE WAITING REQUEST.  THIS WORKS ONLY FOR
R2346    INTERNAL PROGRAMS THAT USED ENDIDLE THROUGH MARGARETS DISPLAY
R2347    SUBROUTINES.

  2348   REF  19  LAST  351    40,3325  4 4766 0  VBRELDSP CS       BIT3
  2349                         40,3326  0 0006 1           EXTEND
  2350   REF   9  LAST  202    40,3327  03 011 1           WAND     DSALMOUT            TURN OFF UPACT LITE
  2351   REF   2  LAST  326    40,3330  10 115 0           CCS      21/22REG            OLD DSPLOCK
  2352   REF  26  LAST  371    40,3331  3 4753 1           CAF      BIT14
  2353   REF   5  LAST  366    40,3332  7 1224 0           MASK     MONSAVE1            EXTERNAL MONITOR BIT (EMB)
  2354   REF 121  LAST  375    40,3333  10 000 0           CCS      A
  2355   REF   1               40,3334  0 3343 0           TC       UNSUSPEN            OLD DSPLOCK AND EMB BOTH 1, UNSUSPEND.
  2356   REF   9  LAST  374    40,3335  0 4432 0  TSTLTS4  TC       RELDSP              NOT UNSUSPENDING EXTERNAL MONITOR,
  2357   REF   5  LAST  365    40,3336  11'245 1           CCS      CADRSTOR             RELEASE DISPLAY SYSTEM AND
  2358                         40,3337  0 3341 1           TC       +2                   DO RE-ESTABLISH IF CADRSTOR IS FULL.
  2359   REF  36  LAST  372    40,3340  0 5205 0           TC       ENDOFJOB
  2360   REF  28  LAST  373    40,3341  0 4655 0           TC       POSTJUMP
  2361   REF   4  LAST  274    40,3342   21275 1           CADR     PINBRNCH
  2362   REF  80  LAST  375    40,3343  3 4772 1  UNSUSPEN CAF      ZERO                EXTERNAL MONITOR IS SUSPENDED,
  2363   REF   5  LAST  365    40,3344  55'215 1           TS       DSPLOCK              JUST UNSUSPEND IT BY CLEARING DSPLOCK.
  2364   REF   6  LAST  376    40,3345  11'245 1           CCS      CADRSTOR             TURN KEY RELEASE LIGHT OFF IF BOTH
  2365   REF  37  LAST  376    40,3346  0 5205 0           TC       ENDOFJOB             CADRSTOR AND DSPLIST ARE EMPTY.
  2366   REF   2  LAST  365    40,3347  0 4455 1           TC       RELDSP1
  23661  REF  38  LAST  376    40,3350  0 5205 0           TC       ENDOFJOB
```

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R2368    NVSUB IS USED FOR SUB ROUTINE CALLS FROM WITHIN COMPUTER. IT CAN BE
R2369    USED TO CALL THE COMBINATION OF ANY DISPLAY, LOAD, OR MONITOR VERB
R2370    TOGETHER WITH ANY NOUN AVAILABLE TO THE KEYBOARD.
R23701   PLACE 0VVVVVVVNNNNNNN INTO A.
R23702   V-S ARE THE 7 BIT VERB CODE.  N-S ARE THE 7 BIT NOUN CODE.

R23703   IF NVSUB IS CALLED WITH THE FOLLOWING NEGATIVE NUMBERS (RATHER THAN THE
R23704   VERB-NOUN CODE) IN A, THEN THE DISPLAY IS BLANKED AS FOLLOWS-
R23705    -4 FULL BLANK, -3 LEAVE MODE, -2 LEAVE MODE AND VERB, -1 BLANK R-S ONLY

R2371    NVSUB CAN BE USED WITH MACH CADR TO BE SPEC BY PLACING THE CADR INTO
R2372    MPAC+2 BEFORE THE STANDARD NVSUB CALL.

R2373     NVSUB RETURNS TO 2+ CALLING LOC AFTER PERFORMING TASK, IF DISPLAY
R2374    SYSTEM IS AVAILABLE. THE NEW NOUN AND VERB CODES ARE DISPLAYED.
R2375    IF V:S =0, THE NEW NOUN CODE IS DISPLAYED ONLY(RETURN WITH NO FURTHER
R2376    ACTION). IF N-S =0, THE NEW VERB CODE IS DISPLAYED ONLY(RETURN WITH NO
R2377    FURTHER ACTION).

R2378    IT RETURNS TO 1+ CALLING LOC WITHOUT PERFORMING TASK, IF DISPLAY
R2379    SYSTEM IS BLOCKED (NOTHING IS DISPLAYED IN THIS CASE).
R2380    IT DOES TC ABORT (WITH OCT 01501) IF IT ENCOUNTERS A DISPLAY PROGRAM
R2381    ALARM CONDITION BEFORE RETURN TO CALLER.

R2382    THE DISPLAY SYSTEM IS BLOCKED BY THE DEPRESSION OF ANY
R2383    KEY, EXCEPT ERROR LIGHT RESET
R2384    IT IS RELEASED BY THE KEY RELEASE BUTTON, ALL EXTENDED VERBS,
R2385    PROCEED WITHOUT DATA, TERMINATE, RESEQUENCE, INITIALIZE EXECUTIVE,
R2386    RECALL PART OF RECALTST IF ENDIDLE WAS USED,
R2387    VE = REQUEST EXECUTIVE, VB = REQUEST WAITLIST,
R2388    MONITOR SET UP.

R23881   THE DISPLAY SYSTEM IS ALSO BLOCKED BY THE EXTERNAL MONITOR BIT, WHICH
R23882   INDICATES AN EXTERNALLY INITIATED MONITOR IS RUNNING (SEE MONITOR)

R2389    A NVSUB CALL THAT PASSES DSPLOCK AND THE EXTERNAL MONITOR BIT ENDS OLD
R23891   MONITOR.

R2390    DSPLOCK IS THE INTERLOCK FOR USE OF KEYBOARD AND DISPLAY SYSTEM WHICH
R2391    LOCKS OUT INTERNAL USE WHENEVER THERE IS EXTERNAL KEYBOARD ACTION.

R23911   NVSUB SHOULD BE USED TWICE IN SUCCESSION FOR :PLEASE PERFORM: SITUATIONS
R23912   (SIMILARLY FOR PLEASE MARK). FIRST PLACE THE CODED NUMBER FOR WHAT
R23913   ACTION IS DESIRED OF OPERATOR INTO THE REGISTERS REFERRED TO BY THE
R23914   :CHECKLIST: NOUN. GO TO NVSUB WITH A DISPLAY VERB AND THE :CHECKLIST:
R23915   NOUN. GO TO NVSUB AGAIN WITH THE :PLEASE PERFORM: VERB AND ZEROS IN THE
R23916   LOW 7 BITS. THIS :PASTES UP: THE :PLEASE PERFORM: VERB INTO THE VERB
R23917   LIGHTS.

R23918   NVMONOPT IS AN ENTRY SIMILAR TO NVSUB, BUT REQUIRING AN ADDITIONAL
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R239181 PARAMETER IN L. IT SHOULD BE USED ONLY WITH A MONITOR VERB-NOUN CODE IN
R239182 A. AFTER EACH MONITOR DISPLAY A *PLEASE* VERB WILL BE PASTED IN THE VERB
R239183 LIGHTS OR DATA WILL BE BLANKED (OR BOTH) ACCORDING TO THE OPTIONS
R239184 SPECIFIED IN L. IF BITS 8-14 OF L ARE OTHER THAN ZERO, THEN THEY WILL
R239185 BE INTERPRETED AS A VERB CODE AND PASTED IN THE VERB LIGHTS. (THIS VERB
R239186 CODE SHOULD DESIGNATE ONE OF THE *PLEASE* VERBS.) IF BITS 1-3 OF L ARE
R239187 OTHER THAN ZERO, THEN THEY WILL BE USED TO BLANK DATA BY BEING FED TO
R239188 BLANKSUB. IF NVMONOPT IS USED WITH A VERB OTHER THAN A MONITOR VERB,
R239189 THE PARAMETER IN L HAS NO EFFECT.

R2392   NVSUB IN FIXED-FIXED PLACES 2+CALLING LOC INTO NVQTEM, TC NVSUBEND INTO
R2393   ENTRET. (THIS WILL RESTORE OLD CALLING BANK BITS)

 2394   REF   3  LAST  372        4000                          SETLOC FFTAG8
 23941                            4202                          BANK
 23945  REF   4  LAST  372 TO  373:      7     37*              COUNT* $$/PIN
 2395                             4202  22 007 0  NVSUB         LXCH    7                ZERO NVMONOPT OPTIONS
 2396   REF   1                   4203  54 123 0  NVMONOPT      TS      NVTEMP
 2397   REF   1                   4204  23'242 1                LXCH    NVQTEM
 2398   REF  94  LAST  373        4205  22 002 0                LXCH    Q
 2399   REF   1                   4206  0 4226 0                TC      EMBDSPCK         CHECK FOR DSP SYST AVAILABLE
 2400   REF   2  LAST  378        4207  23'242 1                LXCH    NVQTEM           2+ CALLING LOC INTO NVQTEM
 24005  REF   4  LAST  366        4210  23'225 0                LXCH    MONSAVE2         STORE NVMONOPT OPTIONS
 2401   REF   3  LAST  374        4211  0 4235 1                TC      KILMONON         TURN ON KILL MONITOR BIT
 2402   REF   1                   4212  3 4223 0  NVSUBCOM      CAF     NVSBBBNK

 2403   REF   9  LAST  140        4213  56 006 1                XCH     BBANK
 24031                            4214  0 0006 1                EXTEND                   SAVE OLD SUPERBITS
 24032  REF   3  LAST  257        4215  04 007 1                ROR     SUPERBNK
 2404   REF   1                   4216  55'243 1                TS      NVBNKTEM
 24041  REF   2  LAST  257        4217  3 4223 0                CAF     PINSUPBT
 24042                            4220  0 0006 1                EXTEND
 24043  REF   4  LAST  378        4221  01 007 1                WRITE   SUPERBNK
 2405   REF   1                   4222  0 3513 0                TC      NVSUBB           GO TO NVSUB1 THRU STANDARD LOC
 2406   REF  43  LAST  373        1202                          EBANK=  DSPCOUNT
 2407   REF   2  LAST  334        4223    62102 0  NVSBBBNK     BBCON   NVSUB1

 24071  REF   2  LAST  378        4223             PINSUPBT =           NVSBBBNK         CONTAINS THE PINBALL SUPERBITS.

 2412   REF   3  LAST  378        4224  53'243 1  NVSUBEND      DXCH    NVQTEM           NVBNKTEM MUST = NVQTEM+1
 2413   REF   1                   4225  0 5214 0                TC      SUPDXCHZ         DTCB WITH SUPERBIT SWITCHING

 24131  REF  27  LAST  376        4226  3 4753 1  EMBDSPCK      CAF     BIT14
 24132  REF   6  LAST  376        4227  7 1224 0                MASK    MONSAVE1         EXTERNAL MONITOR BIT
 24133  REF   6  LAST  376        4230  6 1215 0                AD      DSPLOCK
 24134  REF 122  LAST  376        4231  10 000 0                CCS     A
 24135  REF  46  LAST  367        4232  0 0001 0                TC      L                DSP SYST BLOCKED. RET TO 1+ CALLING LOC
 24136  REF  47  LAST  378        4233  24 001 0                INCR    L                DSP SYST OK. SET RET TO 2+ CALLING LOC
 24137  REF  95  LAST  378        4234  0 0002 0                TC      Q
 2414   REF   7  LAST  373     41,2000                          SETLOC  PINBALL2
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  241405 REF   7 LAST  373 TO  374:     56    822*              COUNT* $$/PIN
  24141                        41,3466                          BANK
R241412 BLANKDSP BLANKS DISPLAY ACCORDING TO OPTION NUMBER IN NVTEMP AS FOLLOWS
R241415  -4 FULL BLANK, -3 LEAVE MODE, -2 LEAVE MODE AND VERB, -1 BLANK R-S ONLY

  241419 REF    8  LAST  370    41,3466  6 4774 1  BLANKDSP AD      SEVEN           7,8,9,OR 10 (A HAD 0,1,2,OR 3)
  241422                        41,3467  0 0004 0           INHINT
  241425 REF   10  LAST  371    41,3470  54 124 1     +2    TS      CODE            BLANK SPECIFIED DSPTABS
  241429 REF   20  LAST  360    41,3471  4 4755 0           CS      BIT12
  241432 REF   11  LAST  379    41,3472  50 124 0           INDEX   CODE
  241435 REF   28  LAST  371    41,3473  57'226 0           XCH     DSPTAB
  241439 REF  123  LAST  378    41,3474  10 000 0           CCS     A
  241442 REF    8  LAST  371    41,3475  25'221 1           INCR    NOUT
  241445                        41,3476  0 3477 0           TC      +1
  241449 REF   12  LAST  379    41,3477  10 124 1           CCS     CODE
  241452 REF    1               41,3500  0 3470 1           TC      BLANKDSP +2
  241455                        41,3501  0 0003 1           RELINT
  241459 REF    2  LAST  378    41,3502  50 123 1           INDEX   NVTEMP
  241462                        41,3503  0 3510 0           TC      +5
  241465                        41,3504  0 3505 1           TC      +1              NVTEMP HAS -4 (NEVER TOUCH MODREG)
  241469 REF   21  LAST  375    41,3505  55'204 1           TS      VERBREG                    -3
  241472 REF   14  LAST  373    41,3506  55'205 0           TS      NOUNREG                    -2
  241475 REF   12  LAST  355    41,3507  55'220 1           TS      CLPASS                     -1
  241479 REF    9  LAST  375    41,3510  0 4261 0           TC      -VD1SET
  241485 REF    4  LAST  374    41,3511  0 4417 1           TC      FLASHOFF        PROTECT AGAINST INVISIBLE FLASH
  241489 REF    1               41,3512  0 3534 0           TC      ENTSET -2       ZEROS REQRET

  2415   REF    2  LAST  379    41,3513  3 3536 1  NVSUB1   CAF     ENTSET          IN BANK
  2416   REF    6  LAST  366    41,3514  54 136 1           TS      ENTRET          SET RETURN TO NVSUBEND
  24161  REF    3  LAST  379    41,3515  10 123 0           CCS     NVTEMP          WHAT NOW
  24162                         41,3516  0 3522 1           TC      +4              NORMAL NVSUB CALL (EXECUTE VN OR PASTE)
  24163  REF   18  LAST  374    41,3517  0 2350 0           TC      GODSPALM
  24164  REF    2  LAST  379    41,3520  0 3466 0           TC      BLANKDSP        BLANK DISPLAY AS SPECIFIED
  24165  REF   19  LAST  379    41,3521  0 2350 0           TC      GODSPALM
  2417   REF    5  LAST  365    41,3522  3 6043 0           CAF     LOW7
  2418   REF    4  LAST  379    41,3523  7 0123 0           MASK    NVTEMP
  2419   REF  192  LAST  374    41,3524  54 157 0           TS      MPAC    +3      TEMP FOR NOUN (CANT USE MPAC, DSPDECVN
  2420   REF    5  LAST  379    41,3525  3 0123 1           CA      NVTEMP                   USES MPAC, +1, +2
  2422   REF    5  LAST  366    41,3526  54 023 1           TS      EDOP            RIGHT 7
  2423   REF    6  LAST  379    41,3527  3 0023 0           CA      EDOP
  2424   REF  193  LAST  379    41,3530  54 160 1           TS      MPAC    +4      TEMP FOR VERB (CANT USE MPAC+1, DSPDECVN
 A2425                                                                                          USES MPAC, +1, +2)
  2426   REF  194  LAST  379    41,3531  10 157 0           CCS     MPAC    +3      TEST NOUN
  2427   REF    1               41,3532  0 3537 0           TC      NVSUB2          IF NOUN NOT +0, GO ON
  2429   REF    9  LAST  372    41,3533  0 2335 0           TC      UPDATVB -2      IF NOUN=+0, DISPLAY VERB, THEN RETURN
  24291  REF   81  LAST  376    41,3534  3 4772 1     -2    CAF     ZERO            ZERO REQRET SO THAT PASTED VERBS CAN
  24292  REF   14  LAST  375    41,3535  55'216 1           TS      REQRET          BE EXECUTED BY OPERATOR.
  2430   REF    1               41,3536  0 4224 1  ENTSET   TC      NVSUBEND
  2431   REF  195  LAST  379    41,3537  10 160 1  NVSUB2   CCS     MPAC +4         TEST VERB
  2432                          41,3540  1 3543 1           TCF     +3              IF VERB NOT +0, GO ON
  2434    REF   2  LAST  365   41,3541  0 2314 0                  TC     UPDATNN -2     IF VERB=+0, DISPLAY NOUN, THEN RETURN
  2435    REF   2  LAST  379   41,3542  0 4224 1                  TC     NVSUBEND
  2436    REF 196  LAST  379   41,3543  3 0156 0                  CA     MPAC     +2    TEMP FOR MACH CADR TO BE SPEC. (DSPDECVN
  2437    REF 197  LAST  380   41,3544  54 161 0                  TS     MPAC     +5                USES MPAC, +1, +2)
  2440    REF  10  LAST  379   41,3545  0 2335 0                  TC     UPDATVB -2     IF BOTH NOUN AND VERB NOT +0 , DISPLAY
  2441    REF   3  LAST  380   41,3546  0 2314 0                  TC     UPDATNN -2     BOTH AND GO TO ENTPAS0
  2442    REF  82  LAST  379   41,3547  3 4772 1                  CAF    ZERO
  2443    REF   3  LAST  374   41,3550  55'217 0                  TS     LOADSTAT       SET FOR WAITING FOR DATA CONDITION
  2444    REF  13  LAST  379   41,3551  55'220 1                  TS     CLPASS
  2445    REF  15  LAST  379   41,3552  55'216 1                  TS     REQRET         SET REQRET FOR PASS 0.
  2446    REF 198  LAST  380   41,3553  3 0161 1                  CA     MPAC     +5    RESTORES MACH CADR TO BE SPEC TO MPAC+2
  2447    REF 199  LAST  380   41,3554  54 156 1                  TS     MPAC     +2    FOR USE IN INTMCTBS (IN ENTPAS0).
  2448    REF   3  LAST  334   41,3555  0 2040 1      ENDNVSB1    TC     ENTPAS0

 R2449    IF INTERNAL MACH CADR TO BE SPECIFIED, MPAC+2 WILL BE PLACED INTO
 R2450    NCUNCADR IN ENTPAS0 (INTMCTBS ).

  2451    REF   4  LAST  378          4000                       SETLOC FFTAG8
  24511                               4235                       BANK
  24515   REF   5 LAST  378 TO  379:    27      64*              COUNT* $$/PIN
 A2452                                                                                  FORCE BIT 15 OF MONSAVE1 TO 1.
  2453    REF  29  LAST  355          4235  3 4752 0  KILMONON   CAF    BIT15             THIS IS THE KILL MONITOR BIT.
  2454    REF   7  LAST  378          4236  55'224 0             TS     MONSAVE1       TURN OFF BIT 14, THE EXTERNAL
 A2455                                                                                   MONITOR BIT.
  2458    REF  96  LAST  378          4237  0 0002 0             TC     Q

 R2459    LOADSTAT  +0 INACTIVE(WAITING FOR DATA). SET BY NVSUB
 R2460              -1 PROCEED NO DATA SET BY V33 OR PROCEED
 R2461              -2 TERMINATE SET BY V34
 R2462             -0    DATA IN       SET BY END OF LOAD ROUTINE
 R2463                 OR RESEQUENCE   SET BY VERB 32

 R2464    L  TC ENDIDLE  (FIXED FIXED)
 R2465    ROUTINES THAT REQUEST LOADS THROUGH NVSUB SHOULD USE ENDIDLE WHILE
 R2466    WAITING FOR THE DATA TO BE LOADED. ENDIDLE PUTS CURRENT JOB TO SLEEP.
 R2467    ENDIDLE CANNOT BE CALLED FROM ERASABLE OR F/F MEMORY,
 R2468    SINCE JOBSLEEP AND JOBWAKE CAN HANDLE ONLY FIXED BANKS.
 R2469    RECALTST TESTS LOADSTAT AND WAKES JOB UP TO,
 R2470    L+1 FOR TERMINATE ,PROCEED WITHOUT DATA, DATA IN , OR RESEQUENCE
 R2473    IT DOES NOTHING IF LOADSTAT INDICATES WAITING FOR DATA.

 R2474    ENDIDLE ABORTS (WITH CODE 21206) IF A SECOND JOB ATTEMPTS TO GO TO SLEEP
 R2475    IN PINBALL. IN PARTICULAR, IF AN ATTEMPT IS MADE TO GO TO ENDIDLE WHEN
 R2476    1) CADRSTOR NOT= +0. THIS IS THE CASE WHERE THE CAPACITY OF ENDIDLE IS
 R2477    EXCEEDED. (+-NZ INDICATE A JOB IS ALREADY ASLEEP DUE TO ENDIDLE.)
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R2478   2) DSPLIST NOT= +0. THIS INDICATES A JOB IS ALREADY ASLEEP DUE TO
R2479   NVSUBUSY.

R2488   ENDIDLE MOVED TO DISPLAY INTERFACE ROUTINES
 2489   REF   7  LAST  376      4240  11'245 1  ISCADR+0 CCS     CADRSTOR       ABORTS (CODE 01206) IF CADRSTOR NOT= +0.
 2490   REF   1                 4241  0 4245 0           TC      DSPABORT       RETURNS IF CADRSTOR = +0.
 2493   REF   2  LAST  204      4242  11'246 1           CCS     DSPLIST        ABORT (CODE 01206) IF DSPLIST NOT = +0.
 2494   REF   2  LAST  381      4243  0 4245 0           TC      DSPABORT       RETURNS IF DSPLIST = +0.
 2495   REF  97  LAST  380      4244  0 0002 0           TC      Q
 2496   REF   2  LAST  372      4245  0 5726 1  DSPABORT TC      POODOO
 2497                           4246   21206 0           OCT     21206          SECOND JOB TRYING TO GO TO SLEEP

R2498   JAMTERM ALLOWS PROGRAMS TO PERFORM THE TERMINATE FUNCTION.
R2499   IT DOES ENDOFJOB.

 2500   REF   3  LAST  378      4247  3 4223 0  JAMTERM  CAF     PINSUPBT
 2501                           4250  0 0006 1           EXTEND
 25011  REF   5  LAST  378      4251  01 007 1           WRITE   SUPERBNK
 25012  REF   2  LAST  215      4252  3 4260 1           CAF     34DEC
 25013  REF  16  LAST  380      4253  55'216 1           TS      REQRET         LEAVE ENTER SET FOR ENTPASS0.
 25014  REF  22  LAST  379      4254  55'204 1           TS      VERBREG
 2502   REF  10  LAST  379      4255  0 4261 0           TC      -VD1SET
 2504   REF  29  LAST  376      4256  0 4655 0           TC      POSTJUMP
 2505   REF   2  LAST  337      4257   61307 1           CADR    VBTERM

 2506                           4260   00042 1  34DEC    DEC     34


 2507   REF   4  LAST  339      4261  4 4351 0  -VD1SET  CS      VD1
 2508   REF  44  LAST  378      4262  55'202 1           TS      DSPCOUNT
 2509   REF  98  LAST  381      4263  0 0002 0           TC      Q
R2532   BLANKSUB BLANKS ANY COMBINATION OF R1, R2, R3.
R2533   CALL WITH BLANKING CODE IN A.
R2534   BIT1=1 BLANKS R1, BIT2=1 BLANKS R2, BIT3=1 BLANKS R3.
R2535   ANY COMBINATION OF THESE BITS IS ACCEPTED.

R2536   DSPCOUNT IS RESTORED TO STATE IT WAS IN BEFORE BLANKSUB WAS EXECUTED.

 2538   REF   9  LAST  379      4264  7 4774 0  BLANKSUB MASK    SEVEN
 25381  REF   6  LAST  379      4265  54 123 0           TS      NVTEMP         STORE BLANKING CODE IN NVTEMP.
 2539   REF  99  LAST  381      4266  22 002 0           LXCH    Q
 2540   REF   2  LAST  378      4267  0 4226 0           TC      EMBDSPCK       CHECK FOR DSP SYST AVAILABLE
 25411  REF   7  LAST  381      4270  10 123 0           CCS     NVTEMP
 25412                          4271  1 4273 1           TCF     +2
 25413  REF  48  LAST  378      4272  0 0001 0           TC      L              NOTHING TO BLANK. RET TO 2+ CALLING LOC
 2544   REF   1                 4273  3 4304 1           CAF     BLNKBBNK
 2545   REF  10  LAST  378      4274  56 006 1           XCH     BBANK
 25451                          4275  0 0006 1           EXTEND
 25452  REF   6  LAST  381      4276  04 007 1           ROR     SUPERBNK       SAVE OLD SUPERBITS.
 2546   REF  40  LAST  342      4277  52 131 0           DXCH    BUF
 25461  REF   4  LAST  381      4300   3 4223 0              CAF     PINSUPBT
 25462                          4301   0 0006 1              EXTEND
 25463  REF   7  LAST  381      4302   01 007 1              WRITE   SUPERBNK
 2547   REF   1                 4303   0 3351 0              TC      BLNKSUB1

 2548   REF  45  LAST  381      1202                         EBANK=  DSPCOUNT
 25481  REF   2  LAST  382      4304    60102 1   BLNKBBNK   BBCON   BLNKSUB1
 2549                           4305              ENDBLFF    EQUALS

 2550   REF   8  LAST  374   40,2000                         SETLOC  PINBALL1
 25501                       40,3351                         BANK
 25505  REF   8 LAST  374 TO  378:     40    745*            COUNT*  $$/PIN
 2551   REF  46  LAST  382   40,3351   3 1202 0   BLNKSUB1   CA      DSPCOUNT            SAVE OLD DSPCOUNT FOR LATER RESTORATION
 25511  REF  41  LAST  381   40,3352   54 132 0              TS      BUF      +2
 25512  REF  24  LAST  374   40,3353   3 4770 0              CAF     BIT1                TEST BIT1. SEE IF R1 TO BE BLANKED.
 2552   REF   1              40,3354   0 3373 0              TC      TESTBIT
 2553   REF  13  LAST  367   40,3355   3 4321 0              CAF     R1D1
 2554   REF   4  LAST  347   40,3356   0 2430 1              TC      5BLANK -1
 2555   REF  19  LAST  242   40,3357   3 4767 0              CAF     BIT2                TEST BIT 2. SEE IF R2 TO BE BLANKED.
 2556   REF   2  LAST  382   40,3360   0 3373 0              TC      TESTBIT
 2557   REF   5  LAST  369   40,3361   3 4322 0              CAF     R2D1
 2558   REF   5  LAST  382   40,3362   0 2430 1              TC      5BLANK -1
 2559   REF  20  LAST  376   40,3363   3 4766 1              CAF     BIT3                TEST BIT3. SEE IF R3 TO BE BLANKED.
 2560   REF   3  LAST  382   40,3364   0 3373 0              TC      TESTBIT
 2561   REF   5  LAST  348   40,3365   3 4323 1              CAF     R3D1
 2562   REF   6  LAST  382   40,3366   0 2430 1              TC      5BLANK -1
 2563   REF  42  LAST  382   40,3367   3 0132 1              CA      BUF      +2         RESTORE DSPCOUNT TO STATE IT HAD
 2564   REF  47  LAST  382   40,3370   55'202 1              TS      DSPCOUNT                 BEFORE BLANKSUB.
 2565   REF  43  LAST  382   40,3371   52 131 0              DXCH    BUF                 CALL L+2 DIRECTLY.
 2566   REF   2  LAST  378   40,3372   0 5215 1              TC      SUPDXCHZ +1         DTCB WITH SUPERBIT SWITCHING

 2567   REF   8  LAST  381   40,3373   7 0123 0   TESTBIT    MASK    NVTEMP              NVTEMP CONTAINS BLANKING CODE.
 2568   REF 124  LAST  379   40,3374   10 000 0              CCS     A
 2569   REF 100  LAST  381   40,3375   0 0002 0              TC      Q                   IF CURRENT BIT = 1, RETURN TO L+1.
 2570   REF   1              40,3376   1 6710 0              TCF     Q+2                 IF CURRENT BIT = 0, RETURN TO L+3
 2574   REF   1              40,3377   3 4353 0   DSPMMJB    CAF     MD1                 GETS HERE THRU DSPMM
 2575   REF  48  LAST  382   40,3400   57'202 0              XCH     DSPCOUNT
 2576   REF   1              40,3401   54 140 0              TS      DSPMMTEM            SAVE DSPCOUNT
 2579   REF   6  LAST  271   40,3402   11'214 0              CCS     MODREG
 2580   REF  43  LAST  374   40,3403   6 4770 0              AD      ONE
 25801  REF   4  LAST  369   40,3404   0 3146 1              TC      DSPDECVN            IF MODREG IS + OR +0, DISPLAY MODREG
 25802                       40,3405   0 3407 1              TC      +2                  IF MODREG IS -NZ, DO NOTHING
 25803  REF   6  LAST  373   40,3406   0 2473 0              TC      2BLANK              IF MODREG IS -0, BLANK MM
 2581   REF   2  LAST  382   40,3407   56 140 1              XCH     DSPMMTEM            RESTORE DSPCOUNT
 2582   REF  49  LAST  382   40,3410   55'202 1              TS      DSPCOUNT
 2583   REF  39  LAST  376   40,3411   0 5205 0              TC      ENDOFJOB

R2584   RECALTST IS ENTERED DIRECTLY AFTER DATA IS LOADED (OR RESEQUENCE VERB IS
R2585   EXECUTED), TERMINATE VERB IS EXECUTED, OR PROCEED WITHOUT DATA VERB IS
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R2586     EXECUTED. IT WAKES UP JOB THAT DID TC ENDIDLE.

R2587     IF CADRSTOR NOT= +0, IT PUTS +0 INTO DSPLOCK, AND TURNS OFF KEY RLSE
R2588     LIGHT IF DSPLIST IS EMPTY (LEAVES KEY RLSE LIGHT ALONE IF NOT EMPTY).

  2589    REF   8  LAST  381    40,3412  11'245 1  RECALTST CCS      CADRSTOR
  2590    REF   1               40,3413  0 3415 1           TC       RECAL1
  2591    REF  40  LAST  382    40,3414  0 5205 0           TC       ENDOFJOB         NORMAL EXIT IF KEYBOARD INITIATED
  2592    REF  83  LAST  380    40,3415  3 4772 1  RECAL1   CAF      ZERO
  2593    REF   9  LAST  383    40,3416  57'245 0           XCH      CADRSTOR
  2594                          40,3417  0 0004 0           INHINT
  2595    REF   1               40,3420  0 5167 1           TC       JOBWAKE
  26041   REF  15  LAST  379    40,3421  3 1205 1           CA       NOUNREG          SAVE VERB IN MPAC, NOUN IN MPAC+1 AT
  26042   REF  49  LAST  381    40,3422  54 001 1           TS       L                TIME OF RESPONSE TO ENDIDLE FOR
  26043   REF  23  LAST  381    40,3423  3 1204 0           CA       VERBREG          POSSIBLE LATER TESTING BY JOB THAT HAS
  26044   REF   1               40,3424  50 064 0           INDEX    LOCCTR           BEEN WAKED UP.
  26045   REF 200  LAST  380    40,3425  52 155 1           DXCH     MPAC
  2605                          40,3426  0 0003 1           RELINT
  2606    REF  10  LAST  376    40,3427  0 4432 0  RECAL3   TC       RELDSP
  2607    REF  41  LAST  383    40,3430  0 5205 0           TC       ENDOFJOB

  2608    REF   3  LAST  380    40,3431  0 4224 1  NVSBENDL TC       NVSUBEND
  26115   REF   4  LAST  296    30,2000                     SBANK=   LOWSUPER
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P2612    MISCELLANEOUS SERVICE ROUTINES IN FIXED/FIXED

  2613   REF   5  LAST  380       4000                       SETLOC FFTAG8
  26131                           4305                       BANK
  26135  REF   6 LAST  380 TO  382:     40    104*           COUNT* $$/PIN
R2614    SETNCADR         E CADR ARRIVES IN A. IT IS STORED IN NOUNCADR. EBANK BITS
R2615                     ARE SET. E ADRES IS DERIVED AND PUT INTO NOUNADD.

  2616   REF   8  LAST  367       4305  55'222 0  SETNCADR TS      NOUNCADR          STORE ECADR
  2617   REF  10  LAST  312       4306  54 003 0    +1     TS      EBANK             SET EBANK BITS
  2618   REF   1                  4307  7 4350 1           MASK    LOW8
  2619   REF   2  LAST  211       4310  6 5024 1           AD      OCT1400
  2620   REF  25  LAST  363       4311  54 145 0           TS      NOUNADD           PUT E ADRES INTO NOUNADD
  2621   REF 101  LAST  382       4312  0 0002 0           TC      Q


R2622    SETNADD          GETS E CADR FROM NOUNCADR, SETS EBANK BITS, DERIVES
R2623                     E ADRES AND PUTS IT INTO NOUNADD.

  2624   REF   9  LAST  384       4313  3 1222 1  SETNADD  CA      NOUNCADR
  2625   REF   7  LAST  357       4314  1 4306 1           TCF     SETNCADR +1


R2626    SETEBANK         E CADR ARRIVES IN A. EBANK BITS ARE SET. E ADRES IS
R2627                     DERIVED AND LEFT IN A.

  2628   REF  11  LAST  384       4315  54 003 0  SETEBANK TS      EBANK             SET EBANK BITS
  2629   REF   2  LAST  384       4316  7 4350 1           MASK    LOW8
  2630   REF   3  LAST  384       4317  6 5024 1           AD      OCT1400           E ADRES LEFT IN A
  2631   REF 102  LAST  384       4320  0 0002 0           TC      Q


  2632                            4321   00016 0  R1D1     OCT     16                THESE 3 CONSTANTS FORM A PACKED TABLE.
  2633                            4322   00011 1  R2D1     OCT     11                DONT SEPARATE.
  2634                            4323   00004 0  R3D1     OCT     4

  2635   REF   1                  4324  54 020 1  RIGHT5   TS      CYR
  2636   REF   2  LAST  384       4325  4 0020 1           CS      CYR
  2637   REF   3  LAST  384       4326  4 0020 1           CS      CYR
  2638   REF   4  LAST  384       4327  4 0020 1           CS      CYR
  2639   REF   5  LAST  384       4330  4 0020 1           CS      CYR
  2640   REF   6  LAST  384       4331  56 020 0           XCH     CYR
  2641   REF 103  LAST  384       4332  0 0002 0           TC      Q

  2642   REF  16  LAST  370       4333  54 022 0  LEFT5    TS      CYL
  2643   REF  17  LAST  384       4334  4 0022 0           CS      CYL
  2644   REF  18  LAST  384       4335  4 0022 0           CS      CYL
  2645   REF  19  LAST  384       4336  4 0022 0           CS      CYL
  2646   REF  20  LAST  384       4337  4 0022 0           CS      CYL
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 2647   REF  21  LAST  384     4340  56 022 1              XCH      CYL
 2648   REF 104  LAST  384     4341  0 0002 0              TC       Q

 2655                          4342   00037 0  LOW5        OCT      37                         THESE 3 CONSTANTS FORM A PACKED TABLE.
 2656                          4343   01740 0  MID5        OCT      1740                       DONT SEPARATE.
 2657                          4344   76000 0  HI5         OCT      76000                      MUST STAY HERE

 2660   REF   1                5313            TCTSKOVR EQUALS  TSKOVCDR
 2661   REF  15  LAST  276     4345  0 5135 0  TCFINDVC TC      FINDVAC


 2662                          4346   30000 1  CHRPRIO     OCT      30000                      EXEC PRIORITY OF CHARIN


 2663                          4347   03777 0  LOW11       OCT      3777
 2665                          4350   00377 1  LOW8        OCT      377


 2667                          4351   00023 0  VD1         OCT      23                         THESE 3 CONSTANTS FORM A PACKED TABLE.
 2668                          4352   00021 1  ND1         OCT      21                         DONT SEPARATE.
 2669                          4353   00025 0  MD1         OCT      25

 26692  REF   2  LAST  382     4353            VBSP1LD  EQUALS  MD1                        VB21 = ALOAD
 26694                         4354   00026 0  VBSP2LD  DEC     22                         VB22 = BLOAD
 26696  REF   2  LAST  258     4615            VBSP3LD  EQUALS  DEC23                      VB23 = CLOAD
 2670                          4355   00012 1  BINCON   DEC     10

 26706  REF  17  LAST  373     4356  3 4764 0  RELDSPON CAF     BIT5
 26707                         4357  1 4363 1           TCF     +4
 26708  REF  23  LAST  308     4360  3 4763 1  FLASHON  CAF     BIT6
 26709                         4361  1 4363 1           TCF     +2
 2671   REF  20  LAST  332     4362  3 4762 0  FALTON   CA      BIT7                       TURN ON OPERATOR ERROR LIGHT
 2672                          4363  0 0006 1           EXTEND
 2673   REF  10  LAST  376     4364  05 011 1           WOR     DSALMOUT                   BIT 7 OF CHANNEL 11
 2674   REF 105  LAST  385     4365  0 0002 0           TC      Q

 2683                          4366  0 0006 1  LODSAMPT EXTEND
 2684   REF  11  LAST  284     4367  3 0025 0           DCA     TIME2
 2685   REF   5  LAST  293     4370  52 014 0           DXCH    SAMPTIME
 2686   REF 106  LAST  385     4371  0 0002 0           TC      Q


 2687                          4372  0 0006 1  TPSL1    EXTEND                             SHIFTS MPAC, +1, +2 LEFT 1
 2688   REF 201  LAST  383     4373  3 0156 0           DCA     MPAC     +1                LEAVES OVFIND SET TO +/- 1 FOR OF/UF
 2689   REF 202  LAST  385     4374  20 156 1           DAS     MPAC     +1
 2690   REF 203  LAST  385     4375  6 0154 1           AD      MPAC
 2691   REF 204  LAST  385     4376  26 154 0    +4     ADS     MPAC
 2692                          4377  54 007 1           TS      7                          TS A DOES NOT CHANGE A ON OF/UF.
 2693   REF 107  LAST  385     4400  0 0002 0           TC      Q                          NO NET OF/UF
 2694   REF   6  LAST  362     4401  54 162 0           TS      MPAC+6                     MPAC +6 SET TO +/-1 FOR OF/UF
 2695   REF 108  LAST  385      4402  0 0002 0              TC       Q

R2696   IF MPAC, +1 ARE EACH +NZ OR +0 AND C(A)=-0, SHORTMP WRONGLY GIVES +0.
R2697   IF MPAC, +1 ARE EACH -NZ OR -0 AND C(A)=+0, SHORTMP WRONGLY GIVES +0.
R2698   PRSHRTMP FIXES FIRST CASE ONLY, BY MERELY TESTING C(A) AND IF IT = -0,
R2699   SETTING RESULT TO -0.
R2700    (DO NOT USE PRSHRTMP UNLESS MPAC, +1 ARE EACH +NZ OR +0, AS THEY ARE
R2701    WHEN THEY CONTAIN TH E SF CONSTANTS.)

 2702   REF   1                 4403  54 135 1  PRSHRTMP TS       MPTEMP
 2703   REF 125  LAST  382      4404  10 000 0           CCS      A
 2704   REF   2  LAST  386      4405  3 0135 0           CA       MPTEMP          C(A) +, DO REGULAR SHORTMP
 2705   REF   8  LAST  368      4406  1 7257 1           TCF      SHORTMP +1      C(A) +0, DO REGULAR SHORTMP
 2706                           4407  1 4405 0           TCF      -2              C(A) -, DO REGULAR SHORTMP
 2707   REF  84  LAST  383      4410  4 4772 0           CS       ZERO            C(A) -0, FORCE RESULT TO -0 AND RETURN.
 2708   REF 205  LAST  385      4411  54 154 0           TS       MPAC
 2709   REF 206  LAST  386      4412  54 155 1           TS       MPAC     +1
 2710   REF 207  LAST  386      4413  54 156 1           TS       MPAC     +2
 2711   REF 109  LAST  386      4414  0 0002 0           TC       Q

 2714   REF  21  LAST  382      4415  4 4766 0  UPACTOFF CS       BIT3            TURN OFF UPLINK ACTIVITY
 2715                           4416  1 4420 1           TCF      +2

 2716   REF  24  LAST  385      4417  4 4763 0  FLASHOFF CS       BIT6            TURN OFF V/N FLASH
 2717                           4420  0 0006 1           EXTEND
 2718   REF  11  LAST  385      4421  03 011 1           WAND     DSALMOUT        BIT 6 OF CHANNEL 11
 2719   REF 110  LAST  386      4422  0 0002 0           TC       Q

 27191  REF 126  LAST  386      4423  50 000 1  CODSTOR  INDEX    A
 27192  REF   2  LAST  143      4424  3 4063 0           CAF      RELTAB
 27193  REF   5  LAST  370      4425  7 4342 1           MASK     LOW5
 27194  REF  13  LAST  379      4426  54 124 1           TS       CODE
 27195  REF  50  LAST  382      4427  3 1202 0           CA       DSPCOUNT
 27196  REF  11  LAST  371      4430  54 143 0           TS       COUNT
 27197  REF 111  LAST  386      4431  0 0002 0           TC       Q
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P2720    INTERNAL USE OF KEYBOARD AND DISPLAY PROGRAM

R2721    USER MUST SCHEDULE CALLS TO NVSUB SO THAT THERE IS NO CONFLICT OF USE OR
R2722    CONFUSION TO OPERATOR. THE OLD GRABLOCK (INTERNAL/INTERNAL INTERLOCK)
R2723    HAS BEEN REMOVED AND THE INTERNAL USER NO LONGER HAS THE PROTECTION THIS
R2724    OFFERED.

R2725    THERE ARE TWO WAYS A JOB CAN BE PUT TO SLEEP BY THE KEYBOARD + DISPLAY
R2726    PROGRAM.    1) BY ENDIDLE
R2727                2) BY NVSUBUSY
R2728    THE BASIC CONVENTION IS THAT ONLY ONE JOB WILL BE PERMITTED ASLEEP VIA
R2729    THE KEYBOARD + DISPLAY PROGRAM AT A TIME. IF A JOB ATTEMPTS TO GO TO
R2730    SLEEP BY MEANS OF (1) OR (2) AND THERE IS ALREADY A JOB ASLEEP THAT WAS
R2731    PUT TO SLEEP BY (1) OR (2), THEN AN ABORT IS CAUSED.

R2732    THE CALLING SEQUENCE FOR NVSUB IS
R2733              CAF     V/N
R2734    L         TC      NVSUB
R2735    L+1       RETURN HERE IF OPERATOR HAS INTERVENED
R2736    L+2       RETURN HERE AFTER EXECUTION

R2737          A ROUTINE CALLED  NVSUBUSY IS PROVIDED (USE IS OPTIONAL)  TO PUT
R2738    YOUR JOB TO SLEEP UNTIL THE OPERATOR RELEASES THE KEYBOARD + DISPLAY
R2739    SYSTEM. NVSUBUSY ALSO TURNS ON THE KEY RELEASE LIGHT.
R2740    NVSUBUSY CANNOT BE CALLED FROM ERASABLE OR F/F MEMORY,
R2741    SINCE JOBSLEEP AND JOBWAKE CAN HANDLE ONLY FIXED BANKS.

R2742             THE CALLING SEQUENCE IS
R2743              CAF     WAKEFCADR
R2744              TC      NVSUBUSY

R2745    .

R2746    NVSUBUSY IS INTENDED FOR USE WHEN AN INTERNAL PROGRAM FINDS THE OPERATOR
R2747    IS USING THE KEYBOARD + DISPLAY PROGRAM (BY HIS OWN INITIATION). IT IS
R2748    NOT INTENDED FOR USE WHEN ONE INTERNAL PROGRAM FINDS ANOTHER INTERNAL
R2749    PROGRAM USING THE KEYBOARD + DISPLAY PROGRAM.

R2750    NVSUBUSY ABORTS (WITH CODE 21206) IF A SECOND JOB ATTEMPTS TO GO TO
R2751    SLEEP IN PINBALL. IN PARTICULAR, IF AN ATTEMPT IS MADE TO GO TO NVSUBUSY
R2752    WHEN
R2753    1) DSPLIST NOT= +0. THIS IS THE CASE WHERE THE CAPACITY OF THE DSPLIST
R2754       IS EXCEEDED.
R2755    2) CADRSTOR NOT= +0. THIS INDICATES THAT A JOB IS ALREADY USING
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L       PINBALL GAME  BUTTONS AND LIGHTS                                                 USER'S PAGE NO.  71       EQ 53

R2756   ENDIDLE. (+-NZ INDICATE A JOB IS ALREADY ASLEEP DUE TO ENDIDLE.)

R2757   NVSUBUSY MOVED TO DISPLAY INTERFACE ROUTINES


R2788   RELDSP IS USED BY VBPROC, VBTERM, VBRQEXEC, VBRQWAIT, VBRELDSP, EXTENDED
R2789   VERB DISPATCHER, VBRESEQ, RECALTST.
R2790   RELDSP1 IS USED BY MONITOR SET UP, VBRELDSP.
 2791   REF 112  LAST  386       4432  56 002 0  RELDSP   XCH     Q             SET DSPLOCK TO +0, TURN RELDSP LIGHT
 2792   REF   1                  4433  54 144 1           TS      RELRET        OFF,  SEARCH DSPLIST
 27921  REF  28  LAST  378       4434  4 4753 0           CS      BIT14
 27922                           4435  0 0004 0           INHINT
 27923  REF   8  LAST  380       4436  7 1224 0           MASK    MONSAVE1
 27924  REF   9  LAST  388       4437  55'224 0           TS      MONSAVE1      TURN OFF EXTERNAL MONITOR BIT
 2793   REF   3  LAST  381       4440  11'246 1           CCS     DSPLIST
 2794                            4441  0 4443 0           TC      +2
 2795   REF   1                  4442  0 4446 0           TC      RELDSP2       LIST EMPTY
 2796   REF  85  LAST  386       4443  3 4772 1           CAF     ZERO
 2797   REF   4  LAST  388       4444  57'246 0           XCH     DSPLIST
 2799   REF   2  LAST  383       4445  0 5167 1           TC      JOBWAKE
 2800                            4446  0 0003 1  RELDSP2  RELINT
 2801   REF  18  LAST  385       4447  4 4764 1           CS      BIT5          TURN OFF KEY RELEASE LIGHT
 2802                            4450  0 0006 1           EXTEND                (BIT 5 OF CHANNEL 11)
 2803   REF  12  LAST  386       4451  03 011 1           WAND    DSALMOUT
 2804   REF  86  LAST  388       4452  3 4772 1    +4     CAF     ZERO
 2805   REF   7  LAST  378       4453  55'215 1           TS      DSPLOCK
 2807   REF   2  LAST  388       4454  0 0144 0           TC      RELRET
 2808   REF 113  LAST  388       4455  56 002 0  RELDSP1  XCH     Q             SET DSPLOCK TO +0. NO DSPLIST SEARCH.
 2809   REF   3  LAST  388       4456  54 144 1           TS      RELRET        TURN KEY RLSE LIGHT OFF IF DSPLIST IS
A2810                                                                           EMPTY. LEAVE KEY RLSE LIGHT ALONE IF
A2811                                                                           DSPLIST IS NOT EMPTY.
 2812   REF   5  LAST  388       4457  11'246 1           CCS     DSPLIST
 2813                            4460  0 4462 0           TC      +2            +  NOT EMPTY. LEAVE KEY RLSE LIGHT ALONE
 2814   REF   2  LAST  388       4461  0 4446 0           TC      RELDSP2       +0 EMPTY. TURN OFF KEY RLSE LIGHT
 2815   REF   3  LAST  388       4462  1 4452 1           TCF     RELDSP2 +4    - NOT EMPTY. LEAVE KEY RLSE LIGHT ALONE
 2818                            4463            ENDPINBF EQUALS
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P28181  PINTEST IS NEEDED FOR AUTO CHECK OF PINBALL.
 28182  REF   2  LAST  249   43,2002             PINTEST  EQUALS LST2FAN
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P2819   VBTSTLTS TURNS ON ALL DISPLAY PANEL LIGHTS. AFTER 5 SEC, IT TURNS
R2820   OFF THE CAUTION AND STATUS LIGHTS.

 2821   REF   9  LAST  382   40,2000                        SETLOC PINBALL1
 28211                       40,3432                        BANK
 28215  REF   9 LAST  382 TO  384:    49   794*             COUNT* $$/PIN
 2822   REF  56  LAST  373   40,3432  0 4636 0  VBTSTLTS TC     BANKCALL
 28224  REF   6  LAST  273   40,3433   66714 0             CADR   CHKPOOH

 28226                       40,3434  0 0004 0             INHINT
 2823   REF  21  LAST  199   40,3435  4 1334 0             CS     IMODES33     SET BIT  1 OF IMODES33, SO IMUNON WONT
 2824   REF   4  LAST  173   40,3436  7 4770 1             MASK   LMPTSTBT     TURN OUT ANY LAMPS
 2825   REF  22  LAST  390   40,3437  27'334 0             ADS    IMODES33
 2827   REF   1              40,3440  3 3550 1             CAF    TSTCON1      TURN ON UPLINK ACTIVITY, TEMP, KEY RLSE,
 2828                        40,3441  0 0006 1             EXTEND              V/N FLASH, OPERATOR ERROR.
 2829   REF  13  LAST  388   40,3442  05 011 1             WOR    DSALMOUT
 2830   REF   1              40,3443  3 3551 0             CAF    TSTCON2      TURN ON NO ATT, GIMBAL LOCK, TRACKER,
 2831   REF  29  LAST  379   40,3444  55'241 0             TS     DSPTAB  +11D PROG ALM.
 2832   REF  17  LAST  315   40,3445  3 4757 0             CAF    BIT10        TURN ON TEST ALARM OUTBIT
 2833                        40,3446  0 0006 1             EXTEND
 2834   REF   3  LAST  202   40,3447  05 013 0             WOR    CHAN13
 2835   REF   3  LAST  328   40,3450  3 4355 0             CAF    TEN
 2836   REF   1              40,3451  54 117 1  TSTLTS1    TS     ERCNT
 2837   REF   1              40,3452  4 3546 1             CS     FULLDSP
 2838   REF   2  LAST  390   40,3453  50 117 0             INDEX  ERCNT
 2839   REF  30  LAST  390   40,3454  55'226 1             TS     DSPTAB
 2840   REF   3  LAST  390   40,3455  10 117 1             CCS    ERCNT
 2841   REF   1              40,3456  0 3451 1             TC     TSTLTS1
 2842   REF   1              40,3457  4 3547 0             CS     FULLDSP1
 2843   REF  31  LAST  390   40,3460  55'227 0             TS     DSPTAB  +1   TURN ON 3 PLUS SIGNS
 2844   REF  32  LAST  390   40,3461  55'232 1             TS     DSPTAB  +4
 2845   REF  33  LAST  390   40,3462  55'234 1             TS     DSPTAB  +6
 2846   REF   4  LAST  223   40,3463  3 4775 0             CAF    ELEVEN
 2847   REF   9  LAST  379   40,3464  55'221 0             TS     NOUT
 2849   REF   1              40,3465  3 7704 0             CAF    SHOLTS
 2851   REF  57  LAST  390   40,3466  0 4636 0             TC     BANKCALL
 2852   REF   2  LAST  209   40,3467   01731 0             CADR   DELAYJOB
A2854                                                                          DSPLOCK IS LEFT BUSY (FROM KEYBOARD
A2855                                                                          ACTION) UNTIL TSTLTS3 TO INSURE THAT
A2856                                                                          LIGHTS TEST WILL BE SEEN.

 2866   REF   1                 7704            SHOLTS     =      DEC500       5 SEC
 2872   REF   1              40,3470  4 3552 1  TSTLTS3    CS     TSTCON3      CALLED BY EXECUTIVE
 2873                        40,3471  0 0004 0             INHINT
 2874                        40,3472  0 0006 1             EXTEND              TURN OFF  UPLINK ACTIVITY, TEMP,
 2875   REF  14  LAST  390   40,3473  03 011 1             WAND   DSALMOUT     OPERATOR ERROR.
 2876   REF  18  LAST  390   40,3474  4 4757 1             CS     BIT10        TURN OFF TEST ALARM OUTBIT
 2877                        40,3475  0 0006 1             EXTEND
 2878   REF   4  LAST  390   40,3476  03 013 0             WAND   CHAN13
 28781  REF  22  LAST  313   40,3477   3 4765 1                 CAF      BIT4              MAKE NO ATT FOLLOW BIT 4 OF CHANNEL 12
 28782                       40,3500   0 0006 1                 EXTEND                       (NO ATT LIGHT ON IF IN COARSE ALIGN)
 28783  REF  27  LAST  262   40,3501   02 012 0                 RAND     CHAN12
 2879   REF  30  LAST  380   40,3502   6 4752 0                 AD       BIT15             TURN OFF AUTO, HOLD, FREE, SPARE,
 2880   REF  34  LAST  390   40,3503   55'241 0                 TS       DSPTAB   +11D     GIMBAL LOCK, SPARE, TRACKER, PROG ALM
 2881   REF   5  LAST  390   40,3504   4 4770 1                 CS       LMPTSTBT
 28813  REF  23  LAST  390   40,3505   7 1334 0                 MASK     IMODES33
 28816  REF  24  LAST  391   40,3506   55'334 0                 TS       IMODES33
 2882                        40,3507   4 0000 0                 COM
 28823  REF   2  LAST  154   40,3510   7 4754 1                 MASK     PIP2FLBT
 28826  REF  25  LAST  391   40,3511   27'334 0                 ADS      IMODES33
 2883                        40,3512   4 0000 0                 COM
 28833  REF   1              40,3513   7 4755 0                 MASK     DNLKFAIL
 28836  REF  26  LAST  391   40,3514   27'334 0                 ADS      IMODES33
 2884                        40,3515   4 0000 0                 COM
 28843  REF   1              40,3516   7 4756 0                 MASK     UPLKFAIL
 28846  REF  27  LAST  391   40,3517   27'334 0                 ADS      IMODES33
 2885   REF   2  LAST  157   40,3520   4 4752 1                 CS       ILIMBIT
 28853  REF  39  LAST  209   40,3521   7 1333 1                 MASK     IMODES30
 28856  REF  40  LAST  391   40,3522   55'333 1                 TS       IMODES30
 2886                        40,3523   4 0000 0                 COM
 28863  REF   1              40,3524   7 4754 1                 MASK     IMUFLBIT
 28866  REF  41  LAST  391   40,3525   27'333 1                 ADS      IMODES30
 2887                        40,3526   4 0000 0                 COM
 28873  REF   1              40,3527   7 4755 0                 MASK     ICDUFLBT
 28876  REF  42  LAST  391   40,3530   27'333 1                 ADS      IMODES30
 2888                        40,3531   4 0000 0                 COM
 28883  REF   2  LAST  164   40,3532   7 4757 1                 MASK     PIPAFLBT
 28886  REF  43  LAST  391   40,3533   27'333 1                 ADS      IMODES30
 2889   REF  28  LAST  199   40,3534   4 1337 0                 CS       OPTMODES
 2890   REF   3  LAST  199   40,3535   7 4762 1                 MASK     CCDUFBIT
 2891   REF  29  LAST  391   40,3536   27'337 0                 ADS      OPTMODES
 2893                        40,3537   0 0003 1                 RELINT

 2894   REF   2  LAST  144   40,3540   0 5120 1                 TC       NOVAC30
 2895   REF  51  LAST  386     1202                             EBANK=   DSPCOUNT
 28955  REF   1              40,3541    03377 1                 2CADR    DSPMMJOB
 28955  REF   1              40,3542    60102 1
 2896   REF   4  LAST  378   40,3543   0 4235 1                 TC       KILMONON          TURN ON KILL MONITOR BIT.
 2897   REF   5  LAST  379   40,3544   0 4417 1                 TC       FLASHOFF          TURN OFF V/N FLASH.
 2898   REF   1              40,3545   1 3335 0                 TCF      TSTLTS4
 2899                        40,3546    05675 0   FULLDSP       OCT      05675             DISPLAY ALL 8:S
 2900                        40,3547    07675 1   FULLDSP1      OCT      07675             DISPLAY ALL 8:S AND +
 29005                       40,3550    00175 1   TSTCON1       OCT      00175
A2901                                                                                      UPLINK ACTIVITY, TEMP, KEY RLSE,
A29015                                                                                     V/N FLASH, OPERATOR ERROR.
 2902                        40,3551    40650 0   TSTCON2       OCT      40650             DSPTAB+11D  BITS 4,6,8,9.
A29025                                                                                     NO ATT, GIMBAL LOCK, TRACKER, PROG ALM.
 2903                        40,3552    00115 1   TSTCON3       OCT      00115             CHAN 11  BITS 1, 3, 4, 7.
A29035                                                                                     UPLINK ACTIVITY, TEMP, OPERATOR ERROR.
```

```
R2905    ERROR LIGHT RESET (RSET) TURNS OFF,
R2906    UPLINK ACTIVITY, AUTC, HOLD, FREE, OPERATOR ERROR,
R2907    PROG ALM, TRACKER FAIL.
R2908    LEAVES GIMBAL LOCK AND NO ATT ALONE.
R2909    IT ALSO ZEROES THE :TEST ALARM: OUT BIT, WHICH TURNS OFF STBY,RESTART.
R2910    IT ALSO SETS :CAUTION RESET: TO 1.
R2911    IT ALSO FORCES BIT 12 OF ALL DSPTAB ENTRIES TO 1.

 2912    REF  10  LAST  390   40,2000                               SETLOC PINBALL1
 29121                        40,3553                               BANK
 29125   REF  10 LAST  390 TO  392:     81    875*                  COUNT* $$/PIN
 2913    REF   3  LAST  376   40,3553  56 115 1  ERROR              XCH    21/22REG         RESTORE ORIGINAL C(DSPLOCK). THUS ERROR
 2914    REF   8  LAST  388   40,3554  55'215 1                     TS     DSPLOCK          LIGHT RESET LEAVES DSPLOCK UNCHANGED.
 2915                         40,3555  0 0004 0                     INHINT
 2916    REF  19  LAST  390   40,3556  3 4757 0                     CAF    BIT10            TURN ON :CAUTION RESET: OUTBIT
 2917                         40,3557  0 0006 1                     EXTEND
 2918    REF  15  LAST  390   40,3560  05 011 1                     WOR    DSALMOUT         BIT10 CHAN 11
 2919    REF   1              40,3561  3 5004 0                     CAF    GL+NOATT         LEAVE GIMBAL LOCK AND NO ATT INTACT,
 2920    REF  35  LAST  391   40,3562  7 1241 0                     MASK   DSPTAB +11D      TURNING OFF AUTO, HOLD, FREE,
 2921    REF  31  LAST  391   40,3563  6 4752 0                     AD     BIT15            PROG ALARM, AND TRACKER.
 2922    REF  36  LAST  392   40,3564  55'241 0                     TS     DSPTAB +11D
 2923    REF  28  LAST  391   40,3565  4 1334 0                     CS     IMODES33         RESET FAIL BITS WHICH GENERATE PROG
 2924    REF   6  LAST  268   40,3566  7 5055 0                     MASK   PRIO16           ALARM SO THAT IF THE FAILURE STILL
 2925    REF  29  LAST  392   40,3567  27'334 0                     ADS    IMODES33         EXISTS, THE ALARM WILL COME BACK ON
 2926    REF  44  LAST  391   40,3570  4 1333 1                     CS     IMODES30
 2927    REF   3  LAST  391   40,3571  7 4757 1                     MASK   PIPAFLBT
 2928    REF  45  LAST  392   40,3572  27'333 1                     ADS    IMODES30

 2931    REF  30  LAST  391   40,3573  4 1337 0                     CS     OPTMODES
 2932    REF   4  LAST  391   40,3574  7 4762 1                     MASK   OCDUFBIT
 2933    REF  31  LAST  392   40,3575  27'337 0                     ADS    OPTMODES
 29335   REF   1              40,3576  0 4542 0                     TC     C13STALL
 2935    REF  20  LAST  392   40,3577  4 4757 1                     CS     BIT10            TURN OFF :TEST ALARM: OUTBIT.
 2936                         40,3600  0 0006 1                     EXTEND
 2937    REF   5  LAST  390   40,3601  03 013 0                     WAND   CHAN13
 2938    REF   1              40,3602  4 3216 0                     CS     ERCON            TURN OFF UPLINK ACTIVITY,
 2939                         40,3603  0 0006 1                     EXTEND                  OPERATOR ERROR.
 2940    REF  16  LAST  392   40,3604  03 011 1                     WAND   DSALMOUT
 2941    REF   3  LAST  368   40,3605  3 4355 0  TSTAB              CAF    BINCON           (DEC 10)
 2942    REF   4  LAST  390   40,3606  54 117 1    +1               TS     ERCNT            ERCNT = COUNT
 2943                         40,3607  0 0004 0                     INHINT
 2944    REF   5  LAST  392   40,3610  50 117 0                     INDEX  ERCNT
 2945    REF  37  LAST  392   40,3611  11'226 1                     CCS    DSPTAB
 2946    REF  44  LAST  382   40,3612  6 4770 0                     AD     ONE
 2947    REF   1              40,3613  0 3620 0                     TC     ERPLUS
 2948    REF  45  LAST  392   40,3614  6 4770 0                     AD     ONE
 2949    REF 127  LAST  386   40,3615  4 0000 0  ERMINUS            CS     A
 2950    REF   1              40,3616  7 7674 1                     MASK   NOTBIT12
 2951    REF   1              40,3617  0 3623 0                     TC     ERCOM
 2952    REF 128  LAST  392   40,3620  4 0000 0  ERPLUS             CS     A
```

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  2953    REF   2  LAST  392   40,3621  7 7674 1               MASK     NOTBIT12
  2954    REF 129  LAST  392   40,3622  4 0000 0               CS       A                       MIGHT WANT TO RESET CLPASS, DECBRNCH,
  2955    REF   6  LAST  392   40,3623  50 117 0  ERCOM        INDEX    ERCNT                   ETC.
  2956    REF  38  LAST  392   40,3624  55'226 1               TS       DSPTAB
  2957                         40,3625  0 0003 1               RELINT
  2958    REF   7  LAST  393   40,3626  10 117 1               CCS      ERCNT
  2959    REF   1                40,3627  0 3606 1               TC       TSTAB    +1
  2961    REF   7  LAST  283   40,3630  54 375 1               TS       FAILREG
  29611   REF   8  LAST  393   40,3631  54 376 1               TS       FAILREG +1
  2962    REF   2  LAST   87   40,3632  55'357 0               TS       SFAIL
  2963    REF  42  LAST  383   40,3633  0 5205 0               TC       ENDOFJOB

  2964                         40,3634   55000 1  OCT55000 OCT      55000
  29645                        40,3635   16001 1  13-11,1  OCT      16001
  29665   REF   5  LAST  336      5004            GL+NOATT EQUALS OCT50                 NO ATT AND GIMBAL LOCK LAMPS
  2967    REF   1                 7674            NOTBIT12 EQUALS -1/8
  2968                         40,3636            ENDPINS1 EQUALS


  3000    REF   5  LAST  383   30,2000                         SBANK=  LOWSUPER
```

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L         R60,R62                                                                                        USER'S PAGE NO.  1      E2 S?

 1501    REF    1                27,2000                           SETLOC  MANUVER
 1502                            27,2074                           BANK

 1503    REF    1                   1004                           EBANK=  TEMPR60

 1504    REF    1                                                  COUNT*  $$/R60
R15041

R150411 R60CSM
R150413 REV 13   CONFORMS TO GSOP CHAPTER FOUR REVISION LOGIC  09  JAN 18,1968
R150415


 1505    REF    2  LAST  241     27,2074  0 4665 0   R60CSM     TC       MAKECADR
 1506    REF    2  LAST  394     27,2075  55'004 0              TS       TEMPR60

 1510    REF   12  LAST  303     27,2076  0 6006 1   REDOMANN   TC       INTPRET
 1511                            27,2077   45014 0              BON      CALL                  IS 3-AXIS FLAG SET
 1512    REF    1                27,2100   02711 1                       3AXISFLG
 1513    REF    1                27,2101   56104 1                       TOBALL1               YES
 1514    REF    1                27,2102   56225 1                       VECPOINT              NO CALL VECPOINT
 1515    REF    1                27,2103   01310 1              STORE    CPHI
 1518                            27,2104   77776 1   TOBALL1    EXIT

 1519    REF    1                27,2105  3 5031 0   TOBALL     CAF      V06N18
 1520    REF   58  LAST  390     27,2106  0 4636 0              TC       BANKCALL
 1521    REF    1                27,2107   21154 1              CADR     GOPERF2R              DISPLAY PLEASE PERFORM AUTO MANEUVER
 1522    REF    1                27,2110  0 2215 0              TC       R61TEST
 1523    REF    1                27,2111  0 2115 0              TC       REDOMANC -1
 1524    REF    1                27,2112  1 2150 0              TCF      ENDMANU1              ENTER I.E. FINISHED WITH R60

 1525    REF    1                27,2113  0 2152 0              TC       CHKLINUS              TO CHECK FCR PRIORITY DISPLAYS
 1526    REF   43  LAST  393     27,2114  0 5205 0              TC       ENDOFJOB

 1527    REF   13  LAST  394     27,2115  0 6006 1      -1      TC       INTPRET
 1529                            27,2116   45014 0   REDOMANC   BON      CALL                  IS 3-AXIS FLAG SET
 1530    REF    2  LAST  394     27,2117   02711 1                       3AXISFLG
 1531                            27,2120   56123 1                       +3                    YES
 1532    REF    2  LAST  394     27,2121   56225 1                       VECPOINT              NO CALL VECPOINT
 1533    REF    2  LAST  394     27,2122   01310 1              STORE    CPHI                  STORE ANGLES
 1534                            27,2123   77776 1              EXIT

 1535    REF    1                27,2124  3 7673 1   TOBALLC    CAF      FURST3                BITS 15,14,13 OF CHAN31 = 011
 1536    REF    1                27,2125  0 5654 0              TC       C31BTCHK              FOR AUTO AND G&N CONTROL
 1537                            27,2126  1 2127 0              TCF      +1
 1538    REF    1                27,2127  6 7671 0              AD       NEG30000
 1539                            27,2130  0 0006 1              EXTEND
 1540                            27,2131  1 2133 0              BZF      +2                    AUTO, NON-FLASH N18
 1541    REF    1                27,2132  1 2105 0              TCF      TOBALL                NOT AUTO
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L        R60,R62                                                                           USER'S PAGE NO.   2       E2 S3

  1542    REF   2  LAST  394    27,2133  3 5031 0             CAF      V06N18        SET UP NON-FLASHING V06 N18
  1543    REF  59  LAST  394    27,2134  0 4636 0             TC       BANKCALL
  1544    REF   1               27,2135   20710 0             CADR     GODSPR
  1545    REF   2  LAST  394    27,2136  0 2152 0             TC       CHKLINUS

  1546    REF  30  LAST  381    27,2137  0 4655 0  STARTMNV TC       POSTJUMP
  1547    REF   1               27,2140   44000 1             CADR     KALCMAN3

  1548    REF  14  LAST  394    27,2141  0 6006 1  ENDMANUV TC       INTPRET
  1549                          27,2142   43014 0             BOFF     BOFF
  1550    REF   7  LAST  270    27,2143   05350 1                      AUTOSEQ
  1551    REF   2  LAST  394    27,2144   56104 1                      TOBALL1
  1552    REF   4  LAST  270    27,2145   00752 1                      TRACKFLG
  1553    REF   3  LAST  395    27,2146   56104 1                      TOBALL1
  1554                          27,2147   77776 1             EXIT

  1555    REF   3  LAST  394    27,2150  3 1004 1  ENDMANU1 CA       TEMPR60
  1556    REF   5  LAST  359    27,2151  0 4660 0             TC       BANKJUMP                                         -

  1559    REF   3  LAST  250    27,2152  4 0100 1  CHKLINUS CS       FLAGWRD4
  1560    REF   1               27,2153  7 4755 0             MASK     PDSPFBIT      IS PRIORITY DISPLAY FLAG SET
  1561    REF 130  LAST  393    27,2154  10 000 0             CCS      A                                                -
  1562    REF 114  LAST  388    27,2155  0 0002 0             TC       Q             NO - EXIT
  1563    REF 115  LAST  395    27,2156  3 0002 0             CA       Q
  1564    REF 208  LAST  386    27,2157  54 156 1             TS       MPAC +2       SAVE RETURN
  1565    REF  16  LAST  369    27,2160  4 6214 1             CS       THREE         OBTAIN LOCATION FOR RESTART.
  1566    REF   2  LAST   72    27,2161  6 0133 0             AD       BUF2          HOLDS Q OF LAST DISPALY
  1567    REF   2  LAST  238    27,2162  55'257 1             TS       TBASE1

  1568    REF   9  LAST  275    27,2163  0 5402 1             TC       PHASCHNG
  1569                          27,2164   00071 1             OCT      71            1.7SPOT FOR RELINUS

  15695   REF   1               01,2022            1P7SPT1  =        1.7SPOT
  1570    REF  21  LAST  385    27,2165  3 4762 0             CAF      BIT7
  1571    REF   1               27,2166  0 5516 0             TC       LINUS         GO SET BITS FOR PRIORITY DISPLAY      -
  1572    REF 209  LAST  395    27,2167  0 0156 0             TC       MPAC +2

  1573    REF   6  LAST  268    27,2170  3 4764 0  RELINUS  CAF      TRACKBIT      IS TRACK FLAG ON
  1574    REF  20  LAST  268    27,2171  7 0075 1             MASK     FLAGWRD1
  1575                          27,2172  0 0006 1             EXTEND
  1576    REF   1               27,2173  1 2213 1             BZF      GOREDO20      NO

  1577    REF  25  LAST  279    27,2174  0 5547 1             TC       UPFLAG
  1578    REF   1               27,2175   00077 1             ADRES    PDSPFLAG      R60 PRIODSP FLAG

  1579    REF  13  LAST  215    27,2176  3 0104 1             CA       FLAGWRD8
  1580    REF   7  LAST  215    27,2177  7 4760 0             MASK     UTBIT
  1581    REF 131  LAST  395    27,2200  10 000 0             CCS      A
  1582    REF   1               27,2201  0 2210 0             TC       RELINUSX      UTFLAG SET,DO NOT SET TARG1FLG,OPTIND
```

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L         R60,R62                                                                                  USER'S PAGE NO.  3      E2 S3

  1583    REF  26  LAST  395   27,2202  0 5547 1             TC      UPFLAG
  1584    REF   1              27,2203   00024 1             ADRES   TARG1FLG          FOR R52

  1585    REF  87  LAST  388   27,2204  3 4772 1             CAF     ZERO              RESET TO ZERO, SINCE
  1586    REF  19  LAST  255   27,2205  55'323 0             TS      OPTIND            OPTIND WAS SET TO -1 BY V379

  1587    REF  27  LAST  396   27,2206  0 5547 1             TC      UPFLAG
  1588    REF   3  LAST  270   27,2207   00037 0             ADRES   R21MARK           ALLOW OPTICS MARKING DURING P2

  1589    REF   1              27,2210  3 5053 1  RELINUSX   CAF     PRIO14            RESTORE ORIGINAL PRIORITY
  1590    REF   3  LAST  267   27,2211  0 5176 1             TC      PRIOCHNG

  1591    REF   3  LAST  395   27,2212  0 1257 0             TC      TBASE1

  1592    REF  31  LAST  395   27,2213  0 4655 0  GOREDO20   TC      POSTJUMP          RESTORE R03 DEADBAND, DO STOPRATE,
  1593    REF   1              27,2214   74416 1             CADR    FIXDB              SET UP 1.11 RESTART, EOJ.
  1595    REF   7  LAST  382   27,2215  3 1214 1  R61TEST    CA      MODREG            ARE WE IN P00.  IF YES THIS MUST BE
  1596                         27,2216  0 0006 1             EXTEND                        VERB49 OR VERB89 SO DO ENDEXT.
  1597    REF   2  LAST  394   27,2217  1 2150 0             BZF     ENDMANU1          RESET 3-AXIS & RUTURN.  USER DOES ENDEXT
  1598    REF   4  LAST  395   27,2220  3 0100 0             CA      FLAGWRD4          ARE WE IN R61 (P20)
  1599    REF   2  LAST  395   27,2221  7 4755 0             MASK    POSPFBIT
  1600                         27,2222  0 0006 1             EXTEND
  1601    REF   4  LAST  241   27,2223  1 4103 0             BZF     GOTOPOOH          NO
  1602    REF   1              27,2224  0 4546 1             TC      GOTOV56           YES
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L        R60,R62                                                               USER'S PAGE NO.   4      E2 S3

P1604    PROGRAM DESCRIPTION - VECPOINT

R1605              THIS INTERPRETIVE SUBROUTINE MAY BE USED TO POINT A SPACECRAFT AXIS IN A DESIRED DIRECTION.  THE AXIS
R1607    TO BE POINTED MUST APPEAR AS A HALF UNIT DOUBLE PRECISION VECTOR IN SUCCESSIVE LOCATIONS OF ERASABLE MEMORY
R1609    BEGINNING WITH THE LOCATION CALLED SCAXIS.  THE COMPONENTS OF THIS VECTOR ARE GIVEN IN SPACECRAFT COORDINATES.
R1611    THE DIRECTION IN WHICH THIS AXIS IS TO BE POINTED MUST APPEAR AS A HALF UNIT DOUBLE PRECISION VECTOR IN
R1613    SUCCESSIVE LOCATIONS OF ERASABLE MEMORY BEGINNING WITH THE ADDRESS CALLED POINTVSM.  THE COMPONENTS OF THIS
R1615    VECTOR ARE GIVEN IN STABLE MEMBER COORDINATES.  WITH THIS INFORMATION VECPOINT COMPUTES A SET OF THREE GIMBAL
R1617    ANGLES (2S COMPLEMENT) CORRESPONDING TO THE CROSS-PRODUCT ROTATION BETWEEN SCAXIS AND POINTVSM AND STORES THEM
R1619    IN T(MPAC) BEFORE RETURNING TO THE CALLER.
R1620              THIS ROTATION, HOWEVER, MAY BRING THE S/C INTO GIMBAL LOCK.  WHEN POINTING A VECTOR IN THE Y-Z PLANE,
R1622    THE TRANSPONDER AXIS, OR THE AOT FOR THE LEM, THE PROGRAM WILL CORRECT THIS PROBLEM BY ROTATING THE CROSS-
R1624    PRODUCT ATTITUDE ABOUT POINTVSM BY A FIXED AMOUNT SUFFICIENT TO ROTATE THE DESIRED S/C ATTITUDE OUT OF GIMBAL
R1626    LOCK.  IF THE AXIS TO BE POINTED IS MORE THAN 40.6 DEGREES BUT LESS THAN 60.5 DEG FROM THE +X (OR-X) AXIS,
R1628    THE ADDITIONAL ROTATION TO AVOID GIMAL LOCK IS 35 DEGREES.  IF THE AXIS IS MORE THAN 60.5 DEGEES FROM +X (OR -X)
R1630    THE ADDITIONAL ROTATION IS 35 DEGREES.  THE GIMBAL ANGLES CORRESPONDING TO THIS ATTITUDE ARE THEN COMPUTED AND
R1632    STORED AS 2S COMPLIMENT ANGLES IN T(MPAC) BEFORE RETURNING TO THE CALLER.
R1634              WHEN POINTING THE X-AXIS, OR THE THRUST VECTOR, OR ANY VECTOR WITHIN 40.6 DEG OF THE X-AXIS, VECPOINT
R1636    CANNOT CORRECT FOR A CROSS-PRODUCT ROTATION INTO GIMBAL LOCK.  IN THIS CASE A PLATFORM REALIGNMENT WOULD BE
R1638    REQUIRED TO POINT THE VECTOR IN THE DESIRED DIRECTION.  AT PRESENT NO INDICATION IS GIVEN FOR THIS SITUATION
R1640    EXCEPT THAT THE FINAL MIDDLE GIMBAL ANGLE IN MPAC +2 IS GREATER THAN 59 DEGREES.

R1642              CALLING SEQUENCE -
R1643                   1) LOAD SCAXIS, POINTVSM
R1644                   2) CALL
R1645                             VECPOINT

R1646              RETURNS WITH

R1647                   1) DESIRED OUTER  GIMBAL ANGLE IN MPAC
R1648                   2) DESIRED INNER  GIMBAL ANGLE IN MPAC +1
R1649                   3) DESIRED MIDDLE GIMBAL ANGLE IN MPAC +2

R1650              ERASABLES USED -

R1651                   1) SCAXIS          6
R1652                   2) POINTVSM        6
R1653                   3) MIS            18
R1654                   4) DEL            18
R1655                   5) COF             6
R1656                   6) VECQTEMP        1
R1657                   7) ALL OF VAC AREA 43

R1658                             TOTAL    99

 1659    REF   1              27,2000                        SETLOC VECPT
 1660                         27,2225                        BANK
 1661  REF  4 LAST 118  E6,1661                         EBANK=  ECDU

 1662  REF  1                                           COUNT*  $$/VECPT
 1663                   27,2225  40020 1  VECPOINT  STQ     BOV           SAVE RETURN ADDRESS
 1664  REF  1           27,2226  03310 0                    VECQTEMP
 1665  REF  1           27,2227  56230 0                    VECLEAR       AND CLEAR OVFIND
 1666                   27,2230  47164 1  VECLEAR   AXC,2   RT8
 1667  REF  2 LAST 118  27,2231  03320 0                    MIS           READ THE PRESENT CDU ANGLES AND
 1668  REF  1           27,2232  44370 0                    READCDUK      STORE THEM IN PD25, 26, 27
 1669                   27,2233  34032 1            STCALL  25D
 1670  REF  1           27,2234  44377 1                    CDUTODCM      S/C AXES TO STABLE MEMBER AXES (MIS)
 1671                   27,2235  61375 1            VLOAD   VXM
 1672  REF  3 LAST 118  27,2236  03357 0                    POINTVSM      RESOLVE THE POINTING DIRECTION VF INTO
 1673  REF  3 LAST 398  27,2237  03321 1                    MIS           INITIAL S/C AXES ( VF = POINTVSM)
 1674                   27,2240  77656 1            UNIT
 1675                   27,2241  00035 1            STORE   28D
A1676                                                                     PD 28 29 30 31 32 33
 1677                   27,2242  53435 0            VXV     UNIT          TAKE THE CROSS PRODUCT VF X VI
 1678  REF  3 LAST 118  27,2243  03351 0                    SCAXIS        WHERE VI = SCAXIS
 1679                   27,2244  57400 1            BOV     VCOMP
 1680  REF  1           27,2245  56355 1                    PICKAXIS
 1681  REF  2 LAST 118  27,2246  17343 0            STODL   COF           CHECK MAGNITUDE
 1682                   27,2247  00045 0                    36D           OF CROSS PRODUCT
 1683                   27,2250  50025 0            DSU     BMN           VECTOR, IF LESS
 1684  REF  1           27,2251  16426 0                    DPB-14        THAN B-14 ASSUME
 1685  REF  2 LAST 398  27,2252  56355 1                    PICKAXIS      UNIT OPERATION
 1686                   27,2253  50375 0            VLOAD   DOT                   INVALID.
 1687  REF  4 LAST 398  27,2254  03351 0                    SCAXIS
 1688                   27,2255  00035 1                    28D
 1689                   27,2256  65552 0            SL1     ARCCOS
 1690                   27,2257  77624 1  COMPMATX  CALL                  NOW COMPUTE THE TRANSFORMATION FROM
 1691  REF  1           27,2260  44522 1                    DELCOMP       FINAL S/C AXES TO INITIAL S/C AXES  MFI
 1692                   27,2261  75160 1            AXC,1   AXC,2
 1693  REF  4 LAST 398  27,2262  03320 0                    MIS           COMPUTE THE TRANSFORMATION FROM FINAL
 1694  REF  1           27,2263  03425 1                    DEL           S/C AXES TO STABLE MEMBER AXES
 1695                   27,2264  77624 1            CALL                  MFS = MIS MFI
 1696  REF  1           27,2265  44304 0                    MXM3          (IN PD LIST)

 1697                   27,2266  51545 1            DLOAD   ABS
 1698                   27,2267  00007 0                    6             MFS6 = SIN(CPSI)                       $2
 1699                   27,2270  50025 0            DSU     BMN
 1700  REF  1           27,2271  16413 0                    SINGIMLC      = SIN(59 DEGS)                         $2
 1701  REF  1           27,2272  56345 0                    FINDGIMB      /CPSI/ LESS THAN 59 DEGS
A1702                                                                     I.E. DESIRED ATTITUDE NOT IN GIMBAL LOCK

 1703                   27,2273  51545 1            DLOAD   ABS           CHECK TO SEE IF WE ARE POINTING
 1704  REF  5 LAST 398  27,2274  03351 0                    SCAXIS        THE THRUST AXIS
 1705                   27,2275  51025 1            DSU     BPL
 1706  REF  1           27,2276  16415 0                    SINVEC1       SIN 49.4 DEGS                          $2
 1707  REF  2 LAST 398  27,2277  56345 0                    FINDGIMB      IF SO, WE ARE TRYING TO POINT IT INTO
```

```
  1708                            27,2300   77775 1             VLOAD            GIMBAL LOCK, ABORT COULD GO HERE
  1709                            27,2301   77626 0             STADR
  1710   REF    5  LAST   398     27,2302   50442 0             STOVL   MIS +12D
  1711                            27,2303   77626 0             STADR            STORE MFS (IN PD LIST) IN MIS
  1712   REF    6  LAST   399     27,2304   50450 0             STOVL   MIS +6
  1713                            27,2305   77626 0             STADR
  1714   REF    7  LAST   399     27,2306   50456 0             STOVL   MIS
  1715   REF    8  LAST   399     27,2307   03327 1                     MIS +6   INNER GIMBAL AXIS IN FINAL S/C AXES
  1716                            27,2310   57444 1             BPL     VCOMP    LOCATE THE IG AXIS DIRECTION CLOSEST TO
  1717   REF    1                 27,2311   56312 1                     IGSAMEX  FINAL X S/C AXIS

  1718                            27,2312   50035 1  IGSAMEX    VXV     BMN      FIND THE SHORTEST WAY OF ROTATING THE
  1719   REF    6  LAST   398     27,2313   03351 0                     SCAXIS   S/C OUT OF GIMBAL LOCK BY A ROTATION
  1720   REF    1                 27,2314   56321 1                     U=SCAXIS ABOUT +- SCAXIS, I.E. IF (IG (SGN MFS3)
 A1721                                                                           X SCAXIS . XF) LESS THAN 0, U = SCAXIS
 A1722                                                                           OTHERWISE U = -SCAXIS

  1723                            27,2315   57575 1             VLOAD   VCOMP
  1724   REF    7  LAST   399     27,2316   03351 0                     SCAXIS
  1725   REF    3  LAST   398     27,2317   37343 1             STCALL  COF      ROTATE ABOUT -SCAXIS
  1726   REF    1                 27,2320   56324 1                     CHEKAXIS
  1727                            27,2321   77775 1  U=SCAXIS   VLOAD
  1728   REF    8  LAST   399     27,2322   03351 0                     SCAXIS
  1729   REF    4  LAST   399     27,2323   03343 0             STORE   COF      ROTATE ABOUT + SCAXIS
  1730                            27,2324   51545 1  CHEKAXIS   DLOAD   ABS
  1731   REF    9  LAST   399     27,2325   03351 0                     SCAXIS   SEE IF WE ARE POINTING THE AOT
  1732                            27,2326   51025 1             DSU     BPL
  1733   REF    1                 27,2327   16417 1                     SINVEC2  SIN 29.5 DEGS                      $2
  1734   REF    1                 27,2330   56334 0                     PICKANG1 IF SO, ROTATE 50 DEGS ABOUT +- SCAXIS
  1735                            27,2331   52145 0             DLOAD   GOTO     IF NOT, MUST BE POINTING THE TRANSPONDER
  1736   REF    1                 27,2332   16423 0                     VECANG2  OR SOME VECTOR IN THE Y, OR Z PLANE
  1737   REF    1                 27,2333   56336 1                     COMPMFSN IN THIS CASE ROTATE 35 DEGS TO GET OUT
 A1738                                                                           OF GIMBAL LOCK (VECANG2  $360)
  1739                            27,2334   77745 1  PICKANG1   DLOAD
  1740   REF    1                 27,2335   16421 1                     VECANG1  = 50 DEGS                        $ 360
  1741                            27,2336   77624 1  COMPMFSN   CALL
  1742   REF    2  LAST   398     27,2337   44522 1                     DELCOMP  COMPUTE THE ROTATION ABOUT SCAXIS TO
  1743                            27,2340   75160 1             AXC,1   AXC,2    BRING MFS OUT OF GIMBAL LOCK
  1744   REF    9  LAST   399     27,2341   03320 0                     MIS
  1745   REF    2  LAST   398     27,2342   03425 1                     DEL
  1746                            27,2343   77624 1             CALL             COMPUTE THE NEW TRANSFORMATION FROM
  1747   REF    2  LAST   398     27,2344   44304 0                     MXM3     DESIRED S/C AXES TO STABLE MEMBER AXES
 A1748                                                                           WHICH WILL ALIGN VI WITH VF AND AVOID
 A1749                                                                           GIMBAL LOCK
  1750                            27,2345   45160 1  FINDGIMB   AXC,1   CALL
  1751                            27,2346   00000 1                     0        EXTRACT THE COMMANDED CDU ANGLES FROM
  1752   REF    1                 27,2347   44647 1                     DCMTOCDU THIS MATRIX
  1753                            27,2350   77634 0             RTB
  1754   REF    1                 27,2351   45644 0                     V1STO2S  CONVERT TO 2:S COMPLEMENT
  1755                            27,2352   52001 1  VECPTRET   SETPD   GOTO
 1756                          27,2353   00001 0                     0
 1757   REF   2  LAST  398     27,2354   03310 0                     VECQTEMP          RETURN TO CALLER

 1758                          27,2355   50375 0  PICKAXIS VLOAD     DOT               IF VF X VI = 0,  FIND VF . VI
 1759                          27,2356   00035 1                     28D
 1760   REF  10  LAST  399     27,2357   03351 0                     SCAXIS
 1761                          27,2360   72240 1           BMN       TLOAD
 1762   REF   1                27,2361   56365 1                     ROT180
 1763                          27,2362   00032 0                     25D
 1764                          27,2363   77650 1           GOTO                        IF VF = VI, CDU DESIRED = PRESENT CDU
 1765   REF   1                27,2364   56352 0                     VECPIRET          PRESENT CDU ANGLES
 1766                          27,2365   47375 0  ROT180   VLOAD     VXV               IF VF, VI ANTIPARALLEL, 180 DEG ROTATION
 1767   REF  10  LAST  399     27,2366   03327 1                     MIS +6            IS REQUIRED. Y STABLE MEMBER AXIS IN
 1768   REF   2  LAST  298     27,2367   15334 1                     HIUNITX           INITIAL S/C AXIS.
 1769                          27,2370   47256 0           UNIT      VXV               FIND Y(SM) X X(I)
 1770   REF  11  LAST  400     27,2371   03351 0                     SCAXIS            FIND UNIT(VI X UNIT(Y(SM) X X(I)))
 1771                          27,2372   40056 0           UNIT      BOV               I.E. PICK A VECTOR IN THE PLANE OF X(I),
 1772   REF   1                27,2373   56407 1                     PICKX             Y(SM) PERPENDICULAR TO VI
 1773   REF   5  LAST  399     27,2374   17343 0           STODL     COF
 1774                          27,2375   00045 0                     36D               CHECK MAGNITUDE
 1775                          27,2376   50025 0           DSU       BMN               OF THIS VECTOR.
 1776   REF   2  LAST  398     27,2377   16426 0                     DPB-14            IF LESS THAN B-14,
 1777   REF   2  LAST  400     27,2400   56407 1                     PICKX             PICK X-AXIS.
 1778                          27,2401   77775 1           VLOAD
 1779   REF   6  LAST  400     27,2402   03343 0                     COF
 1780   REF   7  LAST  400     27,2403   17343 0  XROT     STODL     COF
 1781   REF   2  LAST  305     27,2404   15334 1                     HIDPHALF
 1782                          27,2405   77650 1           GOTO
 1783   REF   1                27,2406   56257 1                     COMPMATX
 1784                          27,2407   52175 0  PICKX    VLOAD     GOTO              PICK THE XAXIS IN THIS CASE
 1785   REF   3  LAST  400     27,2410   15334 1                     HIUNITX
 1786   REF   1                27,2411   56403 0                     XROT
 1788   REF   1                27,2000                     SETLOC    MANUVER1
 1789                          27,2412                     BANK

 17895  REF   2 LAST  398 TO  400:   117   117*            COUNT*    $$/VECPT
 1790                          27,2412   15555 0  SINGIMLC 2DEC      .4285836003       =SIN(59)                 $2
 1790                          27,2413   35172 0
 1791                          27,2414   14113 1  SINVEC1  2DEC      .3796356537       =SIN(49.4)               $2
 1791                          27,2415   36326 0
 1792                          27,2416   07701 0  SINVEC2  2DEC      .2462117800       =SIN(29.5)               $2
 1792                          27,2417   35703 0
 1793                          27,2420   04343 1  VECANG1  2DEC      .1388888889       = 50 DEGREES                    $360
 1793                          27,2421   21616 0
 1794                          27,2422   03070 0  VECANG2  2DEC      .09722222222      = 35 DEGREES                    $360
 1794                          27,2423   34344 0
 1795                          27,2424   00000 1  1BITDP   OCT       0                 KEEP THIS BEFORE DPB(-14)    *********
 1796                          27,2425   00001 0  DPB-14   OCT       00001
 1797                          27,2426   00000 1           OCT       00000
 1799   REF   2  LAST  394     27,2000                     SETLOC    MANUVER
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L        R60,R62                                                                      USER'S PAGE NO.  8      E6 S3
 1800                        27,2427                    BANK
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P1801   ROUTINE FOR INITIATING AUTOMATIC MANEUVER VIA KEYBOARD (V49)

  1802  REF   3  LAST  394        1307                          EBANK=  CPHI

  1803  REF   1                                                 COUNT*  $$/R62
  1804  REF   1                27,2427  3 5025 0  R62DISP  CAF     V06N22        DISPLAY COMMAND ICDUS CPHI, CTHETA, CPHI
  1805  REF  60  LAST  395     27,2430  0 4636 0           TC      BANKCALL
  1806  REF   1                27,2431   20743 0           CADR    GOFLASH
  1807  REF  18  LAST  279     27,2432  1 5524 0           TCF     ENDEXT
  1808  REF   1                27,2433  1 2435 0           TCF     GOMOVE        PROCEED
  1809  REF   2  LAST  264     27,2434  1 2427 0           TCF     R62DISP       ENTER


A 1810                                                                           ASTRONAUT MAY LOAD NEW ICDUS AT THIS
A 1811                                                                           POINT
  1812  REF  28  LAST  396     27,2435  0 5547 1  GOMOVE   TC      UPFLAG        SET 3-AXIS FLAG
  1813  REF   3  LAST  394     27,2436   00124 0           ADRES   3AXISFLG      BIT 6  FLAG 5
  1814  REF  61  LAST  402     27,2437  0 4636 0           TC      BANKCALL
  1815  REF   1                27,2440   56074 1           CADR    R60CSM

  1816  REF  19  LAST  402     27,2441  1 5524 0           TCF     ENDEXT
```

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1        ANGLFIND                                                                          USER'S PAGE NO.   1       E0 53

 050001 REF   1               22,2000                              SETLOC KALCMON1
 050002                       22,2000                              BANK

 0501    REF   5  LAST  398   E6,1661                              EBANK=  BCDU

 05015   REF   1                                                   COUNT*  $$/KALC
 0502    REF  15  LAST  395   22,2000   0 6006 1  KALCMAN3 TC      INTPRET
 0503                         22,2001    77634 0     +1    RTB
 0504    REF   2  LAST  398   22,2002    44370 0                   READCDUK         PICK UP CURRENT CDU ANGLES
 0505    REF   6  LAST  403   22,2003    03262 1           STORE   BCDU             STORE THE INITIAL S/C ANGLES
 0516                         22,2004    72364 0           AXC,2   TLOAD            COMPUTE THE TRANSFORMATION FROM
 0517    REF  11  LAST  400   22,2005    03320 0                   MIS              INITIAL S/C AXES TO STABLE MEMBER AXES
 0518    REF   7  LAST  403   22,2006    03262 1                   BCDU             (MIS)
 0519                         22,2007    77624 1           CALL
 0520    REF   2  LAST  398   22,2010    44377 1                   CDUTODCM
 0521                         22,2011    72364 0           AXC,2   TLOAD            COMPUTE THE TRANSFORMATION FROM
 0522    REF   4  LAST  125   22,2012    03425 1                   MFS              FINAL S/C AXES TO STABLE MEMBER AXES
 0523    REF   4  LAST  402   22,2013    01310 1                   CPHI             (MFS)
 0524                         22,2014    77624 1           CALL
 0525    REF   3  LAST  403   22,2015    44377 1                   CDUTODCM
 0526                         22,2016    45160 1  SECAD    AXC,1   CALL             MIS AND MFS ARRAYS CALCULATED        $2
 0527    REF  12  LAST  403   22,2017    03320 0                   MIS
 0528    REF   1              22,2020    44334 0                   TRANSPOS
 0529                         22,2021    77775 1           VLOAD
 0530                         22,2022    77626 0           STADR
 0531    REF   8  LAST  118   22,2023    50474 0           STOVL   TMIS +12D
 0532                         22,2024    77626 0           STADR
 0533    REF   9  LAST  403   22,2025    50502 0           STOVL   TMIS +6
 0534                         22,2026    77626 0           STADR
 0535    REF  10  LAST  403   22,2027    74510 0           STORE   TMIS             TMIS = TRANSPOSE(MIS) SCALED BY 2
 0536                         22,2030    75160 1           AXC,1   AXC,2
 0537    REF  11  LAST  403   22,2031    03266 0                   TMIS
 0538    REF   5  LAST  403   22,2032    03425 1                   MFS
 0539                         22,2033    77624 1           CALL
 0540    REF   3  LAST  399   22,2034    44304 0                   MXM3
 0541                         22,2035    45575 1           VLOAD   STADR
 0542    REF   1              22,2036    50335 1           STOVL   MFI +12D
 0543                         22,2037    77626 0           STADR
 0544    REF   2  LAST  403   22,2040    50343 0           STOVL   MFI +6
 0545                         22,2041    77626 0           STADR
 0546    REF   3  LAST  403   22,2042    74351 0           STORE   MFI              MFI = TMIS MFS (SCALED BY 4)
 0547                         22,2043    45001 1           SETPD   CALL             TRANSPOSE MFI IN PD LIST
 0548                         22,2044    00023 0                   18D
 0549    REF   1              22,2045    44343 0                   TRNSPSPD
 0550                         22,2046    45575 1           VLOAD   STADR
 0551    REF   1              22,2047    50474 0           STOVL   TMFI +12D
 0552                         22,2050    77626 0           STADR
 0553    REF   2  LAST  403   22,2051    50502 0           STOVL   TMFI +6
 0554                         22,2052    77626 0           STADR
 0555    REF   3  LAST  403   22,2053    74510 0           STORE   TMFI             TMFI = TRANSPOSE (MFI)  SCALED BY 4
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L        ANGLFIND

R0556
R0557    CALCULATE COFSKEW AND MFISYM
R0558
 0559                        22,2054   45345 1            DLOAD   DSU
 0560    REF   4  LAST  403  22,2055   03271 0                    TMFI +2
 0561    REF   4  LAST  403  22,2056   03430 0                    MFI +2
 0562                        22,2057   45325 1            PDDL    DSU              CALCULATE COF SCALED BY 2/SIN(AM)
 0563    REF   5  LAST  404  22,2060   03432 1                    MFI +4
 0564    REF   5  LAST  404  22,2061   03273 1                    TMFI +4
 0565                        22,2062   45325 1            PDDL    DSU
 0566    REF   6  LAST  404  22,2063   03301 0                    TMFI +10D
 0567    REF   6  LAST  404  22,2064   03440 1                    MFI +10D
 0568                        22,2065   77666 1            VDEF
 0569    REF   4  LAST  118  22,2066   03311 1            STORE   COFSKEW          EQUALS MFISKEW
R0570
R0571    CALCULATE AM AND PROCEED ACCORDING TO ITS MAGNITUDE
R0572
 0573                        22,2067   43345 1            DLOAD   CAD
 0574    REF   7  LAST  404  22,2070   03426 1                    MFI
 0575    REF   8  LAST  404  22,2071   03446 1                    MFI +16D
 0576                        22,2072   43225 0            DSU     DAD
 0577    REF   2  LAST   34  22,2073   15326 1                    DP1/4TH
 0578    REF   9  LAST  404  22,2074   03436 0                    MFI +8D
 0579    REF   3  LAST  118  22,2075   03317 1            STORE   CAM              CAM = (MFI0+MFI4+MFI8-1)/2 HALF SCALE
 0580                        22,2076   77726 1            ARCCOS
 0581    REF   2  LAST  118  22,2077   03365 1            STORE   AM               AM=ARCCOS(CAM)  (AM SCALED BY 2)
 0582                        22,2100   51025 1            DSU     BPL
 0583    REF   1             22,2101   04367 1                    MINANG
 0584    REF   1             22,2102   44111 0                    CHECKMAX
 0585                        22,2103   77776 1            EXIT                     MANEUVER LESS THAN 0.25 DEG
 0586                        22,2104 0 0004 0             INHINT                   GO DIRECTLY INTO ATTITUDE HOLD
 0587    REF  46  LAST  392  22,2105 4 4770 1             CS      ONE              ABOUT COMMANDED ANGLES
 0588    REF   4  LAST  262  22,2106 55'340 0             TS      HOLDFLAG         NOGO WILL STOP ANY RATE AND SET UP FOR A
 0589    REF   1             22,2107 0 3163 0             TC      LOADCDUD         GOOD RETURN
 0590    REF   1             22,2110 1 2723 1             TCF     NOGO

 0597                        22,2111   45345 1  CHECKMAX  DLOAD   DSU
 0598    REF   3  LAST  404  22,2112   03365 1                    AM
 0599    REF   1             22,2113   04370 1                    MAXANG
 0600                        22,2114   77244 0            BPL     VLOAD
 0601    REF   1             22,2115   44123 1                    ALTCALC          UNIT
 0602    REF   5  LAST  404  22,2116   03311 1                    COFSKEW          COFSKEW
 0603                        22,2117   77656 1            UNIT
 0604    REF   8  LAST  400  22,2120   03343 0            STORE   COF              COF IS THE MANEUVER AXIS
 0605                        22,2121   77650 1            GOTO                     SEE IF MANEUVER GOES THRU GIMBAL LOCK
 0606    REF   1             22,2122   44745 1                    LOCSKIRT
 0607                        22,2123   53375 0  ALTCALC   VLOAD   VAD              IF AM GREATER THAN 170 DEGREES
 0608    REF  10  LAST  404  22,2124   03426 1                    MFI
 0609    REF   7  LAST  404  22,2125   03267 1                    TMFI
 0610                        22,2126   77762 1            VSR1
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L        ANGLFIND                                                                       USER'S PAGE NO.   3      E6 S3

 0611    REF   1                22,2127   27267 1            STOVL   MFISYM
 0612    REF  11  LAST  404     22,2130   03434 1                    MFI +6
 0613                           22,2131   74455 0            VAD     VSR1
 0614    REF   8  LAST  404     22,2132   03275 1                    TMFI +6
 0615    REF   2  LAST  405     22,2133   27275 1            STOVL   MFISYM +6
 0616    REF  12  LAST  405     22,2134   03442 0                    MFI +12D
 0617                           22,2135   74455 0            VAD     VSR1
 0618    REF   9  LAST  405     22,2136   03303 1                    TMFI +12D
 0619    REF   3  LAST  405     22,2137   03303 1            STORE   MFISYM +12D       MFISYM=(MFI+TMFI)/2  SCALED BY 4
R0620
R0621
R0622    CALCULATE COF
R0623
 0624                           22,2140   70545 1            DLOAD   SR1
 0625    REF   4  LAST  404     22,2141   03317 1                    CAM
 0626                           22,2142   45325 1            PDDL    DSU               PD0 CAM                          $4
 0627    REF   1                22,2143   15334 1                    DPHALF
 0628    REF   5  LAST  405     22,2144   03317 1                    CAM
 0629                           22,2145   65204 1            BOVB    PDDL              PD2 1 - CAM                      $2
 0630    REF   1                22,2146   45761 0                    SIGNMPAC
 0631    REF   4  LAST  405     22,2147   03307 0                    MFISYM +16D
 0632                           22,2150   56225 1            DSU     DDV
 0633                           22,2151   00001 0                    0
 0634                           22,2152   00003 1                    2
 0635                           22,2153   65366 1            SQRT    PDDL              COFZ = SQRT(MFISYM8-CAM)/1-CAM)
 0636    REF   5  LAST  405     22,2154   03277 0                    MFISYM +8D                                     $ ROOT 2
 0637                           22,2155   56225 1            DSU     DDV
 0638                           22,2156   00001 0                    0
 0639                           22,2157   00003 1                    2
 0640                           22,2160   65366 1            SQRT    PDDL              COFY = SQRT(MFISYM4-CAM)/(1-CAM)  $ROOT2
 0641    REF   6  LAST  405     22,2161   03267 1                    MFISYM
 0642                           22,2162   56225 1            DSU     DDV
 0643                           22,2163   00001 0                    0
 0644                           22,2164   00003 1                    2
 0645                           22,2165   55566 1            SQRT    VDEF              COFX = SQRT(MFISYM-CAM)/(1-CAM)  $ROOT 2
 0646                           22,2166   77656 1            UNIT
 0647    REF   9  LAST  404     22,2167   03343 0            STORE   COF
R0648
R0649    DETERMINE  LARGEST COF AND ADJUST ACCORDINGLY
R0650
 0651                           22,2170   45345 1  COFMAXGO  DLOAD   DSU
 0652    REF  10  LAST  405     22,2171   03343 0                    COF
 0653    REF  11  LAST  405     22,2172   03345 0                    COF +2
 0654                           22,2173   71240 1            BMN     DLOAD             COFY G COFX
 0655    REF   1                22,2174   44203 0                    COMP12
 0656    REF  12  LAST  405     22,2175   03343 0                    COF
 0657                           22,2176   50025 0            DSU     BMN
 0658    REF  13  LAST  405     22,2177   03347 1                    COF +4
 0659    REF   1                22,2200   44260 0                    METHOD3           COFZ G COFX OR COFY
 0660                           22,2201   77650 1            GOTO
 0661   REF   1             22,2202   44234 1                     METHOD1          COFX G COFY OR COFZ
 0662                       22,2203   45345 1  COMP12    DLOAD   DSU
 0663   REF  14  LAST  405  22,2204   03345 0                     COF +2
 0664   REF  15  LAST  406  22,2205   03347 1                     COF +4
 0665                       22,2206   77640 0            BMN
 0666   REF   2  LAST  405  22,2207   44260 0                     METHOD3          COFZ G COFY OR COFX

 0667                       22,2210   51145 0  METHOD2   DLOAD   BPL              COFY MAX
 0668   REF   6  LAST  404  22,2211   03313 0                     COFSKEW +2       UY
 0669   REF   1             22,2212   44216 1                     U2POS
 0670                       22,2213   57575 1            VLOAD   VCOMP
 0671   REF  16  LAST  406  22,2214   03343 0                     COF
 0672   REF  17  LAST  406  22,2215   03343 0            STORE   COF
 0673                       22,2216   51145 0  U2POS     DLOAD   BPL
 0674   REF   7  LAST  405  22,2217   03271 0                     MFISYM +2        UX UY
 0675   REF   1             22,2220   44224 0                     OKU21
 0676                       22,2221   57545 1            DLOAD   DCOMP            SIGN OF UX OPPOSITE TO UY
 0677   REF  18  LAST  406  22,2222   03343 0                     COF
 0678   REF  19  LAST  406  22,2223   03343 0            STORE   COF
 0679                       22,2224   51145 0  OKU21     DLOAD   BPL
 0680   REF   8  LAST  406  22,2225   03301 0                     MFISYM +10D      UY UZ
 0681   REF   2  LAST  404  22,2226   44745 1                     LOCSKIRT
 0682                       22,2227   57545 1            DLOAD   DCOMP            SIGN OF UZ OPPOSITE TO UY
 0683   REF  20  LAST  406  22,2230   03347 1                     COF +4
 0684   REF  21  LAST  406  22,2231   03347 1            STORE   COF +4
 0685                       22,2232   77650 1            GOTO
 0686   REF   3  LAST  406  22,2233   44745 1                     LOCSKIRT
 0687                       22,2234   51145 0  METHOD1   DLOAD   BPL              COFX MAX
 0688   REF   7  LAST  406  22,2235   03311 1                     COFSKEW          UX
 0689   REF   1             22,2236   44242 0                     U1POS
 0690                       22,2237   57575 1            VLOAD   VCOMP
 0691   REF  22  LAST  406  22,2240   03343 0                     COF
 0692   REF  23  LAST  406  22,2241   03343 0            STORE   COF
 0693                       22,2242   51145 0  U1POS     DLOAD   BPL
 0694   REF   9  LAST  406  22,2243   03271 0                     MFISYM +2        UX UY
 0695   REF   1             22,2244   44250 0                     OKU12
 0696                       22,2245   57545 1            DLOAD   DCOMP
 0697   REF  24  LAST  406  22,2246   03345 0                     COF +2           SIGN OF UY OPPOSITE TO UX
 0698   REF  25  LAST  406  22,2247   03345 0            STORE   COF +2
 0699                       22,2250   51145 0  OKU12     DLOAD   BPL
 0700   REF  10  LAST  406  22,2251   03273 1                     MFISYM +4        UX UZ
 0701   REF   4  LAST  406  22,2252   44745 1                     LOCSKIRT
 0702                       22,2253   57545 1            DLOAD   DCOMP            SIGN OF UZ OPPOSITE TO UY
 0703   REF  26  LAST  406  22,2254   03347 1                     COF +4
 0704   REF  27  LAST  406  22,2255   03347 1            STORE   COF +4
 0705                       22,2256   77650 1            GOTO
 0706   REF   5  LAST  406  22,2257   44745 1                     LOCSKIRT
 0707                       22,2260   51145 0  METHOD3   DLOAD   BPL              COFZ MAX
 0708   REF   8  LAST  406  22,2261   03315 0                     COFSKEW +4       UZ
 0709   REF   1             22,2262   44266 0                     U3POS
 0710                          22,2263   57575 1              VLOAD   VCOMP
 0711   REF  28  LAST  406     22,2264   03343 0                      COF
 0712   REF  29  LAST  407     22,2265   03343 0              STORE   COF
 0713                          22,2266   51145 0   U3POS      DLOAD   BPL
 0714   REF  11  LAST  406     22,2267   03273 1                      MFISYM +4         UX UZ
 0715   REF   1                22,2270   44274 0                      OKU31
 0716                          22,2271   57545 1              DLOAD   DCOMP
 0717   REF  30  LAST  407     22,2272   03343 0                      COF               SIGN OF UX OPPOSITE TO UZ
 0718   REF  31  LAST  407     22,2273   03343 0              STORE   COF
 0719                          22,2274   51145 0   OKU31      DLOAD   BPL
 0720   REF  12  LAST  407     22,2275   03301 0                      MFISYM +10D       UY UZ
 0721   REF   6  LAST  406     22,2276   44745 1                      LOCSKIRT
 0722                          22,2277   57545 1              DLOAD   DCOMP
 0723   REF  32  LAST  407     22,2300   03345 0                      COF +2            SIGN OF UY OPPOSITE TO UZ
 0724   REF  33  LAST  407     22,2301   03345 0              STORE   COF +2
 0725                          22,2302   77650 1              GOTO
 0726   REF   7  LAST  407     22,2303   44745 1                      LOCSKIRT
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  R0727
  R0728   MATRIX OPERATIONS
  R0729
   0730                         22,2304  77601 0   MXM3     SETPD                    MXM3 MULTIPLIES 2 3X3 MATRICES
   0731                         22,2305  00001 0                   0               AND LEAVES RESULT IN PD LIST
   0732                         22,2306  64743 0            DLOAD* PDDL*           ADDRESS OF 1ST MATRIX IN XR1
   0733                         22,2307  77762 1                   120,2           ADDRESS OF 2ND MATRIX IN XR2
   0734                         22,2310  77770 1                   6,2
   0735                         22,2311  55523 0            PDDL*  VDEF            DEFINE VECTOR M2(COL 1)
   0736                         22,2312  77776 1                   0,2
   0737                         22,2313  64717 1            MXV*   PDDL*           M1XM2(COL 1) IN PD
   0738                         22,2314  00001 0                   0,1
   0739                         22,2315  77760 0                   140,2
   0740                         22,2316  64723 0            PDDL*  PDDL*
   0741                         22,2317  77766 0                   80,2
   0742                         22,2320  77774 0                   2,2
   0743                         22,2321  63666 1            VDEF   MXV*            DEFINE VECTOR M2(COL 2)
   0744                         22,2322  00001 0                   0,1
   0745                         22,2323  64723 0            PDDL*  PDDL*           M1XM2(COL 2) IN PD
   0746                         22,2324  77756 0                   160,2
   0747                         22,2325  77764 1                   100,2
   0748                         22,2326  55523 0            PDDL*  VDEF            DEFINE VECTOR M2(COL 3)
   0749                         22,2327  77772 0                   4,2
   0750                         22,2330  41517 1            MXV*   PUSH            M1XM2(COL 3) IN PD
   0751                         22,2331  00001 0                   0,1
   0752                         22,2332  77650 1            GOTO
   0753   REF   2  LAST   403   22,2333  44343 0                   TRNSPSPD        REVERSE ROWS AND COLS IN PD AND
  R0754                                     RETURN WITH M1XM2 IN PD LIST
  R0755
   0756                         22,2334  76601 1   TRANSPOS SETPD  VLOAD*          TRANSPOS TRANSPOSES A 3X3 MATRIX
   0757                         22,2335  00001 0                   0                AND LEAVES RESULT IN PD LIST
   0758                         22,2336  00001 0                   0,1             MATRIX ADDRESS IN XR1
   0759                         22,2337  62713 0            PDVL*  PDVL*
   0760                         22,2340  00007 0                   6,1
   0761                         22,2341  00015 0                   120,1
   0762                         22,2342  77606 1            PUSH                   MATRIX IN PD
   0763                         22,2343  65345 0   TRNSPSPD DLOAD  PDDL            ENTER WITH MATRIX IN PD LIST
   0764                         22,2344  00003 1                   2
   0765                         22,2345  00007 0                   6
   0766                         22,2346  14003 1            STODL  2
   0767                         22,2347  77626 0            STADR
   0768                         22,2350  63770 1            STODL  6
   0769                         22,2351  00005 1                   4
   0770                         22,2352  77725 1            PDDL
   0771                         22,2353  00015 0                   120
   0772                         22,2354  14005 1            STODL  4
   0773                         22,2355  77626 0            STADR
   0774                         22,2356  63762 1            STODL  120
   0775                         22,2357  00013 0                   100
   0776                         22,2360  77725 1            PDDL
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0777                          22,2361   00017 1                        14D
0778                          22,2362   14013 0             STODL   10D
0779                          22,2363   77626 0             STADR
0780                          22,2364   77760 0             STORE   14D
0781                          22,2365   77616 0             RVQ                          RETURN WITH TRANSPOSED MATRIX IN PD LIST
0782                          22,2366   00013 0   MINANG    DEC     .00069375
0783                          22,2367   17071 1   MAXANG    DEC     .472222
0794                          22,2370   0 0004 0  READCDUK  INHINT                       LOAD T(MPAC) WITH THE CURRENT CDU ANGLES
0795    REF    6  LAST  257   22,2371   3 0034 0            CA      CDUZ
0796    REF 210   LAST  395   22,2372   54 156 1            TS      MPAC +2
0797                          22,2373   0 0006 1            EXTEND
0798    REF    7  LAST  283   22,2374   3 0033 1            DCA     CDUX
0799                          22,2375   0 0003 1            RELINT
0800    REF    1              22,2376   1 6445 0            TCF     TLOAD +6
080101  REF    1              22,2000                       SETLOC  KALCMON2
080102                        22,2377                       BANK

080105  REF    2 LAST  403 TO  409:   255    255*           COUNT*  $$/KALC

0802                          22,2377   66370 0   CDUTODCM  AXT,1   SSP                  SUBROUTINE TO COMPUTE  DIRECTION COSINE
0803                          22,2400   00003 1             OCT     3                    MATRIX RELATING S/C AXES TO STABLE
0804    REF    1              22,2401   00051 0                     S1                   MEMBER AXES FROM 3 CDU ANGLES IN T(MPAC)
0805                          22,2402   00001 0             OCT     1                    SET XR1, S1 AND PD FOR LOOP
0806                          22,2403   00010 0             STORE   7
0807                          22,2404   77601 0             SETPD
0808                          22,2405   00001 0                     0
0809                          22,2406   47133 0   LOOPSIN   SLOAD*  RTB
0810                          22,2407   00013 0                     10D,1
0811    REF    3  LAST  297   22,2410   51754 0                     CDULOGIC
0812                          22,2411   00013 0             STORE   10D                  LOAD PD WITH  0 SIN(PHI)
0813                          22,2412   65356 1             SIN     PDDL                               2 COS(PHI)
0814                          22,2413   00013 0                     10D                                4 SIN(THETA)
0815                          22,2414   41546 0             COS     PUSH                               6 COS(THETA)
0816                          22,2415   71300 1             TIX,1   DLOAD                              8 SIN(PSI)
0817    REF    1              22,2416   44406 0                     LOOPSIN                           10 COS(PSI)
0818                          22,2417   00007 0                     6
0819                          22,2420   72405 0             DMP     SL1
0820                          22,2421   00013 0                     10D
0821                          22,2422   10001 1             STORE   0,2
0822                          22,2423   77745 1             DLOAD
0823                          22,2424   00005 1                     4
0824                          22,2425   65205 0             DMP     PDDL
0825                          22,2426   00001 0                     0                    (PD6 SIN(THETA)SIN(PHI))
0826                          22,2427   00007 0                     6
0827                          22,2430   41205 0             DMP     DMP
0828                          22,2431   00011 1                     8D
0829                          22,2432   00003 1                     2
0830                          22,2433   44352 0             SL1     BDSU
0831                          22,2434   00015 0                     12D
0832                          22,2435   77752 1             SL1
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 0833              22,2436   10003 0        STORE   2,2
 0834              22,2437   77745 1        DLOAD
 0835              22,2440   00003 1                2
 0836              22,2441   65205 0        DMP     PDDL            (PD7 COS(PHI)SIN(THETA)) SCALED 4
 0837              22,2442   00005 1                4
 0838              22,2443   00007 0                6
 0839              22,2444   41205 0        DMP     DMP
 0840              22,2445   00011 1                8D
 0841              22,2446   00001 0                0
 0842              22,2447   77752 1        SL1
 0843              22,2450   72415 1        DAD     SL1
 0844              22,2451   00017 1                14D
 0845              22,2452   10005 0        STORE   4,2
 0846              22,2453   77745 1        DLOAD
 0847              22,2454   00011 1                8D
 0848              22,2455   10007 1        STORE   6,2
 0849              22,2456   77745 1        DLOAD
 0850              22,2457   00013 0                10D
 0851              22,2460   72405 0        DMP     SL1
 0852              22,2461   00003 1                2
 0853              22,2462   10011 0        STORE   8D,2
 0854              22,2463   77745 1        DLOAD
 0855              22,2464   00013 0                10D
 0856              22,2465   57405 1        DMP     DCOMP
 0857              22,2466   00001 0                0
 0858              22,2467   77752 1        SL1
 0859              22,2470   10013 1        STORE   10D,2
 0860              22,2471   77745 1        DLOAD
 0861              22,2472   00005 1                4
 0862              22,2473   57405 1        DMP     DCOMP
 0863              22,2474   00013 0                10D
 0864              22,2475   77752 1        SL1
 0865              22,2476   10015 1        STORE   12D,2
 0866              22,2477   77745 1        DLOAD
 0867              22,2500   72405 0        DMP     SL1             (PUSH UP 7)
 0868              22,2501   00011 1                8D
 0869              22,2502   41325 0        PDDL    DMP             (PD7 COS(PHI)SIN(THETA)SIN(PSI)) SCALE4
 0870              22,2503   00007 0                6
 0871              22,2504   00001 0                0
 0872              22,2505   72415 1        DAD     SL1             (PUSH UP 7)
 0873              22,2506   77626 0        STADR                  C7=COS(PHI)SIN(THETA)SIN(PSI)
 0874              22,2507   67760 1        STORE   14D,2
 0875              22,2510   77745 1        DLOAD
 0876              22,2511   72405 0        DMP     SL1             (PUSH UP 6)
 0877              22,2512   00011 1                8D
 0878              22,2513   41325 0        PDDL    DMP             (PD6 SIN(THETA)SIN(PHI)SIN(PSI)) SCALE4
 0879              22,2514   00007 0                6
 0880              22,2515   00003 1                2
 0881              22,2516   72425 1        DSU     SL1             (PUSH UP 6)
 0882              22,2517   77626 0        STADR
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   0883                         22,2520   67756 1           STORE  16D,2           C8=-SIN(THETA)SIN(PHI)SIN(PSI)
   0884                         22,2521   77616 0           RVQ                     +COS(THETA)COS(PHI)
   0885                         22,2522            ENDDCM   EQUALS


   088601  REF   2  LAST  403   22,2000                     SETLOC KALCMON1
   088602                       22,2522                     BANK

  R0887   CALCULATION OF THE MATRIX DEL......

  R0888             *      *               --T           *
  R0889             DEL = (IDMATRIX)COS(A)+UU (1-COS(A))+UX SIN(A)          SCALED 1

  R0890                   -
  R0891             WHERE U IS A UNIT VECTOR (DP SCALED 2) ALONG THE AXIS OF ROTATION.
  R0893             A IS THE ANGLE OF ROTATION (DP SCALED 2)
  R0894                                                 -
  R0895             UPON ENTRY THE STARTING ADDRESS OF U IS COF, AND A IS IN MPAC

   08955   REF   3 LAST  409 TO 411:     83   338*          COUNT* $$/KALC
   0896                         22,2522   41401 1  DELCOMP  SETPD  PUSH            MPAC CONTAINS THE ANGLE A
   0897                         22,2523   00001 0                  0
   0898                         22,2524   65356 1           SIN    POOL            PD0 = SIN(A)
   0899                         22,2525   41546 0           COS    PUSH            PD2 = COS(A)
   08995                        22,2526   65302 0           SR2    POOL            PD2 = COS(A)                          $6
   0900                         22,2527   41021 1           BDSU   BOVB            PD4 = 1-COS(A)                        $2
   0901    REF   2  LAST  405   22,2530   15334 1                  DPHALF
   09014   REF   2  LAST  405   22,2531   45761 0                  SIGNMPAC

  R0902   COMPUTE THE DIAGONAL COMPONENTS OF DEL

   09024                        22,2532   77725 1           PDDL
   0903    REF  34  LAST  407   22,2533   03343 0                  COF
   0904                         22,2534   41316 0           DSQ    DMP
   0905                         22,2535   00005 1                  4
   0906                         22,2536   52415 0           DAD    SL3
   0907                         22,2537   00003 1                  2
   0908                         22,2540   77604 0           BOVB
   0909    REF   3  LAST  411   22,2541   45761 0                  SIGNMPAC
   0910    REF   3  LAST  399   22,2542   17426 1           STODL  DEL             UX UX(U-COS(A)) +COS(A)               $1
   0911    REF  35  LAST  411   22,2543   03345 0                  COF +2
   0912                         22,2544   41316 0           DSQ    DMP
   0913                         22,2545   00005 1                  4
   0914                         22,2546   52415 0           DAD    SL3
   0915                         22,2547   00003 1                  2
   0916                         22,2550   77604 0           BOVB
   0917    REF   4  LAST  411   22,2551   45761 0                  SIGNMPAC
   0918    REF   4  LAST  411   22,2552   17436 0           STODL  DEL +8D         UY UY(1-COS(A)) +COS(A)               $1
   0919    REF  36  LAST  411   22,2553   03347 1                  COF +4
   0920                         22,2554   41316 0           DSQ    DMP
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L       ANGLFIND                                                                      USER'S PAGE NO. 10      E6 S3

 0921                            22,2555   00005 1            4
 0922                            22,2556   52415 0      DAD   SL3
 0923                            22,2557   00003 1            2
 0924                            22,2560   77604 0      BOVB
 0925   REF   5  LAST  411       22,2561   45761 0            SIGNMPAC
 0926   REF   5  LAST  411       22,2562   03446 1      STORE DEL +16D      UZ UZ(1-COS(A)) +COS(A)              $1

R0927   COMPUTE THE OFF DIAGONAL TERMS OF DEL

 0928                            22,2563   41345 0      DLOAD DMP
 0929   REF  37  LAST  411       22,2564   03343 0            COF
 0930   REF  38  LAST  412       22,2565   03345 0            COF +2
 0931                            22,2566   72405 0      DMP   SL1
 0932                            22,2567   00005 1            4
 0933                            22,2570   41325 0      PDDL  DMP           D6  UX UY (1-COS A)              $ 4
 0934   REF  39  LAST  412       22,2571   03347 1            COF +4
 0935                            22,2572   00001 0            0
 0936                            22,2573   43206 1      PUSH  DAD           D8  UZ SIN A                     $ 4
 0937                            22,2574   00007 0            6
 0938                            22,2575   41112 0      SL2   BOVB
 0939   REF   6  LAST  412       22,2576   45761 0            SIGNMPAC
 0940   REF   6  LAST  412       22,2577   17434 1      STODL DEL +6
 0941                            22,2600   62421 1      BDSU  SL2
 0942                            22,2601   77604 0      BOVB
 0943   REF   7  LAST  412       22,2602   45761 0            SIGNMPAC
 0944   REF   7  LAST  412       22,2603   17430 0      STODL DEL +2
 0945   REF  40  LAST  412       22,2604   03343 0            COF
 0946                            22,2605   41205 0      DMP   DMP
 0947   REF  41  LAST  412       22,2606   03347 1            COF +4
 0948                            22,2607   00005 1            4
 0949                            22,2610   65352 0      SL1   PDDL          D6  UX UZ (1-COS A )             $ 4
 0950   REF  42  LAST  412       22,2611   03345 0            COF +2
 0951                            22,2612   41405 0      DMP   PUSH          D8  UY SIN(A)
 0952                            22,2613   00001 0            0
 0953                            22,2614   62415 0      DAD   SL2
 0954                            22,2615   00007 0            6
 0955                            22,2616   77604 0      BOVB
 0956   REF   8  LAST  412       22,2617   45761 0            SIGNMPAC
 0957   REF   8  LAST  412       22,2620   17432 1      STODL DEL +4        UX UZ (1-COS(A))+UY SIN(A)
 0958                            22,2621   62421 1      BDSU  SL2
 0959                            22,2622   77604 0      BOVB
 0960   REF   9  LAST  412       22,2623   45761 0            SIGNMPAC
 0961   REF   9  LAST  412       22,2624   17442 0      STODL DEL +12D      UX UZ (U-COS(A))-UY SIN(A)
 0962   REF  43  LAST  412       22,2625   03345 0            COF +2
 0963                            22,2626   41205 0      DMP   DMP
 0964   REF  44  LAST  412       22,2627   03347 1            COF +4
 0965                            22,2630   00005 1            4
 0966                            22,2631   65352 0      SL1   PDDL          D6  UY UZ (1-COS(A))             $ 4
 0967   REF  45  LAST  412       22,2632   03343 0            COF
 0968                            22,2633   41405 0      DMP   PUSH          D8  UX SIN(A)
 0969                         22,2634   00001 0                     0
 0970                         22,2635   62415 0           DAD       SL2
 0971                         22,2636   00007 0                     6
 0972                         22,2637   77604 0           BOVB
 0973   REF  10  LAST  412    22,2640   45761 0                     SIGNMPAC
 0974   REF  10  LAST  412    22,2641   17444 0           STODL     DEL +14D        UY UZ(1-COS(A)) +UX SIN(A)
 0975                         22,2642   62421 1           BDSU      SL2
 0976                         22,2643   77604 0           BOVB
 0977   REF  11  LAST  413    22,2644   45761 0                     SIGNMPAC
 0978   REF  11  LAST  413    22,2645   03440 1           STORE     DEL +10D        UY UZ (1-COS(A)) -UX SIN(A)
 0979                         22,2646   77616 0           RVQ


R0980   DIRECTION COSINE MATRIX TO CDU ANGLE ROUTINE
R0981   X1 CONTAINS THE COMPLEMENT OF THE STARTING ADDRESS FOR MATRIX (SCALED 2)
R0982   LEAVES CDU ANGLES SCALED 2PI IN V(MPAC)
R0983   COS(MGA) WILL BE LEFT IN S1 (SCALED 1)

R0984   THE DIRECTION COSINE MATRIX RELATING S/C AXES TO STABLE MEMBER AXES CAN BE WRITTEN AS***

R0986               C =COS(THETA)COS(PSI)
R0987                0
R0988               C =-COS(THETA)SIN(PSI)COS(PHI)+SI (THETA)SIN(PHI)
R0989                1
R0990               C =COS(THETA)SIN(PSI)SIN(PHI) + S N(THETA)COS(PHI)
R0991                2
R0992               C =SIN(PSI)
R0993                3
R0994               C =COS(PSI)COS(PHI)
R0995                4
R0996               C =-COS(PSI)SIN(PHI)
R0997                5
R0998               C =-SIN(THETA)COS(PSI)
R0999                6
R1000               C =SIN(THETA)SIN(PSI)COS(PHI)+CCS THETA)SIN(PHI)
R1001                7
R1002               C =-SIN(THETA)SIN(PSI)SIN(PHI)+CO (THETA)COS(PHI)
R1003                8

R1004               WHERE PHI = OGA
R1005                     THETA = IGA
R1006                     PSI = MGA

 1007                         22,2647   67543 1  DCMTOCDU DLOAD*    ARCSIN
 1008                         22,2650   00007 0                     6,1
 1009                         22,2651   71406 0           PUSH      COS             PD +0    PSI
 1010                         22,2652   41152 1           SL1       BOVB
 1011   REF  12  LAST  413    22,2653   45761 0                     SIGNMPAC
 1012   REF   2  LAST  409    22,2654   00051 0           STORE     S1
 1013                         22,2655   57543 1           DLOAD*    DCOMP
 1014                         22,2656   00015 0                      12D,1
 1015                         22,2657   67471 1            DDV       ARCSIN
 1016   REF   3  LAST  413    22,2660   00051 0                      S1
 1017                         22,2661   51123 0            PDDL*     BPL            PD +2  THETA
 1018                         22,2662   00001 0                      0,1            MUST CHECK THE SIGN OF COS(THETA)
 1019   REF   1               22,2663   44675 0                      OKTHETA        TO DETERMINE THE PROPER QUADRANT
 1020                         22,2664   57545 1            DLOAD     DCOMP
 1021                         22,2665   43244 1            BPL       DAD
 1022   REF   1               22,2666   44672 1                      SUHALFA
 1023   REF   3  LAST  411    22,2667   15334 1                      DPHALF
 1024                         22,2670   77650 1            GOTO
 1025   REF   1               22,2671   44674 1                      CALCPHI
 1026                         22,2672   77625 0  SUHALFA   DSU
 1027   REF   4  LAST  414    22,2673   15334 1                      DPHALF
 1028                         22,2674   77606 1  CALCPHI   PUSH
 1029                         22,2675   57543 1  OKTHETA   DLOAD*    DCOMP
 1030                         22,2676   00013 0                      10D,1
 1031                         22,2677   67471 1            DDV       ARCSIN
 1032   REF   4  LAST  414    22,2700   00051 0                      S1
 1033                         22,2701   51123 0            PDDL*     BPL            PUSH DOWN PHI
 1034                         22,2702   00011 1                      8D,1
 1035   REF   1               22,2703   44715 1                      OKPHI
 1036                         22,2704   57545 1            DLOAD     DCOMP          PUSH UP PHI
 1037                         22,2705   43244 1            BPL       DAD
 1038   REF   1               22,2706   44712 0                      SUHALFAP
 1039   REF   5  LAST  414    22,2707   15334 1                      DPHALF
 1040                         22,2710   77650 1            GOTO
 1041   REF   1               22,2711   44716 1                      VECOFANG
 1042                         22,2712   52025 1  SUHALFAP  DSU       GOTO
 1043   REF   6  LAST  414    22,2713   15334 1                      DPHALF
 1044   REF   2  LAST  414    22,2714   44716 1                      VECOFANG
 1045                         22,2715   77745 1  OKPHI     DLOAD                    PUSH UP PHI
 1046                         22,2716   43466 1  VECOFANG  VDEF      RVQ
```

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L         ANGLFIND                                                                                    USER'S PAGE NO.  13       E6 S3

P1047     ROUTINE FOR TERMINATING AUTOMATIC MANEUVERS

  10511                             22,2717   77776 1  NOGOM3     EXIT
  10512                             22,2720  0 0004 0  NOGOM2     INHINT                          THIS LOCATION ACCESSED BY A BZMF NOGO -2
  10513  REF  62  LAST  402         22,2721  0 4636 0             TC       EANKCALL
  105131 REF   1                    22,2722   40203 1             CADR     ZEROERUR

  10514                             22,2723  0 0004 0  NOGO       INHINT
  10515  REF   3  LAST  222         22,2724  0 4463 1             TC       STOPRATE

  105151 REF   2  LAST  212         22,2725  3 4767 0             CAF      R67BIT
  105152 REF  14  LAST  395         22,2726  7 0104 0             MASK     FLAGWRD8
  105153                            22,2727  0 0006 1             EXTEND
  105154 REF   1                    22,2730  1 2740 1             BZF      NOTR67ND

  105155 REF   2  LAST  365         22,2731  3 5016 0             CAF      1SEC                    WAITLIST TASK IN 1 SECON:
  105156 REF   8  LAST  365         22,2732  0 5233 0             TC       WAITLIST                RETURN TO UPDTCALL
  105157 REF   8  LAST  403         E6,1661                       EBANK=   BCDU
  105158 REF   1                    22,2733   02320 1             2CADR    R67
  105158 REF   1                    22,2734   74066 1
  105159 REF  10  LAST  395         22,2735  0 5402 1             TC       PHASCHNG
  1052                              22,2736   00111 0             OCT      00111

  10522  REF   1                    01,2025            1P11SPT2 =        1.11SPOT
  10525  REF  44  LAST  394         22,2737  0 5205 0             TC       ENDOFJOB

  1053   REF  22  LAST  375         22,2740  3 4767 0  NOTR67ND   CAF      TWO                     RETURN VIA
  1054   REF   9  LAST  415         22,2741  0 5233 0             TC       WAITLIST                GOODEND
  1055   REF   9  LAST  415         E6,1661                       EBANK=   BCDU
  1056   REF   1                    22,2742   02311 0             2CADR    ENDMANU
  1056   REF   1                    22,2743   20066 0
  1058   REF  45  LAST  415         22,2744  1 5205 1             TCF      ENDOFJOB
```

```
L       GIMBAL LOCK AVOIDANCE                                                    USER'S PAGE NO.  1      E0 55

 0002   REF   3  LAST  411   22,2000                        SETLOC KALCMON1
 0003                        22,2745                        BANK

 00035  REF   4 LAST  411 TO  416:   147   485*             COUNT* $$/KALC
 0004   REF  10  LAST  415   E6,1661                        EBANK= BCDU
R0005   DETECTING GIMBAL LOCK
 0006   REF   1              22,2745             LOCSKIRT EQUALS WCALC
 0009                        22,2745   70740 0   WCALC    LXC,1  DLOAD*
 0010   REF   1              22,2746   00774 0                   RATEINDX
 0011   REF   1              22,2747   05002 0                   ARATE,1
 0012                        22,2750   45002 1            SR4    CALL         COMPUTE THE INCREMENTAL ROTATION MATRIX
 0013   REF   3  LAST  399   22,2751   44522 1                   DELCOMP      DEL CORRESPONDING TO A 1 SEC ROTATION
A0014                                                                         ABOUT COF
 0015                        22,2752   74343 0            DLOAD* VXSC
 0016   REF   2  LAST  416   22,2753   05002 0                   ARATE,1
 0017   REF  46  LAST  412   22,2754   03343 0                   COF
 0018                        22,2755   77721 0            MXV
 0019   REF   1              22,2756   05014 1                   QUADROT
 0020   REF   1              22,2757   17311 1            STODL  BRATE
 0021   REF   4  LAST  404   22,2760   03365 1                   AM
 0022                        22,2761   55605 1            DMP    DDV*
 0023   REF   1              22,2762   05012 1                   ANGLTIME
 0024   REF   3  LAST  416   22,2763   05002 0                   ARATE,1
 0025                        22,2764   77661 0            SR
 0026                        22,2765   20606 0                   5
 00265  REF   1              22,2766   03317 1            STORE  TM
 0027                        22,2767   77214 0            BON    VLOAD
 00273  REF   1              22,2770   00313 0                   CYC61FLG
 00276  REF   1              22,2771   71747 0                   RCYCLR61
 0028   REF   2  LAST  416   22,2772   03311 1                   BRATE
 0029                        22,2773   77761 1            VXSC
 0030   REF   1              22,2774   05036 1                   BIASCALE
 0031   REF   1              22,2775   03275 1            STORE  BIASTEMP     ATTITUDE ERROR BIAS TO PREVENT OVERSHOOT
A0032                                                                         IN SYSTEM
 0033                        22,2776   77614 1            SETGO               STATE SWITCH CALCMAN2 (43D)
 0034   REF   1              22,2777   01035 0                   CALCMAN2     0(OFF) = BYPASS STARTING PROCEDURE
 0035   REF   1              22,3000   45053 0                   NEWANGL +1   1(ON) = START MANEUVER


 0036                        22,3001   00044 1   ARATE    2DEC   .0022222222  = .05 DEG/SEC
 0036                        22,3002   15053 0
 0037                        22,3003   00221 0            2DEC   .0088888889  = .2 DEG/SEC
 0037                        22,3004   24255 0
 0038                        22,3005   00554 0            2DEC   .0222222222  = .5 DEG/SEC
 0038                        22,3006   02660 0
 0039                        22,3007   02660 0            2DEC   .0888888889  = 2 DEG/SEC              $22.5 DEG/SEC
 0039                        22,3010   13301 1
 0040                        22,3011   00003 1   ANGLTIME 2DEC   .000190735   = 100B - 19
 0040                        22,3012   04000 0
A0041                                                                         MANEUVER ANGLE TO MANEUVER TIME
```

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L        GIMBAL LOCK AVOIDANCE                                                                   USER'S PAGE NO.   2        E6 S3

 0042                              22,3013   03146 1  QUADROT   2DEC    .1              ROTATION MATRIX FROM S/C AXES TO CONTROL
 0042                              22,3014   14632 0
 0043                              22,3015   00000 1            2DEC    0               AXES  (X ROT = -7.25 DEG)
 0043                              22,3016   00000 1
 0044                              22,3017   00000 1            2DEC    0
 0044                              22,3020   00000 1
 0045                              22,3021   00000 1            2DEC    0
 0045                              22,3022   00000 1
 0046                              22,3023   03131 1            2DEC    .099200         =(.1)COS7.25
 0046                              22,3024   11275 1
 0047                              22,3025   77461 1            2DEC    -.012620        =-(.1)SIN7.25
 0047                              22,3026   47370 0
 0048                              22,3027   00000 1            2DEC    0
 0048                              22,3030   00000 1
 0049                              22,3031   00316 0            2DEC    .012620         (.1)SIN7.25
 0049                              22,3032   30407 1
 0050                              22,3033   03131 1            2DEC    .099200         (.1)COS7.25
 0050                              22,3034   11275 1
 0051                              22,3035   00004 0  BIASCALE 2DEC    .0002543132      = (450/180)(1/0.6)(1/16384)
 0051                              22,3036   05253 0
```

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1         KALCMANU STEERING                                                                        USER'S PAGE NO.  1     EQ S3

R0001     GENERATION OF STEERING COMMANDS FOR DIGITAL AUTOPILOT FREE FALL MANEUVERS

R0003     NEW COMMANDS WILL BE GENERATED EVERY ONE SECOND DURING THE MANEUVER

  0005    REF   4  LAST  416   22,2000                          SETLOC KALCMON1
  0006                         22,3037                          BANK

  0007    REF  11  LAST  416   E6,1661                          EBANK= BCDU

  0008    REF   5 LAST  416 TO  418:      58    543*            COUNT* $$/KALC
  0009    REF   3  LAST  415   22,3037  3 4767 0  NEWDELHI CAF     R67BIT
  000902 REF  15  LAST  415   22,3040  7 0104 0           MASK    FLAGWRD8
  000904                       22,3041  0 0006 1           EXTEND
  000906 REF   2  LAST  416   22,3042  1 3047 0           BZF     NEWANGL -3          NON-R67 SEQUENCE

  000908 REF   7  LAST  395   22,3043  3 4764 0           CAF     TRACKBIT
  00091   REF  21  LAST  395   22,3044  7 0075 1           MASK    FLAGWRD1
  00092                        22,3045  0 0006 1           EXTEND                      CHECK TRACKFLAG
  00093   REF   1              22,3046  1 3161 0           BZF     MYSTEND             IF OFF DO MYSTEND

  00094   REF   5  LAST  404   22,3047  4 1340 0     -3    CS      HOLDFLAG
  0010                         22,3050  0 0006 1           EXTEND                      CHECK HOLDFLAG
  0011    REF   1              22,3051  6 2720 0           BZMF    NOGOM2              IF POS, DO STOPRATE

  0012    REF  16  LAST  403   22,3052  0 6006 1  NEWANGL  TC      INTPRET
  0013                         22,3053   75160 1     +1    AXC,1   AXC,2
  0014    REF  13  LAST  403   22,3054   03320 0                   MIS                 COMPUTE THE NEW MATRIX FROM S/C TO
  0015    REF  12  LAST  413   22,3055   03425 1                   DEL                 STABLE MEMBER AXES
  0016                         22,3056   77624 1           CALL
  0017    REF   4  LAST  403   22,3057   44304 0                   MXM3
  0018                         22,3060   45575 1           VLOAD   STADR
  0019    REF  14  LAST  418   22,3061   50442 0           STOVL   MIS +12D            CALCULATE NEW DESIRED CDU ANGLES
  0020                         22,3062   77626 0           STADR
  0021    REF  15  LAST  418   22,3063   50450 0           STOVL   MIS +6D
  0022                         22,3064   77626 0           STADR
  0023    REF  16  LAST  418   22,3065   74456 0           STORE   MIS
  0024                         22,3066   45160 1           AXC,1   CALL
  0025    REF  17  LAST  418   22,3067   03320 0                   MIS
  0026    REF   2  LAST  399   22,3070   44647 1                   DCMTOCDU            PICK UP THE NEW CDU ANGLES FROM MATRIX
  0027                         22,3071   77634 0           RTB
  0028    REF   2  LAST  399   22,3072   45644 0                   V1STO2S
  0029    REF   1              22,3073   03267 1  NWNGL17D STORE   NCDU                NEW CDU ANGLES (TAG IS USED BY EDIT)
  0030                         22,3074   77414 0           BONCLR  EXIT
  0031    REF   2  LAST  416   22,3075   01215 0                   CALCMAN2
  0032    REF   1              22,3076   40064 1                   MANUSTAT            TO START MANEUVER
  0033    REF  23  LAST  415   22,3077  3 4767 0     -1    CAF     TWO                             +0 OTHERWISE
  0034    REF   2  LAST  118   22,3100  55'664 0  INCRDCDU TS      KSPNDX
  0035                         22,3101  6 0000 1           DOUBLE
  0036    REF   2  LAST  118   22,3102  55'665 1           TS      KDPNDX
  0037    REF   3  LAST  418   22,3103  51'664 1           INDEX   KSPNDX
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L        KALCMANU STEERING                                                                               USER'S PAGE NO.  2      E6 S3

 0038    REF   2  LAST  418    22,3104  3 1666 0              CA       NCDU           NEW DESIRED CDU ANGLES
 0039                          22,3105  0 0006 1              EXTEND
 0040    REF   4  LAST  418    22,3106  5 1664 1              INDEX    KSPNDX
 0041    REF  12  LAST  418    22,3107  21'661 0              MSU      BCDU           INITIAL S/C ANGLE OR PREVIOUS DESIRED
 0042                          22,3110  0 0006 1              EXTEND                  CDU ANGLES
 0043    REF   2  LAST  416    22,3111  7 3013 1              MP       QUADROT
 0044    REF   3  LAST  418    22,3112  51'665 0              INDEX    KDPNDX
 0045    REF   2  LAST  113    22,3113  53'576 0              DXCH     DELCDUX        ANGLE INCREMENTS TO BE ADDED TO
 0046    REF   5  LAST  419    22,3114  51'664 1              INDEX    KSPNDX         DCDU EVERY TENTH SEC
 0047    REF   3  LAST  419    22,3115  3 1666 0              CA       NCDU           BY LEM DAP
 0048    REF   6  LAST  419    22,3116  51'664 1              INDEX    KSPNDX
 0049    REF  13  LAST  419    22,3117  57'661 1              XCH      BCDU
 0050    REF   4  LAST  419    22,3120  51'665 0              INDEX    KDPNDX
 0051    REF   2  LAST  114    22,3121  55'646 0              TS       CDUXD
 0052    REF   7  LAST  419    22,3122  11'664 0              CCS      KSPNDX
 0053    REF   1               22,3123  1 3100 1              TCF      INCRDCDU       LOOP FOR THREE AXES

 0054                          22,3124  0 0003 1              RELINT
R0055    COMPARE PRESENT TIME WITH TIME TO TERMINATE MANEUVER

 0056    REF   1               22,3125  0 3135 0  TMANUCHK    TC       TIMECHK
 00565   REF  32  LAST  396    22,3126  0 4655 0              TC       POSTJUMP
 0057    REF   1               22,3127   40143 0              CADR     CONTMANU

 0058    REF  47  LAST  404    22,3130  3 4770 0              CAF      ONE
 0060    REF  10  LAST  415    22,3131  0 5233 0  MANUSTAL    TC       WAITLIST
 0061    REF  14  LAST  419    E6,1661                        EBANK=   BCDU
 0062    REF   1               22,3132   02303 0              2CADR    MANUSTOP
 0062    REF   1               22,3133   20066 0
 0064    REF  46  LAST  415    22,3134  1 5205 1              TCF      ENDOFJOB


 0065                          22,3135  0 0006 1  TIMECHK     EXTEND
 0066    REF  12  LAST  385    22,3136  4 0025 1              DCS      TIME2
 0067    REF   1               22,3137  53'673 0              DXCH     TTEMP
 0068                          22,3140  0 0006 1              EXTEND
 0069    REF   2  LAST  416    22,3141  3 1717 1              DCA      TM
 0070    REF   2  LAST  419    22,3142  21'673 0              DAS      TTEMP
 0071    REF   3  LAST  419    22,3143  11'672 1              CCS      TTEMP
 0072    REF 116  LAST  395    22,3144  0 0002 0              TC       Q
 0073                          22,3145  1 3147 1              TCF      +2
 0074    REF   1               22,3146  1 3157 0              TCF      2NDRETRN
 0075    REF   4  LAST  419    22,3147  11'673 0              CCS      TTEMP +1
 0076    REF 117  LAST  419    22,3150  0 0002 0              TC       Q
 0077    REF   1               22,3151  1 3153 1              TCF      MANUOFF
 0078                          22,3152  4 0000 0              COM
 0079    REF   3  LAST  415    22,3153  6 5016 0  MANUOFF     AD       1SEC
 0080                          22,3154  0 0006 1              EXTEND
 0081    REF   2  LAST  419    22,3155  6 3157 1              BZMF     2NDRETRN
 0082    REF 118  LAST  419    22,3156  24 002 0              INCR     Q
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0083     REF 119  LAST  419    22,3157  24 002 0  2NDRETRN INCR    Q
0084     REF   3  LAST  339    22,3160  1 6706 1           TCF     Q+1
00842    REF  33  LAST  419    22,3161  0 4655 0  MYSTEND  TC      POSTJUMP
00844    REF   2  LAST  396    22,3162   74416 1           CADR    FIXDB

00855    REF   1               20,2000                     SETLOC  MANUSTUF
00856                          20,2064                     BANK

00858    REF   1                                           COUNT*  $$/KALC
0086                           20,2064   77776 1  MANUSTAT EXIT                    INITIALIZATION ROUTINE FOR AUTO
00861    REF   4  LAST  418    20,2065  3 4767 0           CAF     R67BIT                             MANEUVERS
00862    REF  16  LAST  418    20,2066  7 0104 0           MASK    FLAGWRD8
008625                         20,2067  0 0006 1           EXTEND
00863                          20,2070  1 2075 0           BZF     +5
00864                          20,2071  0 0006 1           EXTEND                  R67 RUNNING
00865    REF   2  LAST  368    20,2072  3 4750 1           DCA     DPOSMAX
00866    REF   3  LAST  419    20,2073  53'717 0           DXCH    TM
00867    REF   1               20,2074  1 2104 1           TCF     TMDON
0087                           20,2075  0 0006 1           EXTEND                  NON-R67 PROGRAM
0088     REF  13  LAST  419    20,2076  3 0025 0           DCA     TIME2
0089     REF   4  LAST  420    20,2077  21'717 0           DAS     TM              TM+TO     MANEUVER COMPLETION TIME
0090     REF   4  LAST  419    20,2100  4 5016 1           CS      1SEC
0091     REF  50  LAST  383    20,2101  54 001 1           TS      L
00911    REF  88  LAST  396    20,2102  4 4772 0           CS      ZERO
0092     REF   5  LAST  420    20,2103  21'717 0           DAS     TM              (TM+TO)-1
0093                           20,2104  0 0004 0  TMDON    INHINT
0094     REF  48  LAST  419    20,2105  4 4770 1           CS      ONE             ENABLE AUTOPILOT TO PERFORM
0095     REF   6  LAST  418    20,2106  55'340 0           TS      HOLDFLAG        AUTOMATIC MANEUVERS
0096     REF   2  LAST  416    20,2107  4 0774 1           CS      RATEINDX        SEE IF MANEUVERING AT HIGH RATE
0097     REF  14  LAST  361    20,2110  6 6211 0           AD      SIX
0098                           20,2111  0 0006 1           EXTEND
0099     REF   1               20,2112  6 2114 1           BZMF    HIGHGAIN
0100                           20,2113  1 2117 0           TCF     +4
0101     REF   2  LAST  182    20,2114  4 1501 0  HIGHGAIN CS      RCSFLAGS        IF SO, SET HIGH RATE FLAG (BIT 15 OF
0102     REF  32  LAST  392    20,2115  7 4752 1           MASK    BIT15           RCSFLAGS)
0103     REF   3  LAST  420    20,2116  27'501 0           ADS     RCSFLAGS
0104                           20,2117  0 0006 1           EXTEND
01045    REF   3  LAST  416    20,2120  3 1711 1           DCA     BRATE           X-AXIS MANEUVER RATE
0105     REF   8  LAST  187    20,2121  53'526 0           DXCH    WBODY
0106                           20,2122  0 0006 1           EXTEND
01065    REF   4  LAST  420    20,2123  3 1713 0           DCA     BRATE +2        Y-AXIS MANEUVER RATE
0107     REF   2  LAST  136    20,2124  53'530 1           DXCH    WBODY1
0108                           20,2125  0 0006 1           EXTEND
01085    REF   5  LAST  420    20,2126  3 1715 0           DCA     BRATE +4        Z-AXIS MANEUVER RATE
0109     REF   2  LAST  112    20,2127  53'532 0           DXCH    WBODY2
0110     REF   2  LAST  416    20,2130  3 1675 1           CA      BIASTEMP +1     INSERT ATTITUDE ERROR BIASES
0111     REF   2  LAST  113    20,2131  55'564 0           TS      BIAS            INTO AUTOPILOT
0112     REF   3  LAST  420    20,2132  3 1677 0           CA      BIASTEMP +3
0113     REF   2  LAST  113    20,2133  55'565 1           TS      BIAS1
0114     REF   4  LAST  420    20,2134  3 1701 0           CA      BIASTEMP +5
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L        KALCMANU STEERING                                                                         USER'S PAGE NO.   4        E6 S3

 0115    REF   2  LAST  113    20,2135  55'566 1             TS        EIAS2
 0116    REF   9  LAST  315    20,2136  3 0025 0             CA        TIME1
 0117    REF   5  LAST  420    20,2137  6 5016 0             AD        1SEC
 0118    REF   1               20,2140  57'671 0             XCH       NEXTIME
 0119    REF  34  LAST  420    20,2141  0 4655 0             TC        POSTJUMP
 0120    REF   2  LAST  419    20,2142   45077 0             CADR      INCRDCDU -1

 0122                          20,2143  0 0004 0   CONTMANU  INHINT                                   CONTINUE WITH UPDATE PROCESS
 0123    REF  10  LAST  421    20,2144  4 0025 1             CS        TIME1
 0124    REF   2  LAST  421    20,2145  6 1671 0             AD        NEXTIME
 0125    REF 132  LAST  395    20,2146  10 000 0             CCS       A
 0126    REF  49  LAST  420    20,2147  6 4770 0             AD        ONE
 0127    REF   1               20,2150  1 2153 0             TCF       MANUCALL
 0128    REF   1               20,2151  6 4752 0             AD        NEGMAX
 0129                          20,2152  4 0000 0             COM
 0130    REF   5  LAST  260    20,2153  0 5223 1   MANUCALL  TC        TWIDDLE
 0131    REF   1               20,2154   02161 0             ADRES     UPDTCALL
 0133                          20,2155  0 0003 1             RELINT
 0134    REF   6  LAST  421    20,2156  3 5016 0             CAF       1SEC                           INCREMENT TIME FOR NEXT UPDATE
 0135    REF   3  LAST  421    20,2157  27'671 1             ADS       NEXTIME
 0136    REF  47  LAST  419    20,2160  1 5205 1             TCF       ENDOFJOB


 0137    REF   5  LAST  420    20,2161  3 4767 0   UPDTCALL  CAF       R67BIT
 01371   REF  17  LAST  420    20,2162  7 0104 0             MASK      FLAGWRD8
 01372                         20,2163  0 0006 1             EXTEND
 01373                         20,2164  1 2171 0             BZF       +5

 01374   REF   7  LAST  272    20,2165  11'774 0             CCS       R61CNTR
 01375                         20,2166  1 2170 1             TCF       +2
 01376   REF   1               20,2167  1 2176 1             TCF       DOREMIS
 01377   REF   8  LAST  421    20,2170  55'774 0             TS        R61CNTR

 01378   REF   1               20,2171  3 7650 0             CAF       PRIO26
 0138    REF  16  LAST  385    20,2172  0 5135 0             TC        FINDVAC                        OF STEERING COMMANDS
 0139    REF  15  LAST  419    E6,1661                       EBANK=    BCDU
 0140    REF   1               20,2173   03037 0             2CADR     NEWDELHI
 0140    REF   1               20,2174   44066 1
 0141    REF  13  LAST  365    20,2175  0 5314 1             TC        TASKOVER


 01411   REF   2  LAST  421    20,2176  3 7650 0   DOREMIS   CAF       PRIO26
 01412   REF  17  LAST  421    20,2177  0 5135 0             TC        FINDVAC
 01413   REF  16  LAST  421    E6,1661                       EBANK=    BCDU
 01414   REF   2  LAST  230    20,2200   02374 0             2CADR     R67RSTRT                       MAKE SURE MIS DOES NOT DEGRADE
 01414                         20,2201   74066 1
 01415   REF  14  LAST  421    20,2202  0 5314 1             TC        TASKOVER
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L       KALCMANU STEERING                                                         USER'S PAGE NO.   5      E6 S3

P0142   ROUTINE FOR TERMINATING AUTOMATIC MANEUVERS

 01425  REF   1                10,2000                      SETLOC  KALCMON3
 01426                         10,2303                      BANK

 01427  REF   1                                             COUNT*  $$/KALC
 0143   REF   1                10,2303  0 4474 1  MANUSTOP  TC      STOPYZ
 0144   REF  18  LAST  266     10,2304  0 4714 1            TC      IBNKCALL
 01445  REF   1                10,2305   45165 1            CADR    LOADYZ

 0145   REF   5  LAST  403     10,2306  3 1307 1  ENDROLL   CA      CPHI
 0146   REF   3  LAST  419     10,2307  55'646 0            TS      CDUXD                SET CDUXD TO THE COMMANDED OUTER GIMBAL
 0149   REF   4  LAST  415     10,2310  0 4463 1            TC      STOPRATE
 0150   REF   2  LAST  396     10,2311  3 5053 1  ENDMANU   CAF     PRIO14
 0151   REF  18  LAST  421     10,2312  0 5135 0            TC      FINDVAC
 0152   REF   9  LAST  421     E6,1774                      EBANK=  R61CNTR
 0153   REF   1                10,2313   02141 1            2CADR   ENDMANUV
 0153   REF   1                10,2314   56066 1
 0155   REF  15  LAST  421     10,2315  0 5314 1            TC      TASKOVER

 01555  REF   2  LAST  178        4000                      SETLOC  STOPRAT
 01556                            4463                      BANK
 01557  REF   1                                             COUNT*  $$/KALC
 0156   REF  89  LAST  420        4463  3 4772 1  STOPRATE  CAF     ZERO
 0157   REF   3  LAST  419        4464  55'575 0            TS      DELCDUX
 0158   REF   4  LAST  422        4465  55'576 0            TS      DELCDUX +1           ZERO ROLL INCREMENTAL ANGLES
 0159   REF   9  LAST  420        4466  55'525 0            TS      WBODY                RATE
 0160   REF  10  LAST  422        4467  55'526 0            TS      WBODY +1
 0161   REF   3  LAST  420        4470  55'564 0            TS      BIAS                 BIAS

 01611  REF  33  LAST  420        4471  4 4752 1            CS      BIT15                MAKE SURE HIGH RATE FLAG (BIT 15 OF
 01612  REF   4  LAST  420        4472  7 1501 0            MASK    RCSFLAGS             RCSFLAGS) IS RESET.
 01613  REF   5  LAST  422        4473  55'501 0            TS      RCSFLAGS

 0162   REF  90  LAST  422        4474  3 4772 1  STOPYZ    CAF     ZERO
 0163   REF   2  LAST  113        4475  55'577 1            TS      DELCDUY              ZERO PITCH, YAW
 0164   REF   3  LAST  422        4476  55'600 1            TS      DELCDUY +1           INCREMENTAL ANGLES
 0165   REF   2  LAST  113        4477  55'601 0            TS      DELCDUZ
 0166   REF   3  LAST  422        4500  55'602 0            TS      DELCDUZ +1
 0167   REF   3  LAST  420        4501  55'527 1            TS      WBODY1               RATES
 0168   REF   4  LAST  422        4502  55'530 1            TS      WBODY1 +1
 0169   REF   3  LAST  420        4503  55'531 0            TS      WBODY2
 0170   REF   4  LAST  422        4504  55'532 0            TS      WBODY2 +1
 0171   REF   3  LAST  420        4505  55'565 1            TS      BIAS1                BIASES
 0172   REF   3  LAST  421        4506  55'566 1            TS      BIAS2
 0173   REF 120  LAST  420        4507  0 0002 0            TC      Q

 01735  REF   2  LAST  420     20,2000                      SETLOC  MANUSTUF
 01736                         20,2203                      BANK
 01738  REF   2 LAST  420 TO  422:      79     79*               COUNT* $$/KALC
 0174   REF   8  LAST  409    20,2203  3 0032 0  ZERDEROR CA     CDUX              PICK UP CDU ANGLES AND STORE IN
 0175   REF   4  LAST  422    20,2204  55'646 0           TS     CDUXD             CDU DESIRED
 0176   REF   3  LAST  243    20,2205  3 0033 1           CA     CDUY
 0177   REF   2  LAST  114    20,2206  55'650 1           TS     CDUYD
 0178   REF   7  LAST  409    20,2207  3 0034 0           CA     CDUZ
 0179   REF   2  LAST  114    20,2210  55'652 0           TS     CDUZD
 0180   REF 121  LAST  422    20,2211  0 0002 0           TC     Q

 01805  REF   5  LAST  418    22,2000                     SETLOC KALCMON1
 01806                        22,3163                     BANK

 01808  REF   6 LAST  418 TO  420 :     84    627*               COUNT* $$/KALC
 0181   REF   6  LAST  422    22,3163  3 1307 1  LOADCDUD CA     CPHI              STORE TERMINAL ANGLES INTO
 0182   REF   5  LAST  423    22,3164  55'646 0           TS     CDUXD             COMMAND ANGLES
 0183   REF   1               22,3165  3 1310 1  LOADYZ   CA     CTHETA
 0184   REF   3  LAST  423    22,3166  55'650 1           TS     CDUYD
 0185   REF   1               22,3167  3 1311 0           CA     CPSI
 0186   REF   3  LAST  423    22,3170  55'652 0           TS     CDUZD
 0187   REF 122  LAST  423    22,3171  0 0002 0           TC     Q
```

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L         SYSTEM TEST STANDARD LEAD INS                                                              USER'S PAGE NO.   1      EO S3

 0001     REF  13  LAST  259   E5,1671                          EBANK=  XSM

 0003     REF   1              13,2000                          SETLOC  E/PROG1
 0004                          13,2036                          BANK

 0005     REF   1                                               COUNT*  $$/P07

R0006               SPECIAL PROGRAMS TO EASE THE PANGS OF ERASABLE MEMORY PROGRAMS.

R0007     E/BKCALL    FOR DOING BANKCALLS FROM AND RETURNING TO ERASABLE.

R0008               THIS ROUTINE IS CALLABLE FROM ERASABLE OR FIXED.  LIKE BANKCALL, HOWEVER, SWITCHING BETWEEN S3 AND S4
R0010     IS NOT POSSIBLE.

R0011               THE CALLING SEQUENCE IS:

A0012                                                           TC      BANKCALL
A0013                                                           CADR    E/BKCALL
A0014                                                           CADR    ROUTINE          WHERE YOU WANT TO GO IN FIXED.
A0015                                                           RETURN HERE FROM DISPLAY TERMINATE, BAD STALL OR TC Q.
A0016                                                           RETURN HERE FROM DISPLAY PROCEED OR GOOD RETURN FROM STALL.
A0017                                                           RETURN HERE FROM DISPLAY ENTER OR RECYCLE.

R0018               THIS ROUTINE REQUIRES TWO ERASABLES (EBUF2, +1) IN UNSWITCHED WHICH ARE UNSHARED BY INTERRUPTS AND
R0020     OTHER EMEMORY PROGRAMS.

R0021               A + L ARE PRESERVED THROUGH BANKCALL AND E/BKCALL.

 0022     REF   3  LAST  395   13,2036  52 134 0  E/BKCALL DXCH    BUF2             SAVE A,L AND GET DP RETURN.
 0023     REF   2  LAST   80   13,2037  53'115 1           DXCH    EBUF2            SAVE DP RETURN.
 0024     REF   3  LAST  424   13,2040  25'114 1           INCR    EBUF2            RETURN +1 BECAUSE DOUBLE CADR.
 0025     REF  11  LAST  381   13,2041  3 0006 1           CA      BBANK
 0026     REF   4  LAST  282   13,2042  7 5041 0           MASK    LOW10            GET CURRENT EBANK.  (SBANK SOMEDAY)
 0027     REF   4  LAST  424   13,2043  27'115 1           ADS     EBUF2 +1         FORM BBCON.  (WAS FBANK)
 0028     REF   5  LAST  424   13,2044  51'114 1           NDX     EBUF2
 0029                          13,2045  2'7777 0           CA      Q -1             GET CADR OF ROUTINE.
 0030     REF   1              13,2046  0 4642 0           TC      SWCALL           GO TO ROUTINE, SETTING Q TO SWRETURN
A0031                                                                               AND RESTORING A + L.
 0032                          13,2047  0 2053 0           TC      +4               TX Q, V34, OR BAD STALL RETURN.
 0033                          13,2050  0 2052 1           TC      +2               PROCEED OR GOOD STALL RETURN.
 0034     REF   6  LAST  424   13,2051  25'114 1           INCR    EBUF2            ENTER OR RECYCLE RETURN.
 0035     REF   7  LAST  424   13,2052  25'114 1           INCR    EBUF2
 0036     REF   8  LAST  424   13,2053  53'115 1  E/SWITCH DXCH    EBUF2
 0037                          13,2054  52 006 0           DTCB
```

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L       SYSTEM TEST STANDARD LEAD INS                                              USER'S PAGE NO.  2      E5 S3

P0038   E/CALL         FOR CALLING A FIXED MEMORY INTERPRETIVE SUBROUTINE FROM ERASABLE AND RETURNING TO ERASABLE.

R0040            THE CALLING SEQUENCE IS...
A0041                                                   RTB
A0042                                                          E/CALL
A0043                                                   CADR   ROUTINE         THE INTERPRETIVE SUBROUTINE YOU WANT.
A0044                                                                          RETURNS HERE IN INTERPRETIVE.

0045    REF  2  LAST  223   13,2055  22 164 1  E/CALL   LXCH   LOC             ADRES -1 OF CADR.
0046    REF 51  LAST  420   13,2056  50 001 0           INDEX  L
0047    REF 52  LAST  425   13,2057  3 0001 0           CA     L               CADR IN A.
0048    REF 53  LAST  425   13,2060  24 001 0           INCR   L
0049    REF 54  LAST  425   13,2061  24 001 0           INCR   L               RETURN ADRES IN L.
0050    REF  9  LAST  424   13,2062  53'115 1           DXCH   EBUF2           STORE CADR AND RETURN.
0051    REF 17  LAST  418   13,2063  0 6006 1           TC     INTPRET
0052                        13,2064   77624 1           CALL
0053    REF 10  LAST  425   13,2065   01114 1                  EBUF2           INDIRECTLY EXECUTE ROUTINE.  IT MUST
0054                        13,2066   77776 1           EXIT                   LEAVE VIA RVQ OR EQUIVALENT.
0055    REF 11  LAST  425   13,2067  23'115 0           LXCH   EBUF2 +1        PICK UP RETURN.
0056    REF 18  LAST  425   13,2070  1 6010 1           TCF    INTPRET +2      SET LOC AND RETURB TO CALLER
```

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L       SYSTEM TEST STANDARD LEAD INS                                              USER'S PAGE NO.  3      E5 53

P0057   E/JOBWAK         FOR WAKING UP ERASABLE MEMORY JOBS.

R0058              THIS ROUTINE MUST BE CALLED IN INTERRUPT OR WITH INTERRUPTS INHIBITED.

R0060              THE CALLING SEQUENCE IS:

A0061                                                      INHINT
A0062                                                       .
A0063                                                       .
A0064                                                      CA      WAKEADR          ADDRESS OF SLEEPING JOB
A0065                                                      TC      IBNKCALL
A0066                                                      CADR    E/JOBWAK
A0067                                                       .                       RETURNS HERE
A0068                                                       .
A0069                                                       .
A0070                                                      RELINT                   IF YOU DID AN INHINT.

 0072   REF   1                12,2000                     SETLOC  E/PROG
 0073                          12,2000                     BANK

 0074   REF   1                                            COUNT*  $$/P07

 0075   REF   3  LAST  388     12,2000  0 5167 1  E/JOBWAK TC      JOBWAKE          ARRIVE IWTH ADRES IN A.
 0076   REF  18  LAST  359     12,2001  4 4756 0           CS      BIT11
 0077   REF   2  LAST  383     12,2002  50 064 0           NDX     LOCCTR
 0078   REF   3  LAST  425     12,2003  26 164 0           ADS     LOC              KNOCK FIXED MEMORY BIT OUT OF ADRES
 0079   REF   1                12,2004  0 0072 1           TC      RUPTREG3         RETURN

R0080   THESE PROGRAMS ARE PROVIDED TO ALLOW OVERLAY OF BANKS 30 THRU 33 OF THE 205 VERSIONS OF SYSTEM TESTS AND
R0082   PRELAUNCH ALIGN.  THE INTENT IS TO ALLOW THE STG AND HYBRID LABS TO RUN ALL THE TESTS WITH COLOSSUS

 0085   REF   1                33,2000                     SETLOC  TESTLEAD
 0086                          33,2000                     BANK

 0087   REF   1                                            COUNT*  $$/COMST
 0088   REF   2  LAST  258     E5,1425                     EBANK=  QPLACE

 0089   REF   1                33,2000  0 3212 0  COMPVER  TC      GCOMPVER         MUST BE 33,2000.

 0090   REF   1                33,2001  0 2703 1  GTSCPSS1 TC      GTSCPSS          MUST BE AT 33,2001
```

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L       IMU CALIBRATION AND ALIGNMENT                                                          USER'S PAGE NO.  1      E 53

R0010   NAME- IMU PERFORMANCE TESTS 2

R0011   DATE- MARCH 20,1967

R0012   BY- SYSTEM TEST GROUP 864-6900 EXT. 1274

R0013   MODNO.- ZERO

R0014   FUNCTIONAL DESCRIPTION

R0015   POSITIONING ROUTINES FOR THE IMU PERFORMANCE TESTS AS WELL AS SOME OF
R0016   THE TESTS THEMSELVES. FOR A DESCRIPTION OF THESE SUBROUTINES AND THE
R0017   OPERATING PROCEDURES (TYPICALLY) SEE STG MEMO 685.THEORETICAL REF.E-1973

 0019   REF   1                 33,2000                                  SETLOC  IMUCAL
 0020                           33,2002                                  BANK

 0021   REF   1                 E5,1423                                  EBANK=  POSITON
 0022   REF   2 LAST   426 TO    427:        2      2*                   COUNT*  $$/COMST
 0036   REF  63  LAST  415      33,2002  0 4636 0   GEOIMUTT  TC      BANKCALL                GYROCOMPASS COMES IN HERE
 0037   REF   2  LAST  252      33,2003   16627 0             CADR    IMUZERO
 0038   REF   1                 33,2004  0 2126 0             TC      IMUSTLLG
 0039   REF  91  LAST  422      33,2005  3 4772 1   IMUBACK   CA      ZERO
 0040   REF   1                 33,2006  55'421 0             TS      NDXCTR
 0041   REF   1                 33,2007  55'450 0             TS      TORQNDX
 0042   REF   2  LAST  427      33,2010  55'451 1             TS      TORQNDX +1
 0043   REF   1                 33,2011  3 4352 1   NBPOSPL   CA      DEC17
 0044   REF   1                 33,2012  55'655 1             TS      ZERONDX1
 0045   REF   1                 33,2013  3 2221 1             CA      XNBADR
 0046   REF   1                 33,2014  0 2134 0             TC      ZEROING
 0047   REF   1                 33,2015  3 4753 1             CA      HALF
 0048   REF   2  LAST  299      33,2016  55'713 1             TS      XNB
 0049   REF  19  LAST  425      33,2017  0 6006 1             TC      INTPRET
 0050                           33,2020   73545 1             DLOAD   SIN
 0051   REF   1                 33,2021   02401 0                     AZIMUTH
 0052   REF   2  LAST  299      33,2022   02724 1             STORE   YNB +2
 0053   REF   2  LAST  299      33,2023   16734 0             STODL   ZNB +4
 0054   REF   2  LAST  427      33,2024   02401 0                     AZIMUTH
 0055                           33,2025   77746 1             COS
 0056   REF   3  LAST  427      33,2026   02726 0             STORE   YNB +4
 0057                           33,2027   77676 0             DCOMP
 0058   REF   3  LAST  427      33,2030   02732 0             STORE   ZNB +2
 00581                          33,2031   77776 1             EXIT
 00582  REF  13  LAST  276      33,2032  0 5354 0             TC      CHECKMM
 00583                          33,2033   00003 1             MM      03                        SEE IF IN OPTICAL VERIFICATION
 00584                          33,2034  1 2036 1             TCF     +2                       NO
 00585  REF   1                 33,2035  1 3217 1             TCF     SETNBPOS +1                YES
 00586  REF  20  LAST  427      33,2036  0 6006 1             TC      INTPRET
 00587                          33,2037   77624 1             CALL
 0059   REF   1                 33,2040   47344 1                     CALCGA
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0060                          33,2041   77776 1              EXIT
0061    REF  64  LAST  427    33,2042  0 4636 0              TC       BANKCALL
0062    REF   2  LAST  254    33,2043   16724 1              CADR     IMUCOARS
0063    REF   1               33,2044  3 4753 1              CAF      GLOKFBIT          IF GLOKFAIL SET, GIMBAL LOCK
0064    REF   4  LAST  208    33,2045  7 0077 0              MASK     FLAGWRD3
0065                          33,2046  0 0006 1              EXTEND
0066                          33,2047  1 2051 0              BZF      +2
0067    REF   2  LAST  427    33,2050  25'421 1              INCR     NDXCTR            +1 IF IN GIMBAL LOCK,OTHERWISE
0068    REF  23  LAST  279    33,2051  0 5561 0              TC       DOWNFLAG          RESET GIMBAL LOCK FLAG
0069    REF   1               33,2052   00056 1              ADRES    GLOKFAIL          BIT 14 FLAG 3
0070    REF   2  LAST  427    33,2053  0 2126 0              TC       IMUSTLLG
0071    REF   3  LAST  428    33,2054  11'421 0              CCS      NDXCTR            IF ONE GO AND DO A PIPA TEST ONLY
0072    REF   1               33,2055  0 2103 1              TC       PIPACHK           ALIGN AND MEASURE VERTICAL PIPA RATE
0074    REF  65  LAST  428    33,2056  0 4636 0              TC       BANKCALL
0075    REF   2  LAST  256    33,2057   17133 0              CADR     IMUFINE
0076    REF   3  LAST  428    33,2060  0 2126 0              TC       IMUSTLLG
0077                          33,2061  0 0006 1              EXTEND
00771   REF   1               33,2062  3 1657 1              DCA      PERFDLAY
00772   REF   1               33,2063  0 5332 0              TC       LONGCALL
00773   REF   2  LAST  427    E5,1423                        EBANK=   POSITON
00774   REF   1               33,2064   02070 1              2CADR    GOESTIMS
00774   REF   1               33,2065   66065 1
00775   REF   1               33,2066  3 2073 1              CA       ESTICADR
00776   REF   1               33,2067  0 5163 0              TC       JOBSLEEP
00777   REF   2  LAST  428    33,2070  3 2073 1   GOESTIMS   CA       ESTICADR
00778   REF   4  LAST  426    33,2071  0 5167 1              TC       JOBWAKE
00779   REF  16  LAST  422    33,2072  0 5314 1              TC       TASKOVER
007791  REF   1               33,2073   66227 0   ESTICADR   CADR     ESTIMS

0078    REF  92  LAST  427    33,2074  3 4772 1   TORQUE     CA       ZERO
0079    REF   7  LAST  295    33,2075  55'253 0              TS       DSPTEM2
0080    REF   1               33,2076  3 1514 0              CA       DRIFTI
0081    REF   8  LAST  428    33,2077  55'254 1              TS       DSPTEM2 +1
0082    REF   3  LAST  428    33,2100  51'423 0              INDEX    POSITON
0083    REF   2  LAST  102    33,2101  55'430 0              TS       SOUTHDR -1
0084    REF   1               33,2102  0 2205 1              TC       SHOW

0085    REF   1               33,2103  3 4756 1   PIPACHK    CA       EBANK4
0086    REF  12  LAST  384    33,2104  54 003 0              TS       EBANK
00865   REF   1               E4,1400                        EBANK=   ERASPIP
0087    REF   2  LAST  428    33,2105  0 1400 1              TC       ERASPIP
0183    REF   1               E5,1512                        EBANK=   DRIFTO
0184    REF   2  LAST  428    33,2106  3 1512 0   VALMIS     CA       DRIFTO
0185    REF   9  LAST  428    33,2107  55'254 1              TS       DSPTEM2 +1
0186    REF  93  LAST  428    33,2110  3 4772 1              CA       ZERO
0187    REF  10  LAST  428    33,2111  55'253 0              TS       DSPTEM2
0188    REF   2  LAST  428    33,2112  0 2205 1              TC       SHOW


01894   REF  24  LAST  428    33,2113  0 5561 0   ENDTEST1   TC       DOWNFLAG          IMU NOT IN USE
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L        IMU CALIBRATION AND ALIGNMENT                                                             USER'S PAGE NO.   3       F5 S3

 0190    REF    3  LAST  270   33,2114   00007 0            ADRES  IMUSE            BIT 3 FLAG 0
 0191    REF   94  LAST  428   33,2115  4 4772 0            CS     ZERO
 0192    REF    3  LAST  221   33,2116  0 5347 1            TC     NEWMODEA
 0193    REF   66  LAST  428   33,2117  0 4636 0            TC     BANKCALL
 0194    REF    1              33,2120   16073 1            CADR   MKRELEAS
 0195    REF   20  LAST  402   33,2121  0 5524 1            TC     ENDEXT
```

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L        IMU CALIBRATION AND ALIGNMENT                                                              USER'S PAGE NO.   4        E5 S3

 0196                            33,2122   43215 0  OVERFFIX DAD     DAD
 0197    REF    1                33,2123   15344 0                   DPPOSMAX
 0198    REF    1                33,2124   26670 1                   CNEDPP
 0199                            33,2125   77616 0           RVQ


 0212                            33,2126  0 0006 1  IMUSTLLG EXTEND
 0213    REF    3  LAST  426     33,2127  23'425 0           QXCH    QPLACE
 0214    REF   67  LAST  429     33,2130  0 4636 0           TC      BANKCALL
 0215    REF    6  LAST  314     33,2131   17644 1           CADR    IMUSTALL
 0216    REF    1                33,2132  0 2655 0           TC      SOMERR2
 0217    REF    4  LAST  430     33,2133  0 1425 0           TC      QPLACE
 0241    REF   55  LAST  425     33,2134  54 001 1  ZEROING  TS      L
 0242                            33,2135  1 2137 1           TCF     +2
 0243    REF    2  LAST  427     33,2136  55'655 1  ZEROING1 TS      ZERONDX1
 0244    REF   95  LAST  429     33,2137  3 4772 1           CAF     ZERO
 0245    REF   56  LAST  430     33,2140  50 001 0           INDEX   L
 0246                            33,2141  54 000 0           TS      0
 0247    REF   57  LAST  430     33,2142  24 001 0           INCR    L
 0248    REF    3  LAST  430     33,2143  11'655 1           CCS     ZERONDX1
 0249    REF    1                33,2144  1 2136 0           TCF     ZEROING1
 0250    REF  123  LAST  423     33,2145  0 0002 0           TC      Q
 0251    REF   1                  32,2000                              SETLOC  IMUCAL3
 0252                             32,2000                              BANK
 0253    REF   1                                                       COUNT*  $$/COMST
 0254                             32,2000   65345 0   ERTHRVSE  DLOAD   PDDL
 0255    REF   1                  32,2001   26663 0                     SCHZEROS         PD24 = (SIN            -COS     0)(OMEG/MS)
 0256    REF   1                  32,2002   02403 1                     LATITUDE
 0257                             32,2003   57546 1             COS     DCOMP
 0258                             32,2004   73525 1             PDDL    SIN
 0259    REF   2  LAST  431       32,2005   02403 1                     LATITUDE
 0260                             32,2006   74266 0             VDEF    VXSC
 0261    REF   1                  32,2007   26224 1                     OMEG/MS
 0262    REF   1                  32,2010   02405 1             STORE   ERVECTOR
 0263                             32,2011   77634 0             RTB
 0264    REF   1                  32,2012   51751 0                     LOADTIME
 0265    REF   1                  32,2013   26443 0             STOVL   TMARK
 0266    REF   2  LAST  431       32,2014   26663 0                     SCHZEROS
 0267    REF   1                  32,2015   02650 0             STORE   ERCOMP1
 0268                             32,2016   77616 0             RVQ
 0269    REF   2  LAST  427       33,2000                       SETLOC  IMUCAL
 0270                             33,2146                       BANK
 0271    REF   3 LAST  427 TO  431:     100    102*             COUNT*  $$/COMST
 0272                             33,2146   47020 0   EARTHR    ITA     RTB              CALCULATES AND COMPENSATES EARTH RATE
 0273    REF   1                  33,2147   00051 0                     S2
 0274    REF   2  LAST  431       33,2150   51751 0                     LOADTIME
 0275    REF   1                  33,2151   02441 1     +3      STORE   TEMPTIME
 0276                             33,2152   51025 1             DSU     BPL
 0277    REF   2  LAST  431       33,2153   02443 0                     TMARK
 0278    REF   1                  33,2154   66157 1                     ERTHR
 0279                             33,2155   77624 1             CALL
 0280    REF   1                  33,2156   66122 0                     OVERFFIX
 0281                             33,2157   74261 1   ERTHR     SL      VXSC
 0282                             33,2160   20212 1                     9D
 0283    REF   2  LAST  431       33,2161   02405 1                     ERVECTOR
 0284                             33,2162   53321 1             MXV     VAD
 0285    REF  14  LAST  424       33,2163   02672 0                     XSM
 0286    REF   2  LAST  431       33,2164   02650 0                     ERCOMP1
 0287    REF   3  LAST  431       33,2165   16650 0             STODL   ERCOMP1
 0288    REF   2  LAST  431       33,2166   02441 1                     TEMPTIME
 0289    REF   3  LAST  431       33,2167   02443 0             STORE   TMARK
 0290                             33,2170   47170 1             AXT,1   RTB
 0291    REF   4  LAST  431       33,2171   02647 0             ECADR   ERCOMP1
 0292    REF   1                  33,2172   45722 1                     PULSEIMU
 0293                             33,2173   77650 1             GOTO
 0294    REF   2  LAST  431       33,2174   00051 0                     S2
 0295                             33,2175  0 0006 1   EARTHR*   EXTEND
 02951   REF   1                  33,2176  23'426 0             QXCH    QPLACES
 02952   REF  21  LAST  427       33,2177  0 6006 1             TC      INTPRET
 02953                            33,2200   77624 1             CALL
 02954   REF   1                  33,2201   66146 1                     EARTHR
 02955                            33,2202   77776 1   PROUT     EXIT
 02956  REF   4  LAST  428   33,2203  0 2126 0                TC       IMUSTLLG
 02957  REF   2  LAST  431   33,2204  0 1426 0                TC       QPLACES
 0296                        33,2205  0 0006 1  SHOW          EXTEND
 0297   REF   5  LAST  430   33,2206  23'425 0                QXCH     QPLACE
 0298   REF   4  LAST  428   33,2207  3 1423 0  SHOW1         CA       POSITON
 0299   REF  11  LAST  428   33,2210  55'255 0                TS       DSPTEM2 +2
 0300   REF   1              33,2211  3 2217 1                CA       VB06N98
 0301   REF  68  LAST  430   33,2212  0 4636 0                TC       BANKCALL
 0302   REF   2  LAST  402   33,2213   20743 0                CADR     GOFLASH
 0304   REF   1              33,2214  0 2113 0                TC       ENDTEST1             V 34
 0305   REF   6  LAST  432   33,2215  0 1425 0                TC       QPLACE                V33
 0306   REF   1              33,2216  1 2207 1                TCF      SHOW1


 0307   REF   2  LAST  431   33,2223            3990DEC       =        OMEG/MS
 0308                        33,2217   01542 0  VB06N98       VN       0698
 0310   REF   6  LAST  373      4352            DEC17         =        ND1
 0311   REF  11  LAST  294   33,2220   02757 0  OGCPL         ECADR    OGC
 0312   REF   7  LAST  421      5016            1SECX         =        1SEC
 0313   REF   5  LAST  381      4351            DEC57         =        VD1
 0314   REF   3  LAST  427   33,2221   01713 0  XNBADR        GENADR   XNB
 0315   REF  15  LAST  431   33,2222   01671 0  XSMADR        GENADR   XSM
 0316                        33,2223   07623 1  OMEG/MS       2DEC     .24339048
 0316                        33,2224   26552 1


 03161  REF  69  LAST  432   33,2225  0 4636 0  P11OUT        TC       BANKCALL
 03162  REF   2  LAST  231   33,2226   70115 0                CADR     MATRXJOB           RETURN TO P11

 03165  REF   2  LAST  238      4000                          SETLOC   FFTAG1
 0317                           4510                          BANK

 03175  REF   1                                               COUNT*   $$/COMST
 0318                           4510  0 0004 0  FINETIME      INHINT                      RETURNS WITH INTERRUPT INHIBITED
 0319                           4511  0 0006 1    +1          EXTEND
 0320   REF   1                 4512  00 004 0                READ     LOSCALAR
 0321   REF  58  LAST  430      4513  54 001 1                TS       L
 0322                           4514  0 0006 1                EXTEND
 0323   REF   2  LAST  432      4515  06 004 0                RXOR     LOSCALAR
 0324                           4516  0 0006 1                EXTEND
 0325                           4517  1 4523 0                BZF      +4
 0326                           4520  0 0006 1                EXTEND
 0327   REF   3  LAST  432      4521  00 004 0                READ     LOSCALAR
 0328   REF  59  LAST  432      4522  54 001 1                TS       L
 0329   REF  11  LAST  360      4523  4 4750 0  +4            CS       POSMAX
 0330   REF  60  LAST  432      4524  6 0001 0                AD       L
 0331                           4525  0 0006 1                EXTEND
 0332   REF   1                 4526  1 4511 1                BZF      FINETIME +1
 0333                           4527  0 0006 1                EXTEND
 0334   REF   1                 4530  00 003 1                READ     HISCALAR
 0335   REF 124  LAST  430       4531  0 0002 0           TC      0

R0336   PROGRAM NAME-OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION
R0337   DATE- NOVEMBER 2  1966
R0338   BY- GEORGE SCHMIDT IL 7-146 EXT. 126
R0339   MOD NO 3
R0340   FUNCTIONAL DESCRIPTION

R0341   THIS     SECTION CONSISTS OF PRELAUNCH ALIGNMENT AND GYRO DRIFT TESTS
R0342   INTEGRATED TOGETHER TO SAVE WORDS. COMPASS IS COMPLETELY RESTART
R0343   PROOFED EXCEPT FOR THE FIRST 30 SECONDS OR SO.  PERFORMANCE TESTS OF
R0344   THE IRIGS IS RESTART PROOFED ENOUGH TO GIVE 75 PERCENT CONFIDENCE THAT
R0345   IF A RESTART OCCURS THE DATA WILL STILL BE GOOD. GOOD PRACTICE TO RECYCL
R0346   WHEN A RESTART OCCURS UNLESS IT HAPPENS NEAR THE END OF A TEST-THEN WAIT
R0347   FOR THE DATA TO FLASH.
R03471  A RESTART IN GYROCOMPASS DURING GYRO TORQUING CAUSES PULSES TO BE LOST
R0348   THE PRELAUNCH ALIGNMENT TECHNIQUE IS BASICALLY THE SAME AS IN BLOCK 1
R0349   EXCEPT THAT IT HAS BEEN SIMPLIFIED IN THE SENSE THAT SMALL ANGLE APPROX.
R0350   HAVE BEEN USED. THE DRIFT TESTS USE A UNIQUE IMPLEMENTATION OF THE
R0351   OPTIMUM STATISTICAL FILTER. FOR A DESCRIPTION SEE E-1973.BOTH OF THESE
R0352   ROUTINES USE STANDARD SYSTEM TEST LEADIN PROCEDURES. THE INITIALIZATION
R0353   PROCEDURE FOR THE DRIFT TESTS IS IN THE JDC S. THE INITIALIZATION METHOD
R0354   FOR GYROCOMPASS IS AN ERAS LOAD THEN A MISSION PHASE CALL.
R0355   THE COMPASS ALIGNS TO Z DOWN,X DOWNRANGE, HAS THE CAPABILITY
R0356   CHANGE AZIMUTH WHILE RUNNING , IS COMPENSATED FOR
R0357   COMPONENT ERRORS,IS CAPABLE OF OPTICAL VERIFICATION( CSM ONLY).

R0358   COMPASS ERASABLE LOAD REQUIRED

R0359    1-LAUNCHAZ -DP AZIMUTH IN REV FROM NORTH OF XSM DESIRED      (NOM=.2)
R0360   2- LATITUDE -DP-OF LAUNCH PAD
R0361   3- AZIMUTH-DP-OF ZNB OF VEHICLE
R03611  4- IMU COMPENSATION PARAMETERS
R0362   5-AZ AND ELEVATION OF TARGETS 1,2      ****OPTIONAL****

R0363   TO PERFORM AS PART OF COMPASS

R0364   1-OPTICAL VERIFICATION- V 65 E
R0365   2-AZIMUTH CHANGE-V 78 E

R0366   SUBROUTINES CALLED

R0367   DURING OPTICAL VERIFICATION (CSM ONLY) ESSENTIALLY ALL OF INFLIGHT ALIGN
R0368   IS CALLED IN ONE WAY OR ANOTHER. SEE THE LISTING.

R0369   NORMAL EXIT

R0370   DRIFT TESTS- LENGTHOT GOES TO ZERO-RETURN TO IMU PERF TEST2 CONTROL
R0371   GYROCOMPASS-MANY,SEE THE LISTING
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R0372   ALARMS

R0373   1600     OVERFLOW IN DRIFT TEST
R0374   1601     BAD IMU TORQUE ABORT
R0375   1602     BAD OPTICS DURING VERIFICATION-RETURN TO COMPASS     CSM ONLY

R0376   OUTPUT

R0377   DRIFT TESTS- FLASHING DISPLAYS OF RESULTS-CONTROLLED IN IMU PERF TESTS 2
R0378   COMPASS-PROGRAM MODE LIGHTS TELL YOU WHAT PHASE OF PROGRAM YOU ARE IN
R0379       01   INITIALIZING THE PLATFORM POSITION AND ERASABLE
R0380       02   GYROCOMPASSING
R0381       03   DOING OPTICAL VERIFICATION (CSM)
R0382
R0383
R0384   DEBRIS

R0385   ALL CENTRALS,ALL OF EBANK XSM
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R0386     MOST OF THE ROUTINES COMMON TO ALIGNMENT AND CALIBRATION APPEAR
R0387     ON THE NEXT FEW PAGES.

 0388   REF  16  LAST  432   E5,1671                          EBANK=  XSM
 0390   REF   3  LAST  431   33,2000                          SETLOC  IMUCAL
 0391                        33,2227                          BANK

 03915  REF   1                                               COUNT*  $$/P02
 0392   REF   2  LAST  270   33,2227  0 5362 0  ESTIMS        TC      2PHSCHNG             COMES HERE FROM IMU2
 0393                        33,2230   00075 0                OCT     00075
 03931                       33,2231   00004 0                OCT     00004                TURN OFF GROUP 4 IF ON
 03932  REF   1              01,2256            5P7SPT1       =       5.7SPOT
 0394                        33,2232  0 0004 0  RSTGTS1       INHINT                       COMES HERE PHASE1 RESTART
 0395   REF  11  LAST  421   33,2233  3 0025 0                CA      TIME1
 0396   REF   1              33,2234  55'645 0                TS      GTSWTLT1
 0397   REF  96  LAST  430   33,2235  3 4772 1                CAF     ZERO                ZERO THE PIPAS
 0398   REF   4  LAST  283   33,2236  54 037 1                TS      PIPAX
 0399   REF   3  LAST  182   33,2237  54 040 1                TS      PIPAY
 0400   REF   2  LAST  182   33,2240  54 041 0                TS      PIPAZ
 0402                        33,2241  0 0003 1                RELINT
 0403   REF   1              33,2242  3 2701 0                CA      77DECML              ZERO ALL NECESSARY LOCATIONS
 0404   REF   4  LAST  430   33,2243  55'655 1                TS      ZERONDX1
 0405   REF   1              33,2244  3 2702 0                CA      ALXXXZ
 0406   REF   2  LAST  427   33,2245  0 2134 0                TC      ZEROING
 0407   REF  22  LAST  431   33,2246  0 6006 1                TC      INTPRET
 04084                       33,2247   77735 0                SLOAD
 04085  REF   3  LAST  431   33,2250   26663 0                        SCHZEROS
 04086  REF   9  LAST  317   33,2251   25477 1                STOVL   GCOMPSW -1
 0409   REF   1              33,2252   26674 0                        INTVAL +2            LOAD SOME INITIAL DRIFT GAINS
 0410   REF   1              33,2253   26455 1                STOVL   ALXIS
 0411   REF   4  LAST  435   33,2254   26663 0                        SCHZEROS
 0412   REF  17  LAST  317   33,2255   01472 1                STORE   GCOMP
 0413   REF   6  LAST  310   33,2256   01315 1                STORE   DELVX                GCOMPZER SUBROUTINE NO LONGER NEEDED
 0414                        33,2257   77776 1                EXIT

 0415   REF   1              33,2260  11'643 0                CCS     GEOCOMP1            NON ZERO IF COMPASS.
 0416                        33,2261  0 2263 1                TC      +2
 0417   REF   1              33,2262  0 2277 1                TC      SLEEPIE +1
 0422   REF  23  LAST  435   33,2263  0 6006 1                TC      INTPRET
 04221                       33,2264   77624 1                CALL
 04222  REF   1              33,2265   64000 0                        ERTHRVSE
 04223                       33,2266   77776 1                EXIT
 0423   REF   1              33,2267  3 1412 1                CA      LENGTHOT              TIMES FIVE IS THE NUM OF SEC ERECTING
 0424   REF   1              33,2270  55'646 0                TS      ERECTIME

 0425   REF   1              33,2271  0 5344 1                TC      NEWMODEX
 0426                        33,2272   00002 0                MM      02
 0427   REF  70  LAST  432   33,2273  0 4636 0                TC      BANKCALL             SET UP PIPA FAIL TO CAUSE ISS ALARM
 0428   REF   2  LAST  317   33,2274   17214 0                CADR    PIPUSE               COMPASS NEVER TURNS THIS OFF
 0429   REF   1           33,2275  0 3157 1       TC      ANNNNNN          END OF FIRST TIME THROUGH
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R0430    COMES HERE AT THE END OF EVERY ITERATION THROUGH DRIFT TEST OR COMPASS

R0431   SET UP WAITLIST SECTION
 0432   REF   2  LAST  435   33,2276  55'412 0  SLEEPIE   TS      LENGTHOT          TEST NOT OVER-DECREMENT LENGTHOT
 0433   REF  11  LAST  415   33,2277  0 5402 1    +1      TC      PHASCHNG           CHANGE PHASE
 0434                        33,2300   00135 0            OCT     00135
 04345  REF   1              01,2264            5P13SPT1  =       5.13SPOT
 0435   REF   3  LAST  427   33,2301  11'450 0            CCS     TORQNDX           ARE WE DOING VERTDRIFT
 0436   REF   1              33,2302  0 2175 0            TC      EARTHR*           TRUE TORQUE SOUTH GYRO
 0437   REF   1              33,2303  0 3162 1  WTLISTNT  TC      CHKCOMED                SEE IF COMPASS OVER
 04371  REF   1              33,2304  0 2306 0            TC      SETGWLST
 04372  REF  48  LAST  421   33,2305  0 5205 0            TC      ENDOFJOB

 04373                       33,2306  0 0006 1  SETGWLST  EXTEND
 04374  REF 211  LAST  409   33,2307  22 154 1            QXCH    MPAC               CALLED EVERY WAITLIST OR AZIMUTH CHANGE
 0438                        33,2310  0 0004 0            INHINT
 0439   REF  12  LAST  435   33,2311  4 0025 1            CS      TIME1
 0440   REF   2  LAST  435   33,2312  6 1645 1            AD      GTSWTLT1
 0441                        33,2313  0 0006 1            EXTEND
 0442                        33,2314  6 2316 1            BZMF    +2
 0443   REF   2  LAST  421   33,2315  6 4752 0            AD      NEGMAX             10 MS ERROR OK
 0444   REF   1              33,2316  6 1644 0            AD      1SECXT1           1 SEC FOR CALIBRATION, .5 SEC IN COMPASS
 0445                        33,2317  0 0006 1            EXTEND
 0446   REF   1              33,2320  6 2324 0            BZMF    RIGHTGTS
 0447   REF   6  LAST  421   33,2321  0 5223 1  WTGTSMPL  TC      TWIDDLE
 0449   REF   1              33,2322   02350 0            ADRES   ALLOOP
 0451   REF 212  LAST  437   33,2323  0 0154 1            TC      MPAC
 0452   REF   7  LAST  370   33,2324  3 4766 1  RIGHTGTS  CAF     FOUR               SET UP NEXT WAITLIST-ALLOW SOME TIME
 0453   REF   1              33,2325  0 2321 0            TC      WTGTSMPL           END OF WAITLIST SECTION


R0454    STORE AND LOAD DATA SECTIONS FOR RESTART PROOFING

 0455   REF   2  LAST  363     4125             25DECML   EQUALS  OCT31
 0456   REF   1              33,2326  3 4125 0  STOREDTA  CAF     25DECML
 0457   REF 213  LAST  437   33,2327  54 154 0    +1      TS      MPAC
 0458   REF 214  LAST  437   33,2330  50 154 1            INDEX   MPAC
 0459   REF   2  LAST  103   33,2331  31'460 1            CAE     THETAX1
 0460   REF 215  LAST  437   33,2332  50 154 1            INDEX   MPAC
 0461   REF   1              33,2333  55'577 1            TS      RESTARPT
 0462   REF 216  LAST  437   33,2334  10 154 0            CCS     MPAC
 0463   REF   1              33,2335  1 2327 1            TCF     STOREDTA +1
 0464   REF 125  LAST  433   33,2336  0 0002 0            TC      Q


 0465   REF   2  LAST  437   33,2337  3 4125 0  LOADSTDT  CAF     25DECML
 0466   REF 217  LAST  437   33,2340  54 154 0    +1      TS      MPAC
 0467   REF 218  LAST  437   33,2341  50 154 1            INDEX   MPAC
 0468   REF   2  LAST  437   33,2342  3 1577 0            CA      RESTARPT
 0469   REF 219  LAST  437   33,2343  50 154 1            INDEX   MPAC
 0470   REF   3  LAST  437   33,2344  55'460 0              TS      THETAX1
 0471   REF 220  LAST  437   33,2345  10 154 0              CCS     MPAC
 0472   REF   1              33,2346  1 2340 0              TCF     LOADSTDT +1
 0473   REF 126  LAST  437   33,2347  0 0002 0              TC      Q


R0474    COMES HERE EVERY ITERATION BY A WAITLIST CALL SET IN SLEEPIE

 0475   REF  13  LAST  437   33,2350  3 0025 0  ALLOOP      CA      TIME1
 0476   REF   3  LAST  437   33,2351  55'645 0              TS      GTSWTLT1            STORE TIME TO SET UP NEXT WAITLIST.
 0477   REF   1              33,2352  3 1540 1  ALLOOP3     CA      ALTIM
 0478   REF   1              33,2353  55'631 0              TS      GEOSAVE1
 0479   REF  12  LAST  437   33,2354  0 5402 1              TC      PHASCHNG
 0480                        33,2355   00115 1              OCT     00115
 04805  REF   1              01,2261            5P11SPT1 =          5.11SPOT
 0481   REF   2  LAST  438   33,2356  31'631 1  ALLOOP1     CAE     GEOSAVE1
 0482   REF   2  LAST  438   33,2357  55'540 0              TS      ALTIM
 0483   REF 133  LAST  421   33,2360  10 000 0              CCS     A
 0484   REF 134  LAST  438   33,2361  3 0000 1              CA      A                   SHOULD NEVER HIT THIS LOCATION
 0485   REF   1              33,2362  55'541 1              TS      ALTIMS
 0486   REF 135  LAST  438   33,2363  4 0000 0              CS      A
 0487   REF   3  LAST  438   33,2364  55'540 0              TS      ALTIM
 0488   REF  97  LAST  435   33,2365  3 4772 1              CAF     ZERO
 04881  REF   5  LAST  435   33,2366  56 037 0              XCH     PIPAX
 0489   REF   7  LAST  435   33,2367  55'314 1              TS      DELVX
 0490   REF  98  LAST  438   33,2370  3 4772 1              CAF     ZERO
 04901  REF   4  LAST  435   33,2371  56 040 0              XCH     PIPAY
 0491   REF   4  LAST  310   33,2372  55'316 0              TS      DELVY
 0492   REF  99  LAST  438   33,2373  3 4772 1              CAF     ZERO
 04921  REF   3  LAST  435   33,2374  56 041 1              XCH     PIPAZ
 0493   REF   3  LAST  311   33,2375  55'320 0              TS      DELVZ
 0494   REF   1              33,2376  3 4351 1              CAF     19DECML             23 OCT
 0495   REF   1              33,2377  0 4126 0              TC      NEWPHASE
 0496                        33,2400   00005 1              OCT     00005
 0497   REF   1              01,2300            5P23SPT1 =          5.23SPOT
 0501   REF   3  LAST  248   33,2401  3 7644 0  SPECSTS     CAF     PRIO22
 0502   REF  19  LAST  422   33,2402  0 5135 0              TC      FINDVAC
 0503   REF   3  LAST  438   E5,1631                        EBANK=  GEOSAVE1
 0504   REF   1              33,2403   02406 1              2CADR   ALFLT                 START THE JOB
 0504   REF   1              33,2404   66065 1
 0505   REF  17  LAST  428   33,2405  0 5314 1              TC      TASKOVER
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R0506    THIS IS PART OF THE JOB DONE EVERY ITERATION

 0507    REF   2  LAST  437    33,2406  0 2326 1  ALFLT     TC      STOREDTA        STORE DATA IN CASE OF RESTART IN JOB
 0508    REF  13  LAST  438    33,2407  0 5402 1            TC      PHASCHNG       THIS IS THE JOB DONE EVERY ITERATION
 0509                          33,2410   00215 1            OCT     00215
 05095   REF   1               01,2275            5P21SPT1 =       5.21SPOT
 0510                          33,2411  1 2413 1            TCF     +2
 0511    REF   2  LAST  438    33,2412  0 2337 1  ALFLT1    TC      LOADSTDT        COMES HERE ON RESTART

 0512    REF   2  LAST  435    33,2413  11'643 0            CCS     GEOCOMP1
 0513                          33,2414  0 2416 0            TC      +2
 0514    REF   1               33,2415  0 2421 1            TC      NORMLOP
 0515    REF   2  LAST  437    33,2416  0 3162 1            TC      CHKCOMED            SEE IF PRELAUNCH OVER
 0516    REF  71  LAST  435    33,2417  0 4636 0            TC      BANKCALL        COMPENSATION IF IN COMPASS
 0517    REF   1               33,2420   15276 0            CADR    1/PIPA

 0518    REF  24  LAST  435    33,2421  0 6006 1  NORMLOP   TC      INTPRET
 0519                          33,2422   77745 1            DLOAD
 0520    REF   2  LAST  435    33,2423   26672 0                    INTVAL
 0521    REF   5  LAST  414    33,2424   24051 0            STOVL   S1
 0522    REF   8  LAST  438    33,2425   01315 1                    DELVX
 0523                          33,2426   76505 0            VXM     VSL1
 0524    REF  17  LAST  435    33,2427   02672 0                    XSM
 0525                          33,2430   57545 1            DLOAD   DCOMP
 0526    REF 221  LAST  438    33,2431   00160 0                    MPAC +3
 0527    REF   1               33,2432   16533 0            STODL   DPIPAY
 0528    REF 222  LAST  439    33,2433   00162 1                    MPAC +5
 0529    REF   1               33,2434   02537 1            STORE   DPIPAZ

 0530                          33,2435   76001 1            SETPD   AXT,1
 0531                          33,2436   00001 0                    0
 0532                          33,2437   00010 0                    8D
 0533                          33,2440   57535 0            SLOAD   DCOMP
 0534    REF   3  LAST  439    33,2441   02644 0                    GEOCOMP1
 0535                          33,2442   77640 0            BMN
 0536    REF   1               33,2443   66764 1                    ALWAYSG        DO A QUICK COMPASS
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R0537     NOW WE HAVE JUST THE CALIBRATION PARTS OF THE PROGRAM-NEXT PAGES

05375  REF   4 LAST  431 TO  432:     49   151*                 COUNT* $$/COMST
 0538                           33,2444   50135 0  ALCGKK    SLOAD  BMN
 0539  REF   2  LAST  438       33,2445   02542 0                   ALTIMS
 0540  REF   1                  33,2446   66461 1                   ALFLT3                 NO NEW GAINS NEEDED
 0541                           33,2447   72174 0  ALKCG     AXT,2  LXA,1                  LOADS SLOPES AND TIME CONSTANTS AT RQST
 0542                           33,2450   00014 1                   12D
 0543  REF   2  LAST  435       33,2451   02454 0                   ALX1S
 0544                           33,2452   62143 0  ALKCG2    DLOAD* INCR,1
 0545  REF   2  LAST   96       33,2453   02243 0                   ALFDK +144D,1
 0546                           33,2454   77775 1            DEC    -2
 0547  REF   1                  33,2455   12555 1            STORE  ALDK +10D,2
 0548                           33,2456   66104 1            TIX,2  SXA,1
 0549  REF   1                  33,2457   66452 1                   ALKCG2
 0550  REF   3  LAST  440       33,2460   02454 0                   ALX1S

 0551                           33,2461   77770 1  ALFLT3    AXT,1                         MEASUREMENT INCORPORATION ROUTINES
 0552                           33,2462   00010 0                   8D                     AND GAIN UPDATES
 0553                           33,2463   41343 0  DELMLP    DLOAD* DMP
 0554  REF   2  LAST  439       33,2464   02543 1                   DPIPAY +8D,1
 0555  REF   1                  33,2465   27427 0                   PIPASC
 0556                           33,2466   43661 1            SLR    BDSU*
 0557                           33,2467   21212 0                   9D
 0558  REF   1                  33,2470   02511 0                   INTY +8D,1
 0559  REF   2  LAST  440       33,2471   06511 1            STORE  INTY +8D,1
 0560                           33,2472   40725 0            PDDL   DMP*
 0561  REF   1                  33,2473   27431 1                   VELSC
 0562  REF   1                  33,2474   02531 1                   VLAUN +8D,1
 0563                           33,2475   77732 1            SL2R
 0564                           33,2476   45425 0            DSU    STADR
 0565  REF   1                  33,2477   71206 0            STORE  DELM +8D,1
 0566  REF   2  LAST  440       33,2500   06573 0            STORE  DELM +10D,1
 0567                           33,2501   77100 0            TIX,1  AXT,2
 0568  REF   1                  33,2502   66463 0                   DELMLP
 0569                           33,2503   00004 0                   4
 0570                           33,2504   56743 1  ALILP     DLOAD* DMPR*
 0571  REF   3  LAST  103       33,2505   75314 0                   ALK +4,2
 0572  REF   2  LAST  440       33,2506   75230 1                   ALDK +4,2
 0573  REF   4  LAST  440       33,2507   12463 0            STORE  ALK +4,2
 0574                           33,2510   77104 1            TIX,2  AXT,2
 0575  REF   1                  33,2511   66504 0                   ALILP
 0576                           33,2512   00010 0                   8D
 0577                           33,2513   66140 1  ALKLP     LXC,1  SXA,1
 0578  REF   1                  33,2514   02455 1                   CMPX1
 0579  REF   2  LAST  440       33,2515   02455 1                   CMPX1
 0580                           33,2516   56743 1            DLOAD* DMPR*
 0581  REF   5  LAST  440       33,2517   02460 1                   ALK +1,1
 0582  REF   3  LAST  440       33,2520   75206 1                   DELM +8D,2
 0583                           33,2521   77613 0            DAD*
 0584   REF   3  LAST  440   33,2522   75266 1                  INTY +8D,2
 0585   REF   4  LAST  441   33,2523   12511 1          STORE   INTY +8D,2
 0586                        33,2524   42743 1          DLOAD*  DAD*
 0587   REF   6  LAST  440   33,2525   75304 1                  ALK +12D,2
 0588   REF   3  LAST  440   33,2526   75220 0                  ALDK +12D,2
 0589   REF   7  LAST  441   33,2527   12473 1          STORE   ALK  +12D,2
 0590                        33,2530   42673 0          DMPR*   DAD*
 0591   REF   4  LAST  440   33,2531   75206 1                  DELM +8D,2
 0592   REF   5  LAST  441   33,2532   75256 1                  INTY +16D,2
 0593   REF   6  LAST  441   33,2533   12521 1          STORE   INTY +16D,2
 0594                        33,2534   40743 0          DLOAD*  DMP*
 0595   REF   1              33,2535   27434 1                  ALSK +1,1
 0596   REF   5  LAST  441   33,2536   75206 1                  DELM +8D,2
 0597                        33,2537   42772 0          SL1R    DAD*
 0598   REF   2  LAST  440   33,2540   75246 0                  VLAUN +8D,2
 0599   REF   3  LAST  441   33,2541   12531 0          STORE   VLAUN +8D,2
 0600                        33,2542   76104 0          TIX,2   AXT,1
 0601   REF   1              33,2543   66513 0                  ALKLP
 0602                        33,2544   00010 0                  8D


 0603                        33,2545   64743 0  LOOSE   DLOAD*  PDDL*           EXTRAPOLATE SWAY VARIABLES
 0604   REF   1              33,2546   02533 0                  ACCWD +8D,1
 0605   REF   4  LAST  441   33,2547   02531 1                  VLAUN +8D,1
 0606                        33,2550   55523 0          PDDL*   VDEF
 0607   REF   1              33,2551   02541 0                  POSNV +8D,1
 0608                        33,2552   76521 0          MXV     VSL1
 0609   REF   2  LAST   96   33,2553   02001 1                  TRANSM1
 0610                        33,2554   77745 1          DLOAD
 0611   REF 223  LAST  439   33,2555   00155 0                  MPAC
 0612   REF   2  LAST  441   33,2556   06541 1          STORE   POSNV +8D,1
 0613                        33,2557   77745 1          DLOAD
 0614   REF 224  LAST  441   33,2560   00160 0                  MPAC +3
 0615   REF   5  LAST  441   33,2561   06531 0          STORE   VLAUN +8D,1
 0616                        33,2562   77745 1          DLOAD
 0617   REF 225  LAST  441   33,2563   00162 1                  MPAC +5
 0618   REF   2  LAST  441   33,2564   06533 1          STORE   ACCWD +8D,1
 0619                        33,2565   77700 0          TIX,1
 0620   REF   1              33,2566   66545 0                  LOOSE


 0621                        33,2567   76174 1          AXT,2   AXT,1           EVALUATE SINES AND COSINES
 0622                        33,2570   00006 1                  6
 0623                        33,2571   00002 0                  2
 0624                        33,2572   57343 1  BOOP    DLOAD*  DMPR
 0625   REF   1              33,2573   02513 1                  ANGX +2,1
 0626   REF   1              33,2574   27437 1                  GEORGEJ
 0627                        33,2575   77722 0          SR2R
 0628                        33,2576   73406 1          PUSH    SIN
 0629                        33,2577   56072 1          SL3R    XAD,1
```

```
0630     REF   1              33,2600   00046 0                       X1
0631                          33,2601   10021 0             STORE     160,2
0632                          33,2602   77745 1             DLOAD
0633                          33,2603   77746 1             COS
0634                          33,2604   10027 0             STORE     220,2            COSINES
0635                          33,2605   77704 1             TIX,2
0636     REF   1              33,2606   66572 1                       BOOP
0637                          33,2607   77776 1  PERFERAS   EXIT
0638     REF   4  LAST  276   33,2610  0 4606 0             TC        E7SETTER
0639     REF   7  LAST  293   E7,1400                       EBANK=    LAT(SPL)
0640     REF   8  LAST  442   33,2611  0 1400 1             TC        LAT(SPL)         GO TO ERASABLE ONLY TO RETURN

R0641                 CAUTION

R0642    THE ERASABLE PROGRAM THAT DOES THE CALCULATIONS MUST BE LOADED
R0643    BEFORE ANY ATTEMPT IS MADE TO RUN THE IMU PERFORMANCE TEST

0734     REF   3  LAST  437   E5,1412                       EBANK=    LENGTHOT
0735     REF   4  LAST  442   33,2612  11'412 0  ONCEMORE   CCS       LENGTHOT
0736     REF   2  LAST  435   33,2613  0 2276 0             TC        SLEEPIE          TEST NOT OVER SET UP NEXT WAITLIST

07361    REF   4  LAST  437   33,2614  11'450 0             CCS       TORQNDX
07362                         33,2615  1 2617 1             TCF       +2
07363    REF   1              33,2616  0 2621 0             TC        SETUPER1
07364    REF   9  LAST  423   33,2617  3 0032 0             CA        CDUX
07365    REF   2  LAST  102   33,2620  55'414 0             TS        LOSVEC +1        FOR TROUBLESHOOTING POSNS 2$4 VD
0737     REF  25  LAST  439   33,2621  0 6006 1  SETUPER1   TC        INTPRET          DRIFT TEST OVER
0738                          33,2622   65345 0             DLOAD     PDDL             ANGLES FROM DRIFT TEST ONLY
0739     REF   1              33,2623   02503 0                       ANGZ
0740     REF   1              33,2624   02507 1                       ANGY
0741                          33,2625   55525 0             PDDL      VDEF
0742     REF   2  LAST  441   33,2626   02511 0                       ANGX
0743                          33,2627   74276 1             VCOMP     VXSC
0744     REF   2  LAST  441   33,2630   27437 1                       GEORGEJ
0745                          33,2631   74521 1             MXV       VSR1
0746     REF  18  LAST  439   33,2632   02672 0                       XSM
0747     REF  12  LAST  432   33,2633   02760 1             STORE     OGC
0748                          33,2634   77776 1             EXIT

0749     REF  14  LAST  439   33,2635  0 5402 1  TORQINCH   TC        PHASCHNG
0750                          33,2636   00005 1             OCT       00005
0751     REF   1              33,2637  3 2220 0             CA        OGCPL
0752     REF  72  LAST  439   33,2640  0 4636 0             TC        BANKCALL
0753     REF   3  LAST  314   33,2641   17244 0             CADR      IMUPULSE
0754     REF   5  LAST  432   33,2642  0 2126 0             TC        IMUSTLLG
0755     REF   5  LAST  442   33,2643  11'450 0             CCS       TORQNDX          + IF IN VERTICAL DRIFT TEST
0756     REF   1              33,2644  0 2106 1             TC        VALMIS           VERT DRIFT TEST OVER
0757     REF  26  LAST  442   33,2645  0 6006 1             TC        INTPRET
07571                         33,2646   77624 1             CALL                       SET UP ERATE FOR PIP TEST OR COMPASS
07572    REF   2  LAST  435   33,2647   64000 0                       ERTHRVSE
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 07573                      33,2650   77776 1           EXIT
 0758   REF   1             33,2651  0 2074 0           TC       TORQUE          GO TO IMU2 FOR A PIPA TEST AND DISPLAY

 0759   REF  19  LAST  268  33,2652  0 5671 1  SOMEERRR TC       ALARM
 0760                       33,2653   01600 0           OCT      1600
 0761                       33,2654  0 2657 1           TC       +3
 0762   REF  20  LAST  443  33,2655  0 5671 1  SOMERR2  TC       ALARM
 0763                       33,2656   01601 1           OCT      1601
 0764   REF  15  LAST  442  33,2657  0 5402 1           TC       PHASCHNG
 0765                       33,2660   00005 1           OCT      00005
 0766   REF   2  LAST  432  33,2661  0 2113 0           TC       ENDTEST1

R0767    THE FAMOUS MAGIC NUMBERS OF SCHMIDT ARE NOW PART OF AN ERASABLE LOAD.

 0769                       33,2662   00000 1  SCHZEROS 2DEC     .00000000
 0769                       33,2663   00000 1
 0770                       33,2664   00000 1           2DEC     .00000000
 0770                       33,2665   00000 1
 0771                       33,2666   00000 1           OCT      00000
 0772                       33,2667   00000 1  ONEDPP   OCT      00000
 0773                       33,2670   00001 0    +1     OCT      00001           ABOVE ORDER IS IMPORTANT

 0774                       33,2671   00004 0  INTVAL   OCT      4
 0775                       33,2672   00002 0           OCT      2
 0776                       33,2673   00220 1           DEC      144
 0777                       33,2674   77776 1           DEC      -1
 0778                       33,2675   35730 0  SOUPLY   2DEC     .93505870        INITIAL GAINS FOR PIP OUTPUTS
 0778                       33,2676   00035 1
 0779                       33,2677   10317 0           2DEC     .26266423        INITIAL GAINS/4 FOR ERECTION ANGLES
 0779                       33,2700   17550 1

 0780                       33,2701   00115 1  77DECML  DEC      77
 0781   REF   4  LAST  440  33,2702   01453 1  ALXXXZ   GENADR   ALXIS -1
R0789    GYROCOMPASS PORTIONS FINISH THIS LOG SECTION

 07895  REF   1                                         COUNT*   $$/P01
R0790    INITIALIZATION SECTION

 0791   REF  22  LAST  418  33,2703  3 0075 0  GTSCPSS  CA       FLAGWRD1        CALLED BY V37
 07911  REF   2  LAST  195  33,2704  7 4755 0           MASK     NOP01BIT
 07913                      33,2705  0 0006 1           EXTEND
 07914  REF   1             33,2706  1 2711 0           BZF      GTSCPSSA
 07915  REF   3  LAST  381  33,2707  0 5726 1           TC       POODOO
 07916                      33,2710   21521 1           OCT      21521           NO DO ALARM FOR P01 - P11 ALREADY DONE
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L        IMU CALIBRATION AND ALIGNMENT                                                      USER'S PAGE NO.  18       E5 S3

 07917  REF   1              33,2711  3 4753 1  GTSCPSSA CAF    PRIO20            INITIAL PRIORITY ONLY 13
 07918  REF   4  LAST  396   33,2712  0 5176 1           TC     PRIOCHNG          CHANGE TO 20

 07919  REF  50  LAST  421   33,2713  3 4770 0           CAF    ONE
 07920  REF   4  LAST  439   33,2714  55'643 0           TS     GEOCOMP1          THIS IS THE LEAD IN FOR COMPASS.
 07930  REF   1              33,2715  3 3211 0           CA     1/PIPAGT
 07940  REF   7  LAST  317   33,2716  55'277 0           TS     1/PIPADT
 07950  REF  26  LAST  314   33,2717  3 4761 0  NXXTBNN  CA     BIT8
 07960  REF   5  LAST  442   33,2720  55'412 0           TS     LENGTHOT
 07970  REF   1              33,2721  3 5011 1           CAF    1/2SECX            COMPASS IS A .5 SEC LOOP
 07980  REF   2  LAST  437   33,2722  55'644 1           TS     1SECXT1
 07990  REF  51  LAST  444   33,2723  3 4770 0           CAF    ONE
 08000  REF   1              33,2724  55'632 0           TS     PREMTRX1
 08005  REF   2  LAST  428   33,2725  55'657 0           TS     PERFDLAY +1
 08006  REF 100  LAST  438   33,2726  3 4772 1           CAF    ZERO
 08007  REF   3  LAST  444   33,2727  55'656 1           TS     PERFDLAY
 08010                       33,2730  0 0006 1           EXTEND
 08020  REF   4  LAST  103   33,2731  3 1634 1           DCA    LUNCHAZ1
 08030  REF   1              33,2732  53'636 1           DXCH   NEWAZ1
 08031                       33,2733  0 0006 1           EXTEND
 08032  REF   5  LAST  444   33,2734  3 1634 1           DCA    LUNCHAZ1
 08033  REF   1              33,2735  53'640 0           DXCH   OLDAZMTH
 08040  REF   2  LAST  427   33,2736  3 4352 1  SETUPGC  CA     DEC17
 08050  REF   5  LAST  435   33,2737  55'655 1           TS     ZERONDX1
 08060  REF   1              33,2740  3 2222 1           CA     XSMADR
 08070  REF   3  LAST  435   33,2741  0 2134 0           TC     ZEROING
 08080  REF   1              33,2742  0 2744 1           TC     POSN17C
 08090  REF   1              33,2743  0 2002 1           TC     GEOIMUTT           GO TO IMU2 FOR FURTHER INITIALIZATION


 08100                       33,2744  0 0006 1  POSN17C  EXTEND                    COMPASS POSITION Z DOWN,X DOWNRANGE
 08110  REF   7  LAST  432   33,2745  23'425 0           QXCH   QPLACE            FROM NORTH IN REVOLUTIONS + CLOCKWSE
 08120  REF   2  LAST  427   33,2746  4 4753 0           CS     HALF              ALL THIS TO INITIALIZE MATRIX
 08130  REF   2  LAST   99   33,2747  55'705 0           TS     ZSM
 08140  REF  27  LAST  442   33,2750  0 6006 1           TC     INTPRET
 08150                       33,2751   41545 0           DLOAD  PUSH
 08160  REF   2  LAST  444   33,2752   02636 0                  NEWAZ1
 08170                       33,2753   77756 0           SIN
 08180  REF  19  LAST  442   33,2754   02676 1           STORE  XSM +4
 08190  REF   2  LAST   99   33,2755   16702 0           STODL  YSM +2
 08200                       33,2756   77746 1           COS
 08210  REF   3  LAST  444   33,2757   02704 0           STORE  YSM +4
 08220                       33,2760   77676 0           DCOMP
 08230  REF  20  LAST  444   33,2761   02674 0           STORE  XSM +2
 08240                       33,2762   77776 1           EXIT
 08250  REF   8  LAST  444   33,2763  0 1425 0           TC     QPLACE


R08260    JOB DONE EVERY ITERATION THROUGH COMPASS PROGRAM.SET BY TASK ALLOOP
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08268  REF   2 LAST  435 TO  440:    141    141*              COUNT* $$/P02
 0827                        33,2764    44743 1  ALWAYSG   DLOAD* DSU*              COMPASS AND ERECT
 0828  REF   3  LAST  440    33,2765    02543 1                   DPIPAY +8D,1
 0829  REF   2  LAST  103    33,2766    02505 0                   FILDELV1 +8D,1
 0830                        33,2767    42675 0            DMPR   DAD*
 0831  REF   1               33,2770    27441 0                   GEOCONS1
 0832  REF   3  LAST  445    33,2771    02505 0                   FILDELV1 +8D,1
 0833  REF   4  LAST  445    33,2772    06505 1            STORE  FILDELV1 +8D,1
 0834                        33,2773    77613 0            DAD*
 0835  REF   1               33,2774    02507 1                   INTVEC1 +8D,1
 0836  REF   2  LAST  445    33,2775    06507 0            STORE  INTVEC1 +8D,1
 0837                        33,2776    42675 0            DMPR   DAD*
 0838  REF   1               33,2777    27443 1                   GEOCONS2
 0839  REF   5  LAST  445    33,3000    02505 0                   FILDELV1 +8D,1
 0840                        33,3001    41475 1            DMPR   PUSH
 0841  REF   1               33,3002    15334 1                   GEOCONS5
 0842                        33,3003    67300 0            TIX,1  SLOAD
 0843  REF   2  LAST  439    33,3004    66764 1                   ALWAYSG
 0844  REF   1               33,3005    02647 0                   ERECTIM1
 0845                        33,3006    71254 1            BZE    DLOAD
 0846  REF   1               33,3007    67020 1                   COMPGS
 0847  REF   2  LAST  103    33,3010    02471 1                   THETAN1 +2
 0848                        33,3011    45425 0            DSU    STADR
 0849  REF   3  LAST  445    33,3012    61306 0            STODL  THETAN1 +2        ERECTION ONLY.
 0850                        33,3013    77621 1            BDSU
 0851  REF   4  LAST  445    33,3014    02473 0                   THETAN1 +4
 0852  REF   5  LAST  445    33,3015    02473 0            STORE  THETAN1 +4
 0853                        33,3016    77650 1            GOTO
 0854  REF   1               33,3017    67042 0                   ADDINDRF
 0855                        33,3020    43345 1  COMPGS    DLOAD  DAD               COMPASS
 0856  REF   6  LAST  445    33,3021    02467 0                   THETAN1
 0857  REF   6  LAST  445    33,3022    02475 0                   FILDELV1
 0858  REF   7  LAST  445    33,3023    16467 0            STODL  THETAN1
 0859  REF   7  LAST  445    33,3024    02475 0                   FILDELV1
 0860                        33,3025    44275 1            DMPR   BDSU
 0861  REF   1               33,3026    27445 1                   GEOCONS3
 0862  REF   8  LAST  445    33,3027    02473 0                   THETAN1 +4
 0863  REF   9  LAST  445    33,3030    16473 0            STODL  THETAN1 +4
 0864  REF   8  LAST  445    33,3031    02501 1                   FILDELV1 +4
 0865                        33,3032    44275 1            DMPR   BDSU
 0866  REF   2  LAST  445    33,3033    27445 1                   GEOCONS3
 0867  REF  10  LAST  445    33,3034    02471 1                   THETAN1 +2
 0868                        33,3035    57325 1            PDDL   DMPR
 0869  REF   3  LAST  445    33,3036    02503 0                   INTVEC1 +4
 0870  REF   1               33,3037    27447 0                   GEOCONS4
 0871                        33,3040    45421 1            BDSU   STADR
 0872  REF  11  LAST  445    33,3041    75306 0            STORE  THETAN1 +2
 0873                        33,3042    77776 1  ADDINDRF  EXIT
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0874    REF   6  LAST  444   33,3043  11'412 0  ENDGTSAL CCS     LENGTHOT         IS 5 SEC OVER-THE TIME TO TORQ PLATFORM
0875    REF   3  LAST  442   33,3044  0 2276 0           TC      SLEEPIE          NO-SET UP NEXT WAITLIST CALL FOR .5 SEC
0876    REF   3  LAST  439   33,3045  0 3162 1           TC      CHKCOMED
0877    REF   2  LAST  204   33,3046  11'324 1           CCS     LGYRO            YES BUT ARE GYROS BUSY
0878    REF   4  LAST  446   33,3047  1 2277 0           TCF     SLEEPIE +1       BUSY-GET THEM .5 SECONDS FROM NOW

0879    REF  28  LAST  444   33,3050  0 6006 1  LASTGTS  TC      INTPRET
0880                         33,3051   77775 1           VLOAD
0881    REF   5  LAST  431   33,3052   02650 0                   ERCOMP1
0882    REF   4  LAST  438   33,3053   16461 0           STODL   THETAX1
0883    REF   4  LAST  431   33,3054   02443 0                   TMARK
0884    REF   8  LAST  441   33,3055   02457 0           STORE   ALK
0885                         33,3056   77776 1           EXIT                     PREVIOUS SECTION WAS FOR RESTARTS

0886    REF  16  LAST  443   33,3057  0 5402 1  RESTAIER TC      PHASCHNG
0887                         33,3060   00275 1           OCT     00275
08875   REF   1              01,2306            5P27SPT1 =       5.27SPOT
0888    REF  29  LAST  446   33,3061  0 6006 1           TC      INTPRET          ADD COMPASS COMMANDS INTO ERATE
0889                         33,3062   64375 1           VLOAD   MXV
0890    REF  12  LAST  445   33,3063   02467 0                   THETAN1
0891    REF  21  LAST  444   33,3064   02672 0                   XSM
0892                         33,3065   53372 1           VSL1    VAD
0893    REF   5  LAST  446   33,3066   02461 0                   THETAX1
0894    REF   6  LAST  446   33,3067   16650 0           STODL   ERCOMP1
0895    REF   9  LAST  446   33,3070   02457 0                   ALK
0896    REF   5  LAST  446   33,3071   02443 0           STORE   TMARK
0897                         33,3072   77776 1           EXIT
0898    REF   2  LAST  437   33,3073  0 2175 0           TC      EARTHR*          TORQUE IT ALL IN
0899    REF   2  LAST  445   33,3074  31'646 1           CAE     ERECTIM1
0900    REF   4  LAST  438   33,3075  55'631 0           TS      GEOSAVE1
0901    REF  17  LAST  446   33,3076  0 5402 1           TC      PHASCHNG
0902                         33,3077   00155 0           OCT     00155
09025   REF   1              01,2267            5P15SPT1 =       5.15SPOT
0903    REF  30  LAST  446   33,3100  0 6006 1  RESTEST1 TC      INTPRET
0904                         33,3101   77775 1           VLOAD
0905    REF   5  LAST  435   33,3102   26663 0                   SCHZEROS
0906    REF  13  LAST  446   33,3103   02467 0           STORE   THETAN1
0907                         33,3104   77776 1           EXIT
0912    REF   1              33,3105  11'632 0           CCS     PREMTRXC
09121   REF   1              33,3106  0 3155 0           TC      NOCHORLD
09122   REF  18  LAST  446   33,3107  0 5402 1           TC      PHASCHNG
0913                         33,3110   00255 0           OCT     00255
091305  REF   1              01,2303            5P25SPT1 =       5.25SPOT
09131   REF  31  LAST  446   33,3111  0 6006 1  RESTEST3 TC      INTPRET
0914                         33,3112   77745 1           DLOAD
09142   REF   2  LAST  183   33,3113   02634 1                   LAUNCHAZ
0915                         33,3114   53025 0           DSU     BZE
09151   REF   2  LAST  444   33,3115   02640 1                   OLDAZMTH
09152   REF   1              33,3116   67152 0                   NOAZCHGE
09153                        33,3117   00001 0           STORE   00
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 09154                       33,3120   43335 0          SLOAD  DAD
 09155  REF   2  LAST  430   33,3121   26671 0                 ONEDPP +1
 0918   REF   2  LAST  446   33,3122   02633 0                 PREMTRXC          DOES NOT CHANGE LAUNCHAZ
 0919   REF   3  LAST  447   33,3123   16633 0          STODL  PREMTRXC
 0920   REF   3  LAST  446   33,3124   02634 1                 LAUNCHAZ
 09201  REF   1              33,3125   16636 0          STODL  NEWAZMTH
 09202                       33,3126   00001 0                 0D
 09203  REF   1              33,3127   02654 1 ADERCOMP STORE  ERCOMP +4
 09204                       33,3130   77776 1          EXIT
 09205  REF   2  LAST  444   33,3131  0 2744 1          TC     POSN17C
 09206  REF  19  LAST  446   33,3132  0 5402 1          TC     PHASCHNG
 09207                       33,3133   00335 1          OCT    00335
 09208  REF   1              01,2314           5P33SPT1 =      5.33SPOT
 0921                        33,3134  0 0006 1 RESCHNG  EXTEND
 0922   REF   2  LAST  447   33,3135  3 1636 0          DCA    NEWAZMTH
 0923   REF   3  LAST  446   33,3136  53'640 0          DXCH   OLDAZMTH
 09231  REF  22  LAST  395   33,3137  3 4762 0          CA     BIT7               SPEND 320 SEC ERECTING
 09232  REF   7  LAST  446   33,3140  55'412 0          TS     LENGTHOT
 0924   REF  20  LAST  447   33,3141  0 5402 1          TC     PHASCHNG
 0925                        33,3142   00075 0          OCT    00075
 09255  REF   2  LAST  435   01,2256           5P7SPT2  =      5.7SPOT
 0926   REF   1              33,3143  3 3210 1 SPITGYRO CA     ERCOMPPL
 0927   REF  73  LAST  442   33,3144  0 4636 0          TC     BANKCALL
 0928   REF   4  LAST  442   33,3145   17244 0          CADR   IMUPULSE
 0929   REF  74  LAST  447   33,3146  0 4636 0          TC     BANKCALL
 0930   REF   7  LAST  430   33,3147   17644 1          CADR   IMUSTALL
 0931   REF   2  LAST  430   33,3150  0 2655 0          TC     SOMERR2
 09311  REF   2  LAST  428   33,3151  0 2227 1          TC     ESTIMS             RE-INITIALIZE


 0932                        33,3152   77776 1 NOAZCHGE EXIT
 0933   REF  52  LAST  444   33,3153  3 4770 0          CA     ONE
 0934   REF   4  LAST  447   33,3154  55'632 0          TS     PREMTRXC
 0941   REF   5  LAST  446   33,3155  11'631 0 NOCHORLD CCS    GEOSAVE1
 0942   REF   3  LAST  446   33,3156  55'646 0          TS     ERECTIM1          COUNTS DOWN FOR ERECTION.

 0943   REF   1              33,3157  3 4322 0 ANNNNNN  CAF    NINE
 0944   REF   8  LAST  447   33,3160  55'412 0          TS     LENGTHOT
 0945   REF   5  LAST  446   33,3161  0 2277 1          TC     SLEEPIE +1


 0946                        33,3162  0 0004 0 CHKCOMED INHINT
 09461  REF   8  LAST  396   33,3163  4 1214 0          CS     MODREG             CHECK FOR MM 07 FIRST
 09462  REF  10  LAST  381   33,3164  6 4774 1          AD     SEVEN
 09463                       33,3165  0 0006 1          EXTEND
 09464  REF   1              33,3166  1 3202 0          BZF    GOBKCALB           IF MM 07 RETURN TO PERF TEST
 0947   REF 101  LAST  444   33,3167  4 4772 0          CS     ZERO
 0948                        33,3170  0 0006 1          EXTEND
 0949   REF   5  LAST  261   33,3171  06 030 1          RXOR   CHAN30            READ AND INVERT BITS IN CHANNEL 30
 0950   REF  19  LAST  388   33,3172  7 4764 1          MASK   BIT5              LIFTOFF BIT
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L        IMU CALIBRATION AND ALIGNMENT                                                 USER'S PAGE NO.  22       E5 53

 0951    REF 136  LAST  438    33,3173  10 000 0            CCS      A
 0952    REF   1               33,3174  1 3203 1            TCF      PRELTERM         LIFTOFF HAS OCCURRED

 0953    REF   2  LAST  261    33,3175  3 4764 0            CA       GRRBKBIT         CHECK FOR BACKUP LIFTOFF
 0954    REF   9  LAST  261    33,3176  7 0101 0            MASK     FLAGWRD5         BITS FLAGWRD5
 0955    REF 137  LAST  448    33,3177  10 000 0            CCS      A
 0956    REF   2  LAST  448    33,3200  1 3203 1            TCF      PRELTERM         BACKUP RECEIVED

 0957                          33,3201  0 0003 1            RELINT
 0958    REF 127  LAST  438    33,3202  0 0002 0  GOBKCALB  TC       Q

 0959    REF   4  LAST  438    33,3203  3 7644 0  PRELTERM  CA       PRIO22           PRELAUNCH DONE - SET UP P11
 0960    REF   5  LAST  444    33,3204  0 5176 1            TC       PRIOCHNG         INCREASE PRIORITY HIGHER THAN SERVICER
 0961                          33,3205  0 0004 0            INHINT
 0962    REF  35  LAST  421    33,3206  0 4655 0            TC       POSTJUMP
 0963    REF   1               33,3207   70000 0            CADR     P11


 0965    REF   2  LAST  447    33,3210   02647 0  ERCOMPPL  ECADR    ERCOMP

 0968    REF   3  LAST  400    26,3333            GEOCONS5  EQUALS   HIDPHALF
 0969                          33,3211   06200 0  1/PIPAGT  OCT      06200
 0970    REF   7  LAST  432       4352            17DECML   =        ND1              OCT 21
 0971    REF   6  LAST  432       4351            19DECML   =        VD1              OCT 23
 0972    REF   3  LAST  200       5011            1/2SECX   =        .5SEC
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L       IMU CALIBRATION AND ALIGNMENT                                                            USER'S PAGE NO. 23      E5 S3

P0973   OPTICAL VERIFICATION ROUTINES FOR GYROCOMPASS

 09735  REF   1                                                      COUNT* $$/P03
 0974   REF  21  LAST  447    33,3212  0 5402 1  GCOMPVER TC      PHASCHNG              OPTICAL VERIFICATION ROUTINE
 0975                         33,3213   00154 1           OCT     00154
 09755  REF   1               01,2143            4P15SPT1 =       4.15SPOT
 0976   REF   2  LAST  435    33,3214  0 5344 1           TC      NEWMODEX               ENTERED BY VERB 65 ENTER
 0977                         33,3215   00003 1           MM      03
 09771  REF   1               33,3216  0 2011 0  SETNBPOS TC      NBPOSPL
 0978   REF  75  LAST  447    33,3217  0 4636 0    +1     TC      BANKCALL
 0979   REF   2  LAST  429    33,3220   16073 1           CADR    MKRELEAS
 0980   REF  25  LAST  382    33,3221  3 4770 0  OPTDATA  CAF     BIT1                  CALLS FOR AZIMUTH AND ELEVATION OF TARGE
 0981                         33,3222  22 007 0           ZL                            T 1,THEN TARGET 2
 0982   REF   1               33,3223  23'427 1    +2     LXCH    RUN
 0983   REF  14  LAST  367    33,3224  55'252 1           TS      DSPTEM1 +2            ELEVATION MEASURED FROM HORIZONTAL
 0984                         33,3225  0 0006 1           EXTEND
 0985   REF   2  LAST  449    33,3226  5 1427 1           INDEX   RUN
 0986   REF   1               33,3227  3 1433 1           DCA     TAZEL1
 0987   REF  15  LAST  449    33,3230  53'251 1           DXCH    DSPTEM1
 0988   REF   1               33,3231  3 3252 1  OPTDATA8 CAF     V05N30E
 0989   REF  76  LAST  449    33,3232  0 4636 0           TC      BANKCALL
 0990   REF   1               33,3233   20705 1           CADR    GODSPRET
 0991   REF   1               33,3234  3 5032 0           CAF     V06N41
 09911  REF  77  LAST  449    33,3235  0 4636 0           TC      BANKCALL
 09912  REF   3  LAST  432    33,3236   20743 0           CADR    GOFLASH
 09913  REF   2  LAST  241    33,3237  0 3370 0           TC      GCOMP5
 09914                        33,3240  0 3242 0           TC      +2
 09915  REF   1               33,3241  1 3231 0           TCF     OPTDATA8

 0992   REF  16  LAST  449    33,3242  53'251 1           DXCH    DSPTEM1               TAZEL1  TARGET 1 AZIMUTH
 0993   REF   3  LAST  449    33,3243  51'427 1           INDEX   RUN
 0994   REF   2  LAST  449    33,3244  53'433 0           DXCH    TAZEL1                TAZEL1 +2 TARGET 2 AZIMUTH
 0995   REF   4  LAST  449    33,3245  11'427 0           CCS     RUN
 0996   REF   1               33,3246  1 3313 1           TCF     CONTIN33
 0997   REF  24  LAST  418    33,3247  3 4767 0           CAF     TWO
 0998   REF  61  LAST  432    33,3250  54 001 1           TS      L
 0999   REF   1               33,3251  1 3223 0           TCF     OPTDATA +2            MPAC    1ST PASS=0  2ND PASS=2


 099921                       33,3252   01236 1  V05N30E  VN      0530

 10136  REF  32  LAST  446    33,3253  0 6006 1           TC      INTPRET                UNDYNAMIC ASSEMBLER
 1014                         33,3254   77170 1  TAR/EREF AXT,1   AXT,2                 TARGET VECTOR
 1015                         33,3255   00002 0                   2                     SIN(EL)  -COS(AZ)COS(EL)   SIN(AZ)COS(EL
 1016                         33,3256   00014 1                   120
 1017                         33,3257   40331 1           SSP     SETPD
 1018   REF   3  LAST  431    33,3260   00052 0                   S2
 1019                         33,3261   00006 1                   6
 1020                         33,3262   00001 0                   0
 1021                         33,3263   60533 1  TAR1     SLOAD*  SR2                   X1=2 X2=12 S2=6 X1=0 X2=6 S2=6
 1022    REF   3  LAST  449   33,3264   02436 1                    TAZEL1 +3,1
 1023                         33,3265   00001 0            STORE   0                 PD00     ELEVATION    PD00
 1024                         33,3266   77756 0            SIN
 1025                         33,3267   10023 1            STORE   18D,2             PD06 ***    SIN(EL)    ***PD12
 1026                         33,3270   77745 1            DLOAD
 1027                         33,3271   00001 0                    0
 1028                         33,3272   41546 0            COS     PUSH              PD00     COS(EL)   PD00
 1029                         33,3273   47133 0            SLOAD*  RTB
 1030    REF   4  LAST  450   33,3274   02435 1                    TAZEL1 +2,1
 1031    REF   4  LAST  409   33,3275   51754 0                    CDULOGIC
 1032                         33,3276   00003 1            STORE   2                 PD02          AZIMUTH   PD02
 1033                         33,3277   41356 1            SIN     DMP
 1034                         33,3300   00001 0                    0
 1035                         33,3301   77752 1            SL1
 1036                         33,3302   10027 0            STORE   22D,2             PD10  *** SIN(AZ)COS(EL)  ***PD16
 1037                         33,3303   71545 0            DLOAD   COS
 1038                         33,3304   00003 1                    2
 1039                         33,3305   72405 0            DMP     SL1
 1040                         33,3306   76076 1            DCOMP   AXT,1
 1041                         33,3307   00000 1                    0
 1042                         33,3310   10025 1            STORE   20D,2             PD08 ***   -COS(AZ)COS(EL)  ***PD14
 1043                         33,3311   43504 1            TIX,2   RVQ
 1044    REF   1              33,3312   67263 1                    TAR1


 104435 REF    4  LAST  435   33,2000                      SETLOC  IMUCAL
 10444                        33,3313                      BANK
 104445 REF    2 LAST  449 TO  450:     65      65*        COUNT*  $$/P03
 10445   REF  53  LAST  447   33,3313  3 4770 0  CONTIN33 CA      ONE
 10446   REF   3  LAST  293   33,3314  55'140 1           TS      STARCODE
 10447   REF 102  LAST  447   33,3315  3 4772 1           CA      ZERO
 10448   REF   1              33,3316  0 3375 0           TC      TARGDRVE
 10449   REF  33  LAST  449   33,3317  0 6006 1           TC      INTPRET
 104492                       33,3320   77624 1           CALL
 104494 REF    1              33,3321   67254 0                   TAR/EREF
 104496                       33,3322   64375 1  NEXTBNKS VLOAD   MXV
 1045                         33,3323   00007 0                   6D
 1047    REF  22  LAST  446   33,3324   02672 0                   XSM
 10471                        33,3325   77772 0           VSL1
 1048    REF   3  LAST   99   33,3326   26736 1           STOVL   STARAD
 1049                         33,3327   00015 0                   12D
 1050                         33,3330   76521 0           MXV     VSL1
 1051    REF  23  LAST  450   33,3331   02672 0                   XSM
 1052    REF   4  LAST  450   33,3332   36744 0           STCALL  STARAD +6
 1054    REF   1              33,3333   67450 1                   LITTLSUB
 1060    REF   3  LAST  442   33,3334   02414 1           STORE   LOSVEC
 1061                         33,3335   77776 1           EXIT
 1069    REF  25  LAST  449   33,3336  3 4767 0  NEXBNKSS CAF     TWO
 1070    REF   4  LAST  450   33,3337  55'140 1           TS      STARCODE
 1071    REF  15  LAST  420   33,3340  3 6211 0           CAF     SIX
 1072     REF   2  LAST  450     33,3341  0 3375 0                TC      TARGDRVE
 1073     REF  34  LAST  450     33,3342  0 6006 1                TC      INTPRET
 1074                            33,3343   77624 1                CALL
 1075     REF   2  LAST  450     33,3344   67450 1                        LITTLSUB
 10751                           33,3345   24015 0                STOVL   12D
 10752    REF   4  LAST  450     33,3346   02414 1                        LOSVEC
 10753                           33,3347   34007 1                STCALL  06D
 10754    REF   1                33,3350   47432 1                        AXISGEN
 10755                           33,3351   77624 1                CALL
 10756    REF   1                33,3352   47240 1                        CALCGTA
 10757                           33,3353   77776 1                EXIT
 1076     REF   1                33,3354  3 5040 0     GCOMP4     CAF     V06N93
 1077     REF  78  LAST  449     33,3355  0 4636 0                TC      BANKCALL
 1078     REF   4  LAST  449     33,3356   20743 0                CADR    GCFLASH
 1079     REF   3  LAST  449     33,3357  0 3370 0                TC      GCOMP5
 1080                            33,3360  1 3362 1                TCF     +2
 1081     REF   1                33,3361  1 3354 1                TCF     GCOMP4
 1082     REF  35  LAST  451     33,3362  0 6006 1                TC      INTPRET
 1083                            33,3363   53375 0                VLOAD   VAD
 1084     REF  13  LAST  442     33,3364   02760 1                        CGC
 1085     REF   7  LAST  446     33,3365   02650 0                        ERCOMP1
 1086     REF   8  LAST  451     33,3366   02650 0                STORE   ERCOMP1
 1087                            33,3367   77776 1                EXIT
 1090     REF   3  LAST  449     33,3370  0 5344 1     GCOMP5     TC      NEWMODEX
 1091                            33,3371   00002 0                MM      02
 1092     REF  22  LAST  449     33,3372  0 5402 1                TC      PHASCHNG
 1093                            33,3373   00004 0                OCT     00014
 1094     REF  49  LAST  437     33,3374  0 5205 0                TC      ENDOFJOB
 1137     REF   5  LAST  450     33,2000                          SETLOC  IMUCAL
 1138                            33,3375                          BANK


 1139     REF   3 LAST  450 TO  451:      50    115*              COUNT*  $$/P03
 1140                            33,3375  0 0006 1     TARGDRVE   EXTEND
 1141     REF   1                33,3376  23'424 1                QXCH    QPLAC
 1142     REF   1                33,3377  55'431 1                TS      TARG1/2
 11421    REF  36  LAST  451     33,3400  0 6006 1                TC      INTPRET
 1143                            33,3401   77624 1                CALL
 1144     REF   2  LAST  450     33,3402   67254 0                        TAR/EREF
 1145                            33,3403   76740 0                LXC,1   VLOAD*
 1146     REF   2  LAST  451     33,3404   02431 0                        TARG1/2
 1147                            33,3405   00007 0                        6D,1
 1148     REF   7  LAST  300     33,3406   36766 0                STCALL  STAR
 1149     REF   1                33,3407   46053 0                        SXTANG
 1150                            33,3410   77776 1                EXIT
 1151     REF   6  LAST  300     33,3411  3 1773 0                CA      SAC
 1152     REF   3  LAST  255     33,3412  55'313 0                TS      DESOPTS
 1153     REF   6  LAST  300     33,3413  3 1775 0                CA      PAC
 1154     REF   4  LAST  255     33,3414  55'312 1                TS      DESOPTT
 1155     REF 103  LAST  450     33,3415  3 4772 1     RETARG     CAF     ZERO
 1156    REF  20  LAST  396    33,3416  55'323 0              TS      OPTIND
 1158    REF  79  LAST  451    33,3417  0 4636 0              TC      BANKCALL
 1159    REF   1               33,3420   16000 0              CADR    SXTMARK
 11621   REF  11  LAST  248    33,3421  10 301 1              CCS     MARKINDX
 11622   REF   1               33,3422  0 3415 1              TC      RETARG               NO MARK TAKEN - DO AGAIN

 11623   REF  80  LAST  452    33,3423  0 4636 0              TC      BANKCALL
 11624   REF   3  LAST  449    33,3424   16073 1              CADR    MKRELEAS

 1163    REF   2  LAST  451    33,3425  0 1424 1              TC      QPLAC


 1171    REF   6  LAST  451    33,2000                        SETLOC  IMUCAL
 1172                          33,3426                        BANK
 1173    REF   4 LAST  451 TO  452:      25    140*           COUNT*  $$/P03
 1200                          33,3426   30341 1  PIPASC      2DEC    .76376833
 1200                          33,3427   22444 0
 1201                          33,3430   57223 0  VELSC       2DEC    -.52223476
 1201                          33,3431   66451 1
 1202                          33,3432   05427 0  ALSK        2DEC    .17329931
 1202                          33,3433   12577 1
 1203                          33,3434   77567 0              2DEC    -.00835370
 1203                          33,3435   44202 1
 1204                          33,3436   24276 1  GEORGEJ     2DEC    .63661977
 1204                          33,3437   14066 1
 1207                          33,3440   03146 1  GEOCONS1    2DEC    .1
 1207                          33,3441   14632 0
 1208                          33,3442   00121 0  GEOCONS2    2DEC    .005
 1208                          33,3443   35341 1
 1209                          33,3444   01767 0  GEOCONS3    2DEC    .062
 1209                          33,3445   31666 0
 1210                          33,3446   00004 0  GEOCONS4    2DEC    .0003
 1210                          33,3447   35223 1
 12525   REF   3 LAST  445 TO  449:     150    291*           COUNT*  $$/P02
 1253                          33,3450   74020 0  LITTLSUB    STQ     AXC,1
 1254    REF   2  LAST   73    33,3451   00300 1                      QMAJ
 1255    REF  23  LAST  295    33,3452   03722 0                      MRKBUF1
 1256                          33,3453   77650 1              GOTO
 1257    REF   1               33,3454   36073 0                      SXTSM2
R1270

 1271    REF   5  LAST  275    43,2000                        SETLOC  EXTVERBS
 1272                          43,3132                        BANK

 1273    REF   8 LAST  279 TO  282:      24    565*           COUNT*  $$/EXTVB
 1300    REF  37  LAST  451    43,3132  0 6006 1  AZMTHCG1    TC      INTPRET
 1301                          43,3133   47145 1              DLOAD   RTB
 1302    REF   3  LAST  447    43,3134   02636 0                      NEWAZMTH
 1303    REF   3  LAST  300    43,3135   45640 1                      1STO2S
 1304                          43,3136   77776 1              EXIT
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  1305    REF 226  LAST  441   43,3137  56 154 1             XCH      MPAC
  1306    REF  17  LAST  449   43,3140  55'250 0             TS       DSPTEM1
  1307    REF  81  LAST  452   43,3141  0 4636 0             TC       BANKCALL
  1308    REF   1              43,3142   20715 0             CADR     CLEANDSP
  1309    REF   1              43,3143  3 3165 0             CAF      VN0629
  1310    REF  82  LAST  453   43,3144  0 4636 0             TC       BANKCALL
  1311    REF   5  LAST  451   43,3145   20743 0             CADR     GOFLASH
  1312                         43,3146  1 3157 0             TCF      +11
  1313                         43,3147  1 3151 0             TCF      +2
  1314                         43,3150  1 3143 0             TCF      -5
  1315    REF  38  LAST  452   43,3151  0 6006 1             TC       INTPRET
  1316                         43,3152   47135 0             SLOAD    RTB
  1317    REF  18  LAST  453   43,3153   01251 0                      DSPTEM1
  1318    REF   5  LAST  450   43,3154   51754 0                      CDULOGIC
  1319    REF   4  LAST  447   43,3155   02634 1             STORE    LAUNCHAZ
  1320                         43,3156   77776 1             EXIT
  1321    REF 104  LAST  451   43,3157  3 4772 1     +11     CAF      ZERO
  1322    REF   5  LAST  447   43,3160  55'632 0             TS       PREMTRXC
  1323    REF  23  LAST  451   43,3161  0 5402 1             TC       PHASCHNG
  1324                         43,3162   00004 0             OCT      00004
  1325    REF  36  LAST  448   43,3163  0 4655 0             TC       POSTJUMP
  13255   REF   5  LAST  376   43,3164   21275 1             CADR     PINBRNCH

  1326                         43,3165   01435 1   VN0629    VN       0629
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*** END OF DIOGENES.064 ***
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P0001   GROUND TRACKING DETERMINATION PROGRAM P21
R0002   PROGRAM DESCRIPTION
R0003   MOD NO - 1
R0004   MOD BY - N.M.NEVILLE
R0005   FUNCTIONAL DECRIPTION-
R0006
R0007   TO PROVIDE THE ASTRONAUT DETAILS OF THE LM OR CSM GROUND TRACK WITHOUT
R0008   THE NEED FOR GROUND COMMUNICATION (REQUESTED BY DSKY).
R0009   CALLING SEQUENCE -
R0010
R0011   ASTRONAUT REQUEST THROUGH DSKY V37E21E
R0012   SUBROUTINES CALLED-
R0013
R0014   GOPERF4
R0015   GOFLASH
R0016   THISPREC
R0017   OTHPREC
R0018   LAT-LONG
R0019   NORMAL EXIT MODES-
R0020
R0021   ASTRONAUT REQUEST TROUGH DSKY TO TERMINATE PROGRAM V34E
R0022   ALARM OR ABORT EXIT MODES-
R0023
R0024   NONE
R0025   OUTPUT -
R0026
R0027   OCTAL DISPLAY OF OPTION CODE AND VEHICLE WHOSE GROUND TRACK IS TO BE
R0028   COMPUTED
R0029             OPTION CODE  00002
R0030             THIS         00001
R0031             OTHER        00002
R0032   DECIMAL DISPLAY OF TIME TO BE INTEGRATED TO HOURS , MINUTES , SECONDS
R0033   DECIMAL DISPLAY OF LAT,LONG,ALT
R0034   ERASABLE INITIALIZATION REQUIRED
R0035
R0036   AXO       2DEC   4.652459653 E-5   RADIANS        %68-69 CONSTANTS"
R0037
R0038   -AYO      2DEC   2.147535898 E-5   RADIANS
R0039
R0040   AZO       2DEC   .7753206164       REVOLUTIONS
R0041   FOR LUNAR ORBITS 504LM VECTOR IS NEEDED
R0042
R0043   504LM     2DEC   -2.700340600 E-5  RADIANS
R0044
R0045   504LM _2  2DEC   -7.514128400 E-4  RADIANS
R0046
R0047   504LM _4  2DEC   _2.553198641 E-4  RADIANS
R0048
R0049   NONE
R0050   DEBRIS
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R0051
R0052    CENTRALS-A,Q,L
R0053    OTHER-THOSE USED BY THE ABOVE LISTED SUBROUTINES
R0054    SEE LEMPREC,LAT-LONG
 0055    REF   6  LAST  393   30,2000                          SBANK= LOWSUPER         FOR LOW 2CADR'S.

 0057    REF   1              37,2000                          SETLOC P20S
 0058                         37,2000                          BANK

 0059    REF   3  LAST  134   E7,1537                          EBANK= P21TIME
 0060    REF   1                                               COUNT* $$/P21
 0061    REF  54  LAST  450   37,2000  3 4770 0  PROG21       CAF    ONE
 0062    REF   3  LAST  188   37,2001  54 776 0               TS     OPTION2         ASSUMED VEHICLE IS LM , R2 = 000 1
 00623   REF  29  LAST  402   37,2002  0 5547 1               TC     UPFLAG
 00626   REF   5  LAST  395   37,2003   00031 0               ADRES  TRACKFLG

 0063    REF  20  LAST  382   37,2004  3 4767 0               CAF    BIT2             OPTION 2
 0064    REF  83  LAST  453   37,2005  0 4636 0               TC     BANKCALL
 0065    REF   1              37,2006   21074 1               CADR   GOPERF4
 0066    REF   5  LAST  396   37,2007  0 4103 1               TC     GOTOPOOH        TERMINATE
 0067                         37,2010  0 2012 0               TC     +2              PROCEED VALUE OF ASSUMED VEHICLE OK
 0068                         37,2011  0 2004 1               TC     -5              R2 LOADED THROUGH DSKY
 00682   REF 105  LAST  453   37,2012  3 4772 1               CAF    ZERO            ZERO DSPTEM
 00685   REF  19  LAST  453   37,2013  55'250 0               TS     DSPTEM1
 00688   REF  20  LAST  456   37,2014  55'251 1               TS     DSPTEM1 +1
 0069    REF   1              37,2015  3 5027 1  P21PROG1     CAF    V6N34           LOAD DESIRED TIME OF LAT-LONG.
 0070    REF   2  LAST  206   37,2016  0 5535 1               TC     VNFLASH
 0075    REF  39  LAST  453   37,2017  0 6006 1               TC     INTPRET
 0076                         37,2020   53145 1               DLOAD  BZE
 00763   REF  21  LAST  456   37,2021   01251 0                      DSPTEM1
 00767   REF   1              37,2022   76155 1                      P21PRTM         SET TO INTEG TO PRES TIME
 0077    REF   2  LAST  228   37,2023   34041 0  P21PROG2     STCALL TDEC1           INTEG TO TIME SPECIFIED IN TDEC
 00773   REF   6  LAST  275   37,2024   27516 0                      INTSTALL
 00776                        37,2025   43014 0               BON    SET
 0078    REF   1              37,2026   01303 0                      P21FLAG
 00783   REF   1              37,2027   76045 1                      P21CONT         ON...RECYCLE USING BASE VECTOR
 00786   REF   4  LAST  228   37,2030   01474 1                      VINTFLAG        OFF..1ST PASS CALC BASE VECTOR
 0079                         37,2031   70535 0               SLOAD  SR1
 0080    REF   4  LAST  456   37,2032   00777 0                      OPTION2
 00805                        37,2033   43030 0               BHIZ   CLEAR
 0081                         37,2034   76036 0                      +2              ZERO..THIS VEHICLE (CM)
 00813   REF   5  LAST  456   37,2035   01674 0                      VINTFLAG        ONE...OTHER VEHICLE(LM)
 00816                        37,2036   43014 0               CLEAR  CLEAR
 0082    REF   3  LAST  228   37,2037   01676 1                      DIM0FLAG
 00823   REF   1              37,2040   01673 1                      INTYPFLG        PRECISION
 00826                        37,2041   77624 1               CALL
 0083    REF   3  LAST  228   37,2042   27236 0                      INTEGRV         CALCULATE
 0084                         37,2043   77650 1               GOTO                   .AND
 00845   REF   1              37,2044   76066 0                      P21VSAVE        ..SAVE BASE VECTOR
 0085                         37,2045   77775 1  P21CONT      VLOAD                  RECYCLE..INTEG FROM BASE VECTOR
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0086    REF   3  LAST  134   37,2046   03605 1                   P21BASER
0087    REF   4  LAST  301   37,2047   25535 0           STOVL   RCV             ..POS
0088    REF   3  LAST  134   37,2050   03613 0                   P21BASEV
0089    REF   4  LAST  302   37,2051   15543 1           STODL   VCV             ..VEL
0090    REF   4  LAST  456   37,2052   03540 0                   P21TIME
0091    REF   6  LAST  301   37,2053   01517 0           STORE   TET             ..TIME
0093                         37,2054   43014 0           CLEAR   CLEAR
0094    REF   4  LAST  456   37,2055   01676 1                   DIM0FLAG
0095    REF   1              37,2056   00263 0                   MOONFLAG
0096                         37,2057   53135 0           SLOAD   BZE
00965   REF   2  LAST  133   37,2060   03604 0                   P21ORIG
0097                         37,2061   76064 1                   +3              ZERO = EARTH
00975                        37,2062   77614 1           SET                     ...2 = MOON
0098    REF   2  LAST  457   37,2063   00063 1                   MOONFLAG
00985                        37,2064   77624 1           CALL
0099    REF   1              37,2065   27211 0                   INTEGRVS
00995                        37,2066   77745 1  P21VSAVE DLOAD                   SAVE CURRENT BASE VECTOR
0100    REF   1              37,2067   00015 0                   TAT
01003   REF   5  LAST  457   37,2070   27540 0           STOVL   P21TIME         ..TIME
01006   REF   1              37,2071   00017 1                   RATT1
0101    REF   4  LAST  457   37,2072   27605 1           STOVL   P21BASER        ..POS B-29 OR B-27
01013   REF   1              37,2073   00025 0                   VATT1
01014   REF   4  LAST  457   37,2074   03613 0           STORE   P21BASEV        ..VEL B-7  OR B-5
01015                        37,2075   77614 1           BONCLR                  WITH ADJUSTED P29 BASE TIME, SKIP
010155  REF   1              37,2076   02605 0                   NEWTFLAG             P29 DISPLAYS
01016   REF   1              37,2077   60015 0                   HOP29DSP
010162                       37,2100   47014 1           BOFF    RTB             RETURN TO P29 IF P29FLAG IS SET
010164  REF   1              37,2101   00356 1                   P29FLAG
010166                       37,2102   76104 0                   +2
010168  REF   1              37,2103   60004 0                   LONGPASS
01017                        37,2104   53646 0           ABVAL   SL*
010172                       37,2105   57576 1                   0,2
010175  REF   3  LAST  293   37,2106   27623 0           STOVL   P21VEL          /VEL/ FOR N73 DSP
01018   REF   1              37,2107   00001 0                   RATT
010185                       37,2110   50256 0           UNIT    DOT
010188  REF   1              37,2111   00007 0                   VATT            U(R).(V)
01019                        37,2112   67471 1           DDV     ASIN            U(R).U(V)
010192  REF   4  LAST  457   37,2113   03623 0                   P21VEL
010195  REF   2  LAST  293   37,2114   03625 0           STORE   P21GAM          SIN-1 U(R).U(V), -90 TO +90
0102                         37,2115   43134 0           SXA,2   SET
01025   REF   3  LAST  457   37,2116   03603 1                   P21ORIG         0 = EARTH  2 = MOON
01026   REF   2  LAST  456   37,2117   01063 0                   P21FLAG
0103                         37,2120   67214 1  P21DSP   CLEAR   SLOAD           GENERATE DISPLAY DATA
01033   REF   1              37,2121   01663 0                   LUNAFLAG
01036   REF   1              37,2122   00050 1                   X2
0104                         37,2123   43054 1           BZE     SET
01043                        37,2124   76126 0                   +2              0 = EARTH
01046   REF   2  LAST  457   37,2125   01463 1                   LUNAFLAG
0105                         37,2126   77775 1           VLOAD
01053   REF   2  LAST  457   37,2127   00001 0                   RATT
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01056  REF   2  LAST   93  37,2130   16152 0             STODL  ALPHAV
0106   REF   2  LAST  457  37,2131   00015 0                    TAT
01063                      37,2132   45014 0             CLEAR  CALL
01066  REF   1             37,2133   00662 0                    ERADFLAG
0107   REF   1             37,2134   26453 1                    LAT-LONG
01072                      37,2135   77605 1             DMP                     MPAC = ALT, METERS B-29
01075  REF   1             37,2136   36166 0                    K.01
01078  REF   3  LAST  293  37,2137   03621 1             STORE  P21ALT           ALT/100 FOR N73 DSP
0108                       37,2140   77776 1             EXIT
0109   REF   1             37,2141 3 2164 0              CAF    V06N43           DISPLAY LAT,LONG,ALT
0110   REF  84  LAST  456  37,2142 0 4636 0              TC     BANKCALL         LAT,LONG = REVS B0     BOTH EARTH/MOON
0111   REF   6  LAST  453  37,2143   20743 0             CADR   GOFLASH          ALT = METERS B-29      BOTH EARTH/MOON
0112   REF   6  LAST  456  37,2144 0 4103 1              TC     GOTOPOOH         TERM
0113   REF   7  LAST  458  37,2145 0 4103 1              TC     GOTOPOOH
0114   REF  40  LAST  456  37,2146 0 6006 1              TC     INTPRET          V32E RECYCLE
0115                       37,2147   43345 1             DLOAD  DAD
0116   REF   6  LAST  457  37,2150   03540 0                    P21TIME
0117   REF   1             37,2151   36161 1                    600SEC           600 SECONDS OR 10 MIN
0118   REF  22  LAST  456  37,2152   01251 0             STORE  DSPTEM1
0119                       37,2153   77634 0             RTB
0120   REF   1             37,2154   76015 1                    P21PROG1
01202                      37,2155   52034 1  P21PRTM    RTB    GOTO
01205  REF   3  LAST  431  37,2156   51751 0                    LOADTIME
01208  REF   1             37,2157   76023 1                    P21PROG2
0121                       37,2160   00003 1  600SEC     2DEC   60000            10 MIN
0121                       37,2161   25140 0
0122                       37,2162   00001 0  P21ONENN   OCT    00001            NEEDED TO DETERMINE VEHICLE
0123                       37,2163   00000 1             OCT    00000            TO BE INTEGRATED
0124                       37,2164   01453 1  V06N43     VN     00643
0125   REF   1                5027            V6N34      =      V06N34
0131                       37,2165   00243 1  K.01       2DEC   .01
0131                       37,2166   32703 1
1000   REF   1             30,2000                       SETLOC P29TAG1
1001                       30,2000                       BANK

10015  REF   1                                           COUNT* $$/P29
1002   REF   2  LAST  134  E7,1543                       EBANK= LONGFOR

1003   REF  41  LAST  458  30,2000 0 6006 1   P29        TC     INTPRET          TIME-TO-LONGITUDE PROGRAM
1004                       30,2001   47014 1             SET    RTB              SET=P29,CLEARED=P21--CHECKED IN P21
1005   REF   2  LAST  457  30,2002   00076 0                    P29FLAG          FLAG ALSO MARKS FIRST PASS THRU P29
1006   REF   2  LAST  225  30,2003   76000 0                    PROG21           GET BASE TIME + STATE VECTOR FROM P21
1007   REF   1             30,2004 3 2152 0   LONGPASS   CAF    V06N43LP
1008   REF   1             30,2005 0 5540 0              TC     VNFLASHR         ASTRONAUT LOADS DESIRED LONGITUDE
1009                       30,2006 1 2012 1              TCF    +4
1010   REF   9  LAST  355  30,2007 3 4773 0              CAF    FIVE             BLANK R1,R3
1011   REF   1             30,2010 0 5516 0              TC     BLANKET
1012   REF  50  LAST  451  30,2011 0 5205 0              TC     ENDOFJOB
1013   REF   5  LAST  293  30,2012 52 751 0              DXCH   LONG
1014   REF   3  LAST  458  30,2013 53'544 1              DXCH   LONGFOR          STORE DESIRED LONGITUDE
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 1015   REF  42  LAST  458   30,2014  0 6006 1            TC      INTPRET
 1016                        30,2015   65375 0  HOP29DSP VLOAD   PDDL              STORE UNIT NORTH(IN PLANETARY COORDS.)
 1017   REF   2  LAST   34   30,2016   15330 0                    UNITZ                 AND BASE TIME ON PUSHLIST FOR
 1018   REF   1              30,2017   03540 0                    P29BASET              RP-TO-R
 1019   REF   2  LAST  134   30,2020   03542 1           STORE   PASSTIME          INITIALIZE TIME OF CROSSING
 1020                        30,2021   43125 0           PDDL    SET
 1021   REF   3  LAST  220   30,2022   15336 0                    ZEROVECS
 1022   REF   3  LAST  458   30,2023   00076 0                    P29FLAG           IN CASE OF RESTART OR REPEAT INTEGRATION
 1023   REF   2  LAST  134   30,2024   03546 0           STORE   DELTLONG          INITIALIZE LONGITUDE DIFFERENCE TO ZERO
 1024                        30,2025   43014 0           CLEAR   BOFF
 1025   REF   3  LAST  457   30,2026   01663 0                    LUNAFLAG
 1026   REF   2  LAST   34   30,2027   04343 1                    CMOONFLG
 1027                        30,2030   60034 0                    +4
 1028                        30,2031   71214 0           SET     DLOAD
 1029   REF   4  LAST  459   30,2032   01463 1                    LUNAFLAG          SET LUNAFLAG=CMOONFLG FOR LAT-LONG
 1030   REF   1              30,2033   20150 1                    FMOON             MPAC NONZERO FOR MOON, ZERO FOR EARTH
 1031                        30,2034   77624 1           CALL                      GET UNIT PLANETARY NORTH IN BASE COORDS
 1032   REF   1              30,2035   55345 0                    RP-TO-R
 1033                        30,2036   41406 0           PUSH    PUSH              PD=12D,MUSUBZ(UNIT PLANETARY NORTH)
 1034                        30,2037   53435 0           VXV     UNIT
 1035   REF   1              30,2040   03605 1                    P29BASER
 1036   REF   2  LAST  134   30,2041   27552 0           STOVL   MUSUBE            PD=6D,MUSUBE=UNIT LOCAL EAST AT P29BASER
 1037                        30,2042   53435 0           VXV     UNIT
 1038   REF   3  LAST  459   30,2043   03552 0                    MUSUBE
 1039   REF   2  LAST  134   30,2044   27560 1           STOVL   MUSUBC            UNIT EQUATORIAL CENTRAL-DIRECTED VECTOR
 1040   REF   2  LAST  459   30,2045   03605 1                    P29BASER
 1041                        30,2046   53435 0           VXV     UNIT              FORM MUSUBN(UNIT ORBITAL LOCAL NORTH)
 1042   REF   1              30,2047   03613 0                    P29BASEV
 1043                        30,2050   41406 0           PUSH    PUSH              PD=18D
 1044                        30,2051   53435 0           VXV     UNIT
 1045   REF   3  LAST  459   30,2052   03605 1                    P29BASER
 1046   REF   2  LAST  134   30,2053   27566 1           STOVL   MUSUBS            PD=12D,MUSUBS=UNIT ORBITAL TANG. VEL.
 1047                        30,2054   63241 0           DOT     PDVL              PD=6D,MUSUBZ AT 0D, EXCHANGE DOT-PRODUCT
 1048                        30,2055   00001 0                    0D                    WITH MUSUBN IN PUSHLIST
 1049                        30,2056   45565 0           SIGN    STADR             PD=6D, PUT MUSUBN IN HEMI. OF MUSUBZ
 1050   REF   1              30,2057   50203 0           STOVL   MUSUBN
 1051   REF   4  LAST  459   30,2060   03605 1                    P29BASER
 1052                        30,2061   70414 1  HOPALONG BOFF    VSR2              MUST BE B+29 FOR LAT-LONG
 1053   REF   3  LAST  459   30,2062   04343 1                    CMOONFLG
 1054                        30,2063   60064 0                    +1
 1055   REF   3  LAST  458   30,2064   16152 0           STODL   ALPHAV            STORE FOR LAT-LONG
 1056   REF   3  LAST  459   30,2065   03542 1                    PASSTIME
 1057                        30,2066   45014 0           CLEAR   CALL              FIND LONGITUDE FOR PRESENT ITERATION OF
 1058   REF   2  LAST  458   30,2067   00662 0                    ERADFLAG              POSITION VECTOR
 1059   REF   2  LAST  458   30,2070   26453 1                    LAT-LONG
 1060                        30,2071   45345 1           DLOAD   DSU               COMPARE WITH DESIRED LONGITUDE
 1061   REF   4  LAST  458   30,2072   03544 1                    LONGFOR
 1062   REF   6  LAST  458   30,2073   00751 1                    LONG
 1063                        30,2074   51406 1           PUSH    ABS               PD=2D, SAVE DELTA
 1064                        30,2075   50025 0           DSU     BMN               IF WITHIN EPSILONG, DISPLAY RESULTS
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  1065  REF   1                 30,2076   20142 1                      EPSILONG          .01 DEGREES
  1066  REF   1                 30,2077   60122 0                      PASSOUT
  1067                          30,2100   77600 1            BOV                         CLEAR OVERFLOW INDICATOR
  1068                          30,2101   60102 1                      +1
  1069                          30,2102   40015 1            DAD       BOV               CHECK WHETHER WITHIN EPSILON OF 360 DEG.
  1070  REF   1                 30,2103   20144 1                      TWICEEPS          .02 DEGREES
  1071  REF   2  LAST  460      30,2104   60122 0                      PASSOUT
  1072                          30,2105   71214 0            BOFCLR    DLOAD             P29FLAG CLEARED FOR LATER PASSES
  1073  REF   4  LAST  459      30,2106   00256 0                      P29FLAG           PD=0D
  1074  REF   1                 30,2107   40272 1                      MODULO
  1075                          30,2110   43244 1            BPL       DAD               MAKE DELTA>0
  1076                          30,2111   60113 1                      +2
  1077  REF   2  LAST  430      30,2112   15344 0                      DPPOSMAX
  1078                          30,2113   45214 1            BOFF      DSU               FOR EARTH,DELTA>0
  1079  REF   4  LAST  459      30,2114   04343 1                      CMOONFLG          FOR MOON, DELTA.0
  1080  REF   1                 30,2115   40212 1                      HOP1
  1081  REF   3  LAST  460      30,2116   15344 0                      DPPOSMAX
  1082                          30,2117   52125 0            PDDL      GOTO              PD=2D
  1083  REF   2  LAST  459      30,2120   20150 1                      FMOON             327.8/328.8, B+1
  1084  REF   1                 30,2121   40214 1                      HOP2
  1085  REF   1                 20,2000                      SETLOC    P29TAG2
  1086                          20,2212                      BANK

 10865  REF   1                                            COUNT*    $$/P29
  1087                          20,2212   77725 1  HOP1      PDDL                        PD=2D
  1088  REF   1                 20,2213   20146 0                      FEARTH            16/15, B+1
  1089  REF   2  LAST  134      20,2214   03550 1  HOP2      STORE     FUDGE
  1090                          20,2215   77745 1  DELTLOAD  DLOAD                       PD=0D, LOAD DELTA
  1091                          20,2216   40005 0  THETCOMP  DMP       BOV
  1092  REF   3  LAST  460      20,2217   03550 1                      FUDGE
  1093                          20,2220   40221 1                      +1                CLEAR OVERFLOW INDICATOR
  1094                          20,2221   43352 1            SL1       DAD               SHIFT TO GET B0, SINCE FUDGE IS B+1
  1095  REF   3  LAST  459      20,2222   03546 0                      DELTLONG
  1096                          20,2223   40006 0            PUSH      BOV               PD=2D, IF FUDGE FACTOR MAKES DELTLONG>
  1097  REF   1                 20,2224   40303 0                      ADDTEN                 360, MODIFY BASE TIME
  1098  REF   4  LAST  460      20,2225   03546 0            STORE     DELTLONG          CUMULATIVE EQUATORIAL DELTA
  1099                          20,2226   74346 0            COS       VXSC
  1100  REF   4  LAST  459      20,2227   03552 0                      MUSUBE
  1101                          20,2230   73525 1            PDDL      SIN               PD=6D
  1102                          20,2231   53361 0            VXSC      VAD               PD=0D
  1103  REF   3  LAST  459      20,2232   03560 1                      MUSUBC            ROTATE MUSUBE THRU ANGLE DELTLONG
  1104                          20,2233   53435 0            VXV       UNIT              FORM MUSUBD=ROTATED ORBITAL UNIT
  1105  REF   2  LAST  459      20,2234   03574 1                      MUSUBN                 POSITION VECTOR, OUTWARD-DIRECTED
  1106                          20,2235   63206 0            PUSH      PDVL              PD=12D
  1107  REF   5  LAST  459      20,2236   03605 1                      P29BASER
  1108                          20,2237   50256 0            UNIT      DOT               PD=6D, DOT PRODUCT IS B+2
  1109                          20,2240   63352 0            SL1       PDVL              PD=2D, MAKE B+1 FOR ACOS, EXCHANGE
  1110                          20,2241   65241 0            DOT       PDDL              PD=2D, EXCHANGE WITH PUSHLIST
  1111  REF   3  LAST  459      20,2242   03566 1                      MUSUBS
  1112                          20,2243   75326 1            ACOS      SIGN              PD=0D
  1113                        20,2244   73406 1                   PUSH    SIN           PD=20, FORM THETA=ORBITAL DELTA
  1114    REF   2  LAST  100  20,2245   16732 0                   STODL   SNTH          PD= 0
  1115                        20,2246   74146 1                   COS     AXC,1
  1116                        20,2247   00002 0                           20
  1117    REF   2  LAST  100  20,2250   26734 0                   STOVL   CSTH          STORE ANGLE DATA AND BASE STATE VECTOR
  1118    REF   6  LAST  460  20,2251   03605 1                           P29BASER           FOR TIME-THETA
  1119    REF   1             20,2252   26657 1                   STOVL   RVEC
  1120    REF   2  LAST  459  20,2253   03613 0                           P29BASEV
  1121    REF   2  LAST  100  20,2254   02746 0                   STORE   VVEC
  1122                        20,2255   74014 1                   BOFF    AXC,1         SET X1=-20 FOR EARTH, -100 FOR MOON
  1123    REF   5  LAST  460  20,2256   04343 1                           CMOONFLG
  1124                        20,2257   40261 0                           +2
  1125                        20,2260   00012 1                           10D
  1126                        20,2261   45014 0                   CLEAR   CALL          INTEGRATE BASE STATE VECTOR THRU THETA
  1127    REF   1             20,2262   03666 1                           RVSW
  1128    REF   1             20,2263   25002 1                           TIMETHET
  1129                        20,2264   43345 1                   DLOAD   DAD
  1130    REF   1             20,2265   00037 0                           T             T=TIME TO TRAVERSE THETA
  1131    REF   2  LAST  459  20,2266   03540 0                           P29BASET
  1132    REF   4  LAST  459  20,2267   27542 1                   STOVL   PASSTIME      TIME OF LONGITUDE CROSSING
  1133                        20,2270   77650 1                   GOTO                  UPDATED POSITION VECTOR LOADED FOR
  1134    REF   1             20,2271   60061 0                           HOPALONG           LAT-LONG
  1135                        20,2272   50025 0   MODULO          DSU     BMN           MPAC CONTAINS ABS(DELTA)+EPSILONG
  1136    REF   7  LAST  414  20,2273   15334 1                           DPHALF        IF THIS IS NEAR 360, MUST ADJUST DELTA
  1137    REF   1             20,2274   40215 0                           DELTLOAD           BY 360 TO GET ANGLE NEAR ZERO
  1138                        20,2275   77625 0                   DSU                   TO ADJUST, SUBTRACT DPHALF (TWICE) AND
  1139    REF   2  LAST  460  20,2276   20142 1                           EPSILONG           EPSILONG TO GET NEGATIVE NUMBER,
  1140                        20,2277   75225 0                   DSU     SIGN               AND SIGN BY UNADJUSTED DIFFERENCE,
  1141    REF   8  LAST  461  20,2300   15334 1                           DPHALF             AT TOP OF PUSHLIST, PD=0D.
  1142                        20,2301   77650 1                   GOTO
  1143    REF   1             20,2302   40216 0                           THETCOMP
  1144                        20,2303   43345 1   ADDTEN          DLOAD   DAD           ADD 10 MINUTES TO BASE TIME
  1145    REF   3  LAST  461  20,2304   03540 0                           P29BASET
  1146    REF   2  LAST  458  20,2305   36161 1                           600SEC
  1147                        20,2306   52014 0                   SET     GOTO          SET FLAG TO SKIP DISPLAYS ON RETURN TO
  1148    REF   2  LAST  457  20,2307   02465 1                           NEWTFLAG           P29
  1149    REF   2  LAST  458  20,2310   76023 1                           P21PROG2      GO TO P21 FOR INTEGRATION
  1150    REF   2  LAST  458  30,2000                             SETLOC  P29TAB1
  1151                        30,2122                             BANK

  11515   REF   2 LAST  458 TO  460:      82     82*              COUNT*  $$/P29
  1152                        30,2122    77776 1  PASSOUT         EXIT
  1153    REF   5  LAST  461  30,2123   53'542 1                  DXCH    PASSTIME
  1154    REF  23  LAST  458  30,2124   53'251 1                  DXCH    DSPTEM1
  1155    REF   1             30,2125   3 2151 0                  CAF     V06N34LP
  1156    REF  85  LAST  458  30,2126   0 4636 0                  TC      BANKCALL
  1157    REF   7  LAST  458  30,2127    20743 0                  CADR    GOFLASH       DISPLAY PASSTIME
  1158    REF   8  LAST  458  30,2130   0 4103 1                  TC      GOTOPOOH
  1159                        30,2131   0 2133 1                  TC      +2
  1160    REF   2  LAST  457  30,2132   0 2004 1                  TC      LONGPASS      RECYCLE TO LONGITUDE INPUT
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L       GROUND TRACKING DETERMINATION PROGRAM - P21                             USER'S PAGE NO.  8     E7 S3

 1161   REF   2  LAST  458   30,2133  3 2152 0                  CAF     V06N43LP
 1162   REF  86  LAST  461   30,2134  0 4636 0                  TC      BANKCALL          DISPLAY LAT,LONG,ALT AT DESIRED
 1163   REF   8  LAST  461   30,2135   20743 0                  CADR    GOFLASH                LONGITUDE
 1164   REF   9  LAST  461   30,2136  0 4103 1                  TC      GOTOPOOH
 1165   REF  10  LAST  462   30,2137  0 4103 1                  TC      GOTOPOOH
 1166   REF   2  LAST  225   30,2140  0 2000 0                  TC      P29               RECYCLE TO START OF PROGRAM
 1167                        30,2141   00000 1   EPSILONG 2DEC     .2777778E-04      .01 DEGREES
 1167                        30,2142   16441 1
 1168                        30,2143   00000 1   TWICEEPS 2DEC     .5555556E-04      .02 DEGREES
 1168                        30,2144   35101 1
 1169                        30,2145   21042 1   FEARTH   2DEC    1.0666667 B-01 16/15
 1169                        30,2146   04211 1
 1170                        30,2147   17747 0   FMOON    2DEC     .996958637 B-01 327.8/328.8
 1170                        30,2150   02563 0
 1171                        30,2151   01442 1   V06N34LP VN        0634
 1172                        30,2152   01453 1   V06N43LP VN        0643
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L        P34-P35, P74-P75                                                    USER'S PAGE NO.   1      FD 53

P0010    TRANSFER PHASE INITIATION (TPI) PROGRAMS (P34 AND P74)

R0011    MOD NO -1       LOG SECTION - P32-P35, P72-P75
R0012    MOD BY WHITE.P  DATE 1JUNE67

R0013    PURPOSE

R0014            (1) TO CALCULATE THE REQUIRED DELTA V AND OTHER INITIAL CONDITIONS
R0015                REQUIRED BY THE ACTIVE VEHICLE FOR EXECUTION OF THE TRANSFER
R0016                PHASE INITIATION (TPI) MANEUVER, GIVEN -

R0017                (A) TIME OF IGNITION TIG (TPI) OR THE ELEVATION ANGLE (E) OF
R0018                    THE ACTIVE/PASSIVE VEHICLE LOS AT TIG (TPI).

R0019                (B) CENTRAL ANGLE OF TRANSFER (CENTANG) FROM TIG (TPI) TO
R0020                    INTERCEPT TIME (TIG (TPF)).

R0021            (2) TO CALCULATE TIG (TPI) GIVEN E OR E GIVEN TIG (TPI).

R0022            (3) TO CALCULATE THESE PARAMETERS BASED UPON MANEUVER DATA
R0023                APPROVED AND KEYED INTO THE DSKY BY THE ASTRONAUT.

R0024            (4) TO DISPLAY TO THE ASTRONAUT AND THE GROUND CERTAIN DEPENDENT
R0025                VARIABLES ASSOCIATED WITH THE MANEUVER FOR APPROVAL BY THE
R0026                ASTRONAUT/GROUND.

R0027            (5) TO STORE THE TPI TARGET PARAMETERS FOR USE BY THE DESIRED
R0028                THRUSTING PROGRAM.

R0029    ASSUMPTIONS

R0030            (1) LM ONLY - THIS PROGRAM IS BASED UPON PREVIOUS COMPLETION OF
R0031                THE CONSTANT DELTA ALTITUDE (CDH) PROGRAM (P33/P73).
R0032                THEREFORE -

R0033                (A) AT A SELECTED TPI TIME (NOW IN STORAGE) THE LINE OF SIGHT
R0034                    BETWEEN THE ACTIVE AND PASSIVE VEHICLES WAS SELECTED TO BE
R0035                    A PRESCRIBED ANGLE (E) (NOW IN STORAGE) FROM THE
R0036                    HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE POSITION.

R0037                (B) THE TIME BETWEEN CDH IGNITION AND TPI IGNITION WAS
R0038                    COMPUTED TO BE GREATER THAN 10 MINUTES.

R0039                (C) THE VARIATION OF THE ALTITUDE DIFFERENCE BETWEEN THE
R0040                    ORBITS WAS MINIMIZED.

R0041                (D) THE PERICENTER ALTITUDES OF ORBITS FOLLOWING CSI AND

R0042                    CDH WERE COMPUTED TO BE GREATER THAN 35,000 FT FOR LUNAR
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R0043               ORBIT OR 85 NM FOR EARTH ORBIT.

R0044          (E) THE CSI AND CDH MANEUVERS WERE ASSUMED TO BE PARALLEL TO
R0045               THE PLANE OF THE PASSIVE VEHICLE ORBIT.  HOWEVER, CREW
R0046               MODIFICATION OF DELTA V (LV) COMPONENTS MAY HAVE RESULTED
R0047               IN AN OUT-OF-PLANE MANEUVER.

R0048          (2) STATE VECTOR UPDATED BY P27 ARE DISALLOWED DURING AUTOMATIC
R0049              STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION (4)).

R0050          (3) THIS PROGRAM MUST BE DONE OVER A TRACKING STATION FOR REAL
R0051              TIME GROUND PARTICIPATION IN DATA INPUT AND OUTPUT.  COMPUTED
R0052              VARIABLES MAY BE STORED FOR LATER VERIFICATION BY THE GROUND.
R0053              THESE STORAGE CAPABILITIES ARE LIMITED ONLY TO THE PARAMETERS
R0054              FOR ONE THRUSTING MANEUVER AT A TIME EXCEPT FOR CONCENTRIC
R0055              FLIGHT PLAN MANEUVER SEQUENCES.

R0056          (4) THE RENDEZVOUS RADAR MAY OR MAY NOT BE USED TO UPDATE THE LM
R0057              OR CSM STATE VECTORS FOR THIS PROGRAM.  IF RADAR USE IS
R0058              DESIRED THE RADAR WAS TURNED ON AND LOCKED ON THE CSM BY
R0059              PREVIOUS SELECTION OF P20.  RADAR SIGHTING MARKS WILL BE MADE
R0060              AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN ENABLED BY THE
R0061              TRACK AND UPDATE FLAGS (SEE P20).  THE RENDEZVOUS TRACKING
R0062              MARK COUNTER IS ZEROED BY THE SELECTION OF P20 AND AFTER EACH
R0063              THRUSTING MANEUVER.

R0064          (5) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

R0065          (6) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

R0066                  ACTIVE VEHICLE FLAG - DESIGNATES THE VEHICLE WHICH IS
R0067                  DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH
R0068                  CALCULATES THE MANEUVER PARAMETERS.  SET AT THE START OF
R0069                  EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

R0070                  FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS
R0071                  SELECTED THE FINAL MANEUVER COMPUTATION CYCLE.

R0072                  EXTERNAL DELTA V FLAG - DESIGNATES THE TYPE OF STEERING
R0073                  REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE THRUSTING
R0074                  PROGRAM SELECTED AFTER COMPLETION OF THIS PROGRAM.

R0075          (7) ONCE THE PARAMETWRS REQUIRED FOR COMPUTION OF THE MANEUVER
R0076              HAVE BEEN COMPLETELY SPECIFIED, THE VALUE OF THE ACTIVE
R0077              VEHICLE CENTRAL ANGLE OF TRANSFER IS COMPUTED AND STORED.
R0078              THIS NUMBER WILL BE AVAILABLE FOR DISPLAY TO THE ASTRONAUT
R0079              THROUGH THE USE OF V06N52.

R0080              THE ASTRONAUT WILL CALL THIS DISPLAY TO VERIFY THAT THE
R0081              CENTRAL ANGLE OF TRANSFER OF THE ACTIVE VEHICLE IS NOT WITHIN
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R0082                  170 TO 190 DEGREES.  IF THE ANGLE IS WITHIN THIS ZONE THE
R0083                  ASTRONAUT SHOULD REASSESS THE INPUT TARGETING PARAMETERS BASED
R0084                  UPON DELTA V AND EXPECTED MANEUVER TIME.

R0085             (8) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

R0086                       P34 IF THIS VEHICLE IS ACTIVE VEHICLE.

R0087                       P74 IF THIS VEHICLE IS PASSIVE VEHICLE.

R0088      INPUT

R0089             (1) TTPI     TIME OF THE TPI MANEUVER
R0090             (2) ELEV     DESIRED LOS ANGLE AT TPI
R0091             (3) CENTANG  ORBITAL CENTRAL ANGLE OF THE PASSIVE VEHICLE DURING
R0092                          TRANSFER FROM TPI TO TIME OF INTERCEPT

R0093      OUTPUT

R0094             (1) TRKMKCNT NUMBER OF MARKS
R0095             (2) TTOGO    TIME TO GO
R0096             (3) +MGA     MIDDLE GIMBAL ANGLE
R0097             (4) TTPI     COMPUTED TIME OF TPI MANEUVER
R0098                  OR
R0099                 ELEV     COMPUTED LOS ANGLE AT TPI
R0100             (5) POSTTPI  PERIGEE ALTITUDE AFTER THE TPI MANEUVER
R0101             (6) DELVTPI  MAGNITUDE OF DELTA V AT TPI
R0102             (7) DELVTPF  MAGNITUDE OF DELTA V AT INTERCEPT
R0103             (8) DVLOS    DELTA VELOCITY AT TPI - LINE OF SIGHT
R0104             (9) DELVLVC  DELTA VELOCITY AT TPI - LOCAL VERTICAL COORDINATES

R0105      DOWNLINK

R0114             (1) TTPI     TIME OF THE TPI MANEUVER
R0115             (2) TIG      TIME OF THE TPI MANEUVER
R0116             (3) ELEV     DESIRED LOS ANGLE AT TPI
R0117             (4) CENTANG  ORBITAL CENTRAL ANGLE OF THE PASSIVE VEHICLE DURING
R0118                          TRANSFER FROM TPI TO TIME OF INTERCEPT
R0119             (5) DELVEET3 DELTA VELOCITY AT TPI - REFERENCE COORDINATES
R0120             (6) TPASS4   TIME OF INTERCEPT
R0121      COMMUNICATION TO THRUSTING PROGRAMS

R0122             (1) TIG      TIME OF THE TPI MANEUVER
R0123             (2) RTARG    OFFSET TARGET POSITION
R0124             (3) TPASS4   TIME OF INTERCEPT
R0125             (4) XDELVFLG RESET TO INDICATE LAMBERT (AIMPOINT) VG COMPUTATION

R0126      SUBROUTINES USED

R0127             AVFLAGA
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L        P34-P35, P74-P75                                                                               USER'S PAGE NO.  4      L  53

R0128            AVFLAGP
R0129            VNPOOH
R0130            DISPLAYE
R0131            SELECTMU
R0132            PRECSET
R0133            S33/34.1
R0134            ALARM
R0135            BANKCALL
R0136            GOFLASH
R0137            GOTOPOOH
R0138            TIMETHET
R0139            S34/35.2
R0140            PERIAPO1
R0141            SHIFTR1
R0142            S34/35.5
R0143            VN1645

 0144    REF   1                35,2000                          SETLOC CSI/CDH
 0145                           35,2000                          BANK
 0146    REF   4  LAST  267     E4,1760                          EBANK= SUBEXIT
 0147    REF   1                                                 COUNT* $$/P3474
 0148    REF   1                35,2000  0 4553 0  P34           TC     AVFLAGA
 0149    REF   1                35,2001  0 2003 0                TC     P34/P74A
 0150    REF   1                35,2002  0 4565 0  P74           TC     AVFLAGP
 01505   REF   1                35,2003  0 4572 0  P34/P74A      TC     P20FLGON
 0151    REF  43  LAST  459     35,2004  0 6006 1                TC     INTPRET
 015182                         35,2005    71214 0               CLEAR  DLOAD
 015184  REF   2  LAST  220     35,2006    05274 0                      TPIMNFLG
 015186  REF   1                35,2007    32205 1                      130DEG
 015188  REF   5  LAST  292     35,2010    17754 1               STODL  CENTANG
 01519   REF   4  LAST  459     35,2011    15336 0                      ZEROVECS
 015192  REF   5  LAST  292     35,2012    03744 0               STORE  ELEV
 015194  REF   7  LAST  217     35,2013    03766 0               STORE  NN
 015195                         35,2014    77776 1               EXIT

 015196  REF   1                35,2015  3 4532 1                CAF    V06N37
 0152    REF   3  LAST  456     35,2016  0 5535 1                TC     VNFLASH
 0153    REF   1                35,2017  3 4533 0                CAF    V06N55
 01531   REF   4  LAST  466     35,2020  0 5535 1                TC     VNFLASH
 0154    REF  44  LAST  466     35,2021  0 6006 1                TC     INTPRET
 0155                           35,2022    71214 0               CLEAR  DLOAD
 0156    REF   2  LAST   51     35,2023    01270 0                      ETPIFLAG
 0157    REF   4  LAST  284     35,2024    03663 1                      TTPI
 0158    REF  17  LAST  284     35,2025    17413 1               STODL  TIG
 0159    REF   6  LAST  466     35,2026    03744 0                      ELEV
 0160                           35,2027    43054 1               BZE    SET
 0161    REF   1                35,2030    72032 0                      P34/P74B
 0162    REF   3  LAST  466     35,2031    01070 1                      ETPIFLAG
 0163                           35,2032    77624 1  P34/P74B CALL
 0164    REF   1                35,2033    11217 0                      SELECTMU
```

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0165                          0032              DELELO    EQUALS 26D
0166                          35,2034  43145 0  P34/P74C  DLOAD  SET
0167    REF   5  LAST  466    35,2035  15336 0                   ZEROVECS
0168    REF   1               35,2036  03461 1                   ITSWICH
0169                          35,2037  43014 0            BON    CLEAR
0170    REF   4  LAST  466    35,2040  01310 1                   ETPIFLAG
0171    REF   1               35,2041  72043 0                   SWCHSET
0172    REF   2  LAST  467    35,2042  03661 0                   ITSWICH
0173    REF   1               35,2043  02355 0  SWCHSET   STORE  NOMTPI
0174                          35,2044  43345 1  INTLOOP   DLOAD  CAD
0175    REF   5  LAST  466    35,2045  03663 1                   TTPI
0176    REF   2  LAST  467    35,2046  02355 0                   NOMTPI
0177    REF   3  LAST  456    35,2047  34041 0            STCALL TDEC1
0178    REF   1               35,2050  45236 1                   PRECSET
0179                          35,2051  77624 1            CALL
0180    REF   1               35,2052  72251 1                   S33/34.1
0181                          35,2053  77454 1            BZE    EXIT
0182    REF   1               35,2054  72065 1                   SWCHCLR
0183    REF  21  LAST  443    35,2055  0 5671 1 INTALM    TC     ALARM
0184                          35,2056  00611 1            OCT    611
0185    REF   1               35,2057  3 5023 0           CAF    V05N09
0186    REF  87  LAST  462    35,2060  0 4636 0           TC     BANKCALL
0187    REF   9  LAST  462    35,2061  20743 0            CADR   GOFLASH
0188    REF  11  LAST  462    35,2062  0 4103 1           TC     GOTOPOOH
0189    REF   2  LAST  466    35,2063  0 2003 0           TC     P34/P74A          PROCEED
0190    REF   1               35,2064  0 2055 0           TC     INTALM            V32
0191                          35,2065  43014 0  SWCHCLR   BONCLR BON
0192    REF   3  LAST  467    35,2066  03601 0                   ITSWICH
0193    REF   1               35,2067  72044 1                   INTLOOP
0194    REF   5  LAST  467    35,2070  01310 1                   ETPIFLAG
0195    REF   1               35,2071  72100 0                   P34/P74D          DISPLAY TTPI
0196                          35,2072  77776 1            EXIT
0197    REF   2  LAST  466    35,2073  3 4533 0           CAF    V06N55
01971   REF   5  LAST  466    35,2074  0 5535 1           TC     VNFLASH
0198    REF  45  LAST  466    35,2075  0 6006 1           TC     INTPRET
01985                         35,2076  77650 1            GOTO
01986   REF   1               35,2077  72120 1                   P34/74E
0199                          35,2100  77776 1  P34/P74D  EXIT
0200    REF   2  LAST  466    35,2101  3 4532 1           CAF    V06N37            TTPI
0201    REF   6  LAST  467    35,2102  0 5535 1           TC     VNFLASH
0202    REF  46  LAST  467    35,2103  0 6006 1 P34/P74E  TC     INTPRET
02021                         35,2104  43014 0            BOFF   BOFF
020215  REF   1               35,2105  01351 1                   FINALFLG
02022   REF   2  LAST  467    35,2106  72120 1                   P34/74E           LAST PASS
020225  REF   8  LAST  395    35,2107  05350 1                   AUTOSEQ
02023   REF   3  LAST  467    35,2110  72120 1                   P34/74E
020235                        35,2111  43145 0            DLOAD  CLEAR             IT IS FINAL COMP IN MINKEY
02024   REF   6  LAST  467    35,2112  15336 0                   ZEROVECS            SET UP FOR TIG OPTION
020245  REF   6  LAST  467    35,2113  01270 0                   ETPIFLAG
02025   REF   7  LAST  466    35,2114  17744 0            STODL  ELEV
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020255 REF   6  LAST  467    35,2115   03663 1                  TTPI
02026  REF  18  LAST  466    35,2116   37413 0          STCALL  TIG
020265 REF   1               35,2117   72034 0                  P34/P74C
0203                         35,2120   71201 1  P34/74E SETPD   DLOAD
0204                         35,2121   00001 0                  0D
0205   REF   2  LAST  130    35,2122   03746 1                  RTX1
0206   REF   2  LAST  442    35,2123   14047 1          STODL   X1
0207   REF   6  LAST  466    35,2124   03754 1                  CENTANG
0208                         35,2125   71406 0          PUSH    COS
0209   REF   3  LAST  461    35,2126   16734 0          STODL   CSTH
0210                         35,2127   77756 0          SIN
0211   REF   3  LAST  461    35,2130   26732 0          STOVL   SNTH
0212   REF   4  LAST  220    35,2131   03554 0                  RPASS3
0213                         35,2132   77657 0          VSR*
0214                         35,2133   57176 0                  0,2
0215   REF   2  LAST  461    35,2134   26657 1          STOVL   RVEC
0216   REF   4  LAST  220    35,2135   03562 0                  VPASS3
0217                         35,2136   43057 1          VSR*    SET
0218                         35,2137   57176 0                  0,2
0219   REF   2  LAST  461    35,2140   03466 0                  RVSW
0220   REF   3  LAST  461    35,2141   36746 1          STCALL  VVEC
0221   REF   2  LAST  461    35,2142   25002 1                  TIMETHET
0222                         35,2143   77745 1          DLOAD
0223   REF   7  LAST  468    35,2144   03663 1                  TTPI
0224   REF   2  LAST  126    35,2145   03503 1          STORE   INTIME              FOR INITVEL
0225                         35,2146   77615 0          DAD
0226   REF   2  LAST  461    35,2147   00037 0                  T                   RENDEZVOUS TIME
0227   REF   4  LAST  185    35,2150   37656 0          STCALL  TPASS4              FOR INITVEL
0228   REF   2  LAST  220    35,2151   72561 0                  S34/35 2
0229                         35,2152   51575 1          VLOAD   ABVAL
0230   REF   5  LAST  185    35,2153   03646 0                  DELVEET3
0231   REF   4  LAST  292    35,2154   26635 0          STOVL   DELVTPI
0232   REF   1               35,2155   03640 0                  VPASS4
0233                         35,2156   51451 0          VSU     ABVAL
0234   REF   3  LAST  127    35,2157   03620 0                  VTPRIME
0235   REF   4  LAST  292    35,2160   26637 1          STOVL   DELVTPF
0236   REF   6  LAST  220    35,2161   03540 0                  RACT3
0237                         35,2162   45115 0          PDVL    CALL
0238   REF   3  LAST  127    35,2163   03612 1                  VIPRIME
0239   REF   1               35,2164   45174 1                  PERIAPO1
0240                         35,2165   77624 1          CALL
0241   REF   1               35,2166   45330 0                  SHIFTR1
0242   REF   3  LAST  292    35,2167   16641 0          STODL   PCSTTPI
0243   REF   8  LAST  468    35,2170   03663 1                  TTPI
0244   REF  19  LAST  468    35,2171   03413 1          STORE   TIG
0245                         35,2172   77776 1          EXIT
0246   REF   1               35,2173 3 4534 1           CAF     V06N58
0247   REF   7  LAST  467    35,2174 0 5535 1           TC      VNFLASH
0248   REF  47  LAST  467    35,2175 0 6006 1           TC      INTPRET
0249                         35,2176   77624 1          CALL
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 0250   REF   1                 35,2177   72774 0                      S34/35.5
 0251                           35,2200   77624 1            CALL
 0252   REF   1                 35,2201   73027 0                      VN1645
 0253                           35,2202   77650 1            GOTO
 0254   REF   2  LAST  468      35,2203   72034 0                      P34/P74C
 02542                          35,2204   13434 0  130DEG    OCT       13434             13  DEG - CENTANG
 02544                          35,2205   16163 1            OCT       16163
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R0255    RENDEZVOUS MID-COURSE MANEUVER PROGRAMS (P35 AND P75)

R0256    MOD NO -1        LOG SECTION - P32-P35, P72-P75
R0257    MOD BY WHITE.P  DATE  1JUNE67

R0258    PURPOSE

R0259           (1) TO CALCULATE THE REQUIRED DELTA V AND OTHER INITIAL CONDITIONS
R0260               REQUIRED BY THE ACTIVE VEHICLE FOR EXECUTION OF THE NEXT
R0261               MIDCOURSE CORRECTION OF THE TRANSFER PHASE OF AN ACTIVE
R0262               VEHICLE RENDEZVOUS.

R0263           (2) TO DISPLAY TO THE ASTRONAUT AND THE GROUND CERTAIN DEPENDENT
R0264               VARIABLES ASSOCIATED WITH THE MANEUVER FOR APPROVAL BY THE
R0265               ASTRONAUT/GROUND.

R0266           (3) TO STORE THE TPM TARGET PARAMETERS FOR USE BY THE DESIRED
R0267               THRUSTING PROGRAM.

R0268    ASSUMPTIONS

R0269           (1) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

R0270           (2) STATE VECTOR UPDATES BY P27 ARE DISALLOWED DURING AUTOMATIC
R0271               STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION (3)).

R0272           (3) THE RENDEZVOUS RADAR IS ON AND IS LOCKED ON THE CSM.  THIS WAS
R0273               DONE DURING PREVIOUS SELECTION OF P20.  RADAR SIGHTING MARKS
R0274               WILL BE MADE AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN
R0275               ENABLED BY THE TRACK AND UPDATE FLAGS (SEE P20). THE
R0276               RENDEZVOUS TRACKING MARK COUNTER IS ZEROED BY THE SELECTION OF
R0277               P20 AND AFTER EACH THRUSTING MANEUVER.

R0278           (4) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

R0279                   ACTIVE VEHICLE FLAG - DESIGNATES THE VEHICLE WHICH IS
R0280                   DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH
R0281                   CALCULATES THE MANEUVER PARAMETERS.  SET AT THE START OF
R0282                   EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

R0283                   FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS
R0284                   SELECTED THE FINAL MANEUVER COMPUTATION CYCLE

R0285                   EXTERNAL DELTA V FLAG - DESIGNATES THE TYPE OF STEERING
R0286                   REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE THRUSTING
R0287                   PROGRAM SELECTED AFTER COMPLETION OF THIS PROGRAM.

R0288           (5) THE TIME OF INTERCEPT (T(INT)) WAS DEFINED BY PREVIOUS
R0289               COMPLETION OF THE TRANSFER PHASE INITIATION (TPI) PROGRAM
R0290               (P34/P74) AND IS PRESENTLY AVAILABLE IN STORAGE.
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L         P34-P35, P74-P75                                                                     USER'S PAGE NO.   9      E4 S3

R0291           (6) ONCE THE PARAMETERS REQUIRED FOR COMPUTION OF THE MANEUVER
R0292               HAVE BEEN COMPLETELY SPECIFIED, THE VALUE OF THE ACTIVE
R0293               VEHICLE CENTRAL ANGLE OF TRANSFER IS COMPUTED AND STORED.
R0294               THIS NUMBER WILL BE AVAILABLE FOR DISPLAY TO THE ASTRONAUT
R0295               THROUGH THE USE OF V06N52.

R0296               THE ASTRONAUT WILL CALL THIS DISPLAY TO VERIFY THAT THE
R0297               CENTRAL ANGLE OF TRANSFER OF THE ACTIVE VEHICLE IS NOT WITHIN
R0298               170 TO 190 DEGREES.  IF THE ANGLE IS WITHIN THIS ZONE THE
R0299               ASTRONAUT SHOULD REASSESS THE INPUT TARGETING PARAMETERS BASED
R0300               UPON DELTA V AND EXPECTED MANEUVER TIME.

R0301           (7) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

R0302                    P35 IF THIS VEHICLE IS ACTIVE VEHICLE.

R0303                    P75 IF THIS VEHICLE IS PASSIVE VEHICLE.

R0304     INPUT

R0305           (1) TPASS4    TIME OF INTERCEPT - SAVED FROM P34/P74
R0306     OUTPUT

R0307           (1) TRKMKCNT NUMBER OF MARKS
R0308           (2) TTOGO     TIME TO GO
R0309           (3) +MGA      MIDDLE GIMBAL ANGLE
R0310           (4) DVLOS     DELTA VELOCITY AT MID - LINE OF SIGHT
R0311           (5) DELVLVC  DELTA VELOCITY AT MID - LOCAL VERTICAL COORDINATES

R0312     DOWNLINK

R0325           (1) TIG       TIME OF THE TPM MANEUVER
R0326           (2) DELVEET3 DELTA VELOCITY AT TPM - REFERENCE COORDINATES
R0327           (3) TPASS4    TIME OF INTERCEPT
R0328     COMMUNICATION TO THRUSTING PROGRAMS

R0329           (1) TIG       TIME OF THE TPM MANEUVER
R0330           (2) RTARG     OFFSET TARGET POSITION
R0331           (3) TPASS4    TIME OF INTERCEPT
R0332           (4) XDELVFLG RESET TO INDICATE LAMBERT (AIMPOINT) VG COMPUTATION

R0333     SUBROUTINES USED

R0334           AVFLAGA
R0335           AVFLAGP
R0336           LOADTIME
R0337           SELECTMU
R0338           PRECSET
R0339           S34/35.1
R0340           S34/35.2
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L        P34-P35, P74-P75                                                                               USER'S PAGE NO. 10      E4 S3

R0341          S34/35.5
R0342          VN1645

 0343   REF   1                                            COUNT*  $$/P3575
 0344   REF   5  LAST   96   E4,1754                       EBANK=  KT

 0345   REF   2  LAST  466   35,2206  0 4553 0  P35        TC      AVFLAGA
 0346                        35,2207  0 0006 1             EXTEND
 0347   REF   1              35,2210  3 1422 1             DCA     ATIGINC
 0348   REF   1              35,2211  0 2215 0             TC      P35/P75A
 0349   REF   2  LAST  466   35,2212  0 4565 0  P75        TC      AVFLAGP
 0350                        35,2213  0 0006 1             EXTEND
 0351   REF   1              35,2214  3 1424 1             DCA     PTIGINC
 0352   REF   6  LAST  472   35,2215  53'755 0  P35/P75A   DXCH    KT
 03525  REF   2  LAST  466   35,2216  0 4572 0             TC      P20FLGON          SET UPDATFLG, TRACKFLG
 0353   REF  48  LAST  468   35,2217  0 6006 1             TC      INTPRET
 0359                        35,2220   77624 1             CALL
 0360   REF   2  LAST  466   35,2221   11217 0                     SELECTMU
 0361                        35,2222   77634 0  P35/P75B   RTB
 0362   REF   4  LAST  458   35,2223   51751 0                     LOADTIME
 03621  REF   2  LAST  129   35,2224   03665 1             STORE   TSTRT
 03622                       35,2225   77615 0             DAD
 03623  REF   7  LAST  472   35,2226   02355 0                     KT
 03624  REF  20  LAST  468   35,2227   03413 1             STORE   TIG
 0363   REF   3  LAST  468   35,2230   03503 1             STORE   INTIME            FOR INITVEL
 0364   REF   4  LAST  467   35,2231   34041 0             STCALL  TDEC1
 0365   REF   2  LAST  467   35,2232   45236 1                     PRECSET           ADVANCE BOTH VEHICLES
 0366                        35,2233   77624 1             CALL
 0367   REF   2  LAST  220   35,2234   74000 1                     S34/35.1          GET NORM AND LOS FOR TRANSFORM
 0368                        35,2235   77624 1             CALL
 0369   REF   3  LAST  468   35,2236   72561 0                     S34/35.2          GET DELTA V(LV)
 0370                        35,2237   77624 1             CALL
 0371   REF   2  LAST  469   35,2240   72774 0                     S34/35.5
 03711                       35,2241   43014 0             BOFF    SET
 03712  REF   2  LAST  467   35,2242   01351 1                     FINALFLG
 03713                       35,2243   72245 1                     +2
 03714  REF   1              35,2244   05067 0                     P35FLAG
 0372                        35,2245   77624 1             CALL
 0373   REF   2  LAST  469   35,2246   73027 0                     VN1645
 0379                        35,2247   77650 1             GOTO
 0380   REF   1              35,2250   72222 0                     P35/P75B
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L        P34-P35, P74-P75                                                                         USER'S PAGE NO.  11      E4 S3

P0381    ..... S33/34.1 .....

  0382                             35,2251   66220 1  S33/34.1 STQ    SSP
  0383   REF   1                   35,2252   01023 1                  NORMEX
  0384   REF   2  LAST  133        35,2253   03665 1                  TITER
  0385                             35,2254   40000 0           OCT    40000
  0386                             35,2255   40345 1           DLOAD  SETPD
  0387   REF   1                   35,2256   33145 1                  MAX250
  0388                             35,2257   00001 0                  0D
  0389   REF   2  LAST  126        35,2260   27454 1           STOVL  SECMAX
  0390   REF   7  LAST  468        35,2261   03540 0                  RACT3
  0391   REF   1                   35,2262   27576 0           STOVL  RAPREC
  0392   REF   5  LAST  220        35,2263   03546 0                  VACT3
  0393   REF   1                   35,2264   27570 0           STOVL  VAPREC
  0394   REF   5  LAST  468        35,2265   03554 0                  RPASS3
  0395   REF   1                   35,2266   27620 0           STOVL  RPPREC
  0396   REF   5  LAST  468        35,2267   03562 0                  VPASS3
  0397   REF   1                   35,2270   03612 1           STORE  VPPREC
  0398                             35,2271   77624 1  ELCALC   CALL
  0399   REF   3  LAST  472        35,2272   74000 1                  S34/35.1            NORMAL AND LOS
  0400                             35,2273   63235 0           VXV    PDVL
  0401   REF   8  LAST  473        35,2274   03540 0                  RACT3               (RA*VA)*RA 0D
  0402                             35,2275   53515 0           PDVL   UNIT                ULOS AT 6D
  0403   REF   9  LAST  473        35,2276   03540 0                  RACT3
  0404                             35,2277   46315 1           PDVL   VPROJ               XCHNJ AND UP
  0405                             35,2300   51352 1           VSL2   BVSU
  0406   REF   2  LAST   97        35,2301   02625 1                  ULOS
  0407                             35,2302   63256 0           UNIT   PDVL                UP AT 0D
  0408                             35,2303   63241 0           DOT    PDVL                UP.UN*RA AT 0D
  0409                             35,2304   00001 0                  0D                  UP IN MPAC
  0410                             35,2305   75241 1           DOT    SIGN
  0411   REF   3  LAST  473        35,2306   02625 1                  ULOS
  0412                             35,2307   65552 0           SL1    ACOS
  0413                             35,2310   50315 0           PDVL   DOT                 EA AT 0D
  0414   REF   4  LAST  473        35,2311   02625 1                  ULOS
  0415   REF  10  LAST  473        35,2312   03540 0                  RACT3
  0416                             35,2313   71244 0           BPL    DLOAD
  0417   REF   1                   35,2314   72317 1                  TESTY
  0418   REF   4  LAST  460        35,2315   15344 0                  DPPOSMAX
  0419                             35,2316   41425 1           DSU    PUSH
  0420                             35,2317   71214 0  TESTY    BOFF   DLOAD
  0421   REF   4  LAST  467        35,2320   03741 0                  ITSWICH
  0422   REF   1                   35,2321   72546 0                  ELEX
  0423   REF   2  LAST  126        35,2322   03452 1                  DELEL
  0424   REF   1                   35,2323   14033 1           STODL  DELELO
  0425                             35,2324   77625 0           DSU
  0426   REF   8  LAST  467        35,2325   03744 0                  ELEV
  0427   REF   3  LAST  473        35,2326   03452 1           STORE  DELEL
  0428                             35,2327   45246 0           ABS    DSU
  0429   REF   1                   35,2330   33151 1                  ELEPS
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 0430                            35,2331   77640 0                BMN
 0431   REF   1                  35,2332   72556 1                        TIMEX             COMMERCIALS EVERYWHERE
 0432                            35,2333   70535 0   FIGTIME   SLOAD  SR1
 0433   REF   3  LAST   473      35,2334   03665 1                        TITER
 0434                            35,2335   72030 1                BHIZ    LXA,1
 0435   REF   2  LAST   473      35,2336   01023 1                        NORMEX            TOO MANY ITERATIONS
 0436   REF 227  LAST   453      35,2337   00154 1                        MPAC
 0437                            35,2340   77330 1                SXA,1   VLOAD
 0438   REF   4  LAST   474      35,2341   03664 0                        TITER
 0439   REF   6  LAST   473      35,2342   03554 0                        RPASS3
 0440                            35,2343   65256 0                UNIT    PDDL
 0441                            35,2344   00045 0                        36D
 0442                            35,2345   53515 0                PDVL    UNIT
 0443   REF  11  LAST   473      35,2346   03540 0                        RACT3
 0444                            35,2347   77725 1                PDDL
 0445                            35,2350   41525 0                PDDL    PUSH
 0446                            35,2351   00045 0                        36D
 0447                            35,2352   77621 1                BDSU
 0448                            35,2353   00015 0                        12D
 0449                            35,2354   14037 0                STODL   30D               RP - RA MAGNITUDES
 0450   REF   9  LAST   461      35,2355   15334 1                        DPHALF
 0451                            35,2356   41425 1                DSU     PUSH
 0452   REF   9  LAST   473      35,2357   03744 0                        ELEV
 0453                            35,2360   50165 0                SIGN    BMN
 0454                            35,2361   00037 0                        30D
 0455   REF   3  LAST   474      35,2362   01023 1                        NORMEX
 0456                            35,2363   71545 0                DLOAD   COS
 0457                            35,2364   56205 0                DMP     DDV
 0458                            35,2365   00017 1                        14D
 0459                            35,2366   00015 0                        12D
 0460                            35,2367   77676 0                DCOMP                     SINCE COS(180-A)=-COS A
 0461                            35,2370   00035 1                STORE   28D
 0462                            35,2371   44246 1                ABS     BDSU
 0463   REF  10  LAST   474      35,2372   15334 1                        DPHALF
 0464                            35,2373   77240 1                BMN     VLOAD
 0465   REF   4  LAST   474      35,2374   01023 1                        NORMEX
 0466   REF   2  LAST    97      35,2375   02617 0                        UNRM
 0467                            35,2376   53435 0                VXV     UNIT
 0468                            35,2377   00007 0                        6D                UN*RA
 0469                            35,2400   41241 0                DOT     DMP
 0470   REF   6  LAST   473      35,2401   03546 0                        VACT3
 0471                            35,2402   00015 0                        12D
 0472                            35,2403   47315 0                PDVL    VXV
 0473                            35,2404   00001 0                        0D
 0474   REF   6  LAST   473      35,2405   03562 0                        VPASS3
 0475                            35,2406   53435 0                VXV     UNIT
 0476                            35,2407   00001 0                        0D                (RP*VP)*RP
 0477                            35,2410   41241 0                DOT     DMP
 0478   REF   7  LAST   474      35,2411   03562 0                        VPASS3
 0479                            35,2412   00017 1                        14D
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0480                          35,2413   77621 1                  BDSU
0481                          35,2414   63301 0                  NORM     PDVL            NORMALIZED WA - WP 12D
0482   REF   3  LAST  468     35,2415   00047 1                           X1
0483                          35,2416   00007 0                           6D
0484                          35,2417   50235 0                  VXV      DOT
0485                          35,2420   00001 0                           0D
0486   REF   3  LAST  474     35,2421   02617 0                           UNRM            RA*RP.UN 14D
0487                          35,2422   50315 0                  PDVL     DOT
0488                          35,2423   00001 0                           0D
0489                          35,2424   00007 0                           6D
0490                          35,2425   65552 0                  SL1      ACOS
0491                          35,2426   77765 0                  SIGN
0492                          35,2427   43225 0                  DSU      DAD               ALPHA   PI
0493   REF  11  LAST  474     35,2430   15334 1                           DPHALF
0494   REF  10  LAST  474     35,2431   03744 0                           ELEV
0495                          35,2432   65525 0                  PDDL     ACOS
0496                          35,2433   00035 1                           28D
0497                          35,2434   75221 1                  BDSU     SIGN
0498   REF  12  LAST  475     35,2435   15334 1                           DPHALF
0499                          35,2436   00037 0                           30D             CONTAINS RP-RA
0500                          35,2437   77615 0                  DAD
0501                          35,2440   56205 0                  DMP      DDV
0502   REF   1                35,2441   33143 1                           TWOPI
0503                          35,2442   77605 1                  DMP
0504                          35,2443   41257 1                  SL*      DMP
0505                          35,2444   20176 0                           0 -3,1
0506                          35,2445   51406 1                  PUSH     ABS
0507                          35,2446   50025 0                  DSU      BMN
0508   REF   3  LAST  473     35,2447   03454 1                           SECMAX
0509   REF   1                35,2450   72454 1                           OKMAX
0510                          35,2451   75345 1                  DLOAD    SIGN              REPLACE TIME WITH MAX TIME SIGNED
0511   REF   4  LAST  475     35,2452   03454 1                           SECMAX
0512                          35,2453   77606 1                  PUSH
0513                          35,2454   51135 1   OKMAX          SLOAD    BPL             TEST FIRST ITERATION
0514   REF   5  LAST  474     35,2455   03665 1                           TITER
0515   REF   1                35,2456   72464 1                           REPETE
0516                          35,2457   71331 0                  SSP      DLOAD
0517   REF   6  LAST  475     35,2460   03665 1                           TITER
0518                          35,2461   37777 1                  OCT      37777
0519                          35,2462   77650 1                  GOTO
0520   REF   1                35,2463   72522 1                           STORDELT
0521                          35,2464   41345 0   REPETE         DLOAD    DMP
0522   REF   4  LAST  473     35,2465   03452 1                           DELEL
0523   REF   2  LAST  473     35,2466   00033 1                           DELELO
0524                          35,2467   71244 0                  BPL      DLOAD
0525   REF   1                35,2470   72500 1                           NEXTES
0526   REF   5  LAST  475     35,2471   03454 1                           SECMAX
0527                          35,2472   77605 1                  DMP
0528   REF   1                35,2473   33147 0                           THIRD
0529   REF   6  LAST  475     35,2474   17454 1                  STODL    SECMAX
```

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L        P34-P35, P74-P75                                                                         USER'S PAGE NO.  14       04 53

 0530                              35,2475   70446 0               ABS     SR1             CROSSED OVER SOLUTION
 0531                              35,2476   52076 1               DCOMP   GOTO            DT=(-SIGN(DTO)//DT//)/2
 0532     REF   1                  35,2477   72510 0                       RESIGN
 0533                              35,2500   51545 1   NEXTES      DLOAD   ABS
 0534     REF   5  LAST   475      35,2501   03452 1                       DELEL
 0535                              35,2502   51525 1               PDDL    ABS
 0536     REF   3  LAST   475      35,2503   00033 1                       DELELO
 0537                              35,2504   77625 0               DSU
 0538                              35,2505   71240 1               BMN     DLOAD
 0539     REF   1                  35,2506   72513 0                       REVERS            WRONG DIRECTION
 0540                              35,2507   77646 0               ABS
 0541                              35,2510   52165 1   RESIGN      SIGN    GOTO
 0542     REF   2  LAST   126      35,2511   03450 0                       DELTEEO
 0543     REF   2  LAST   475      35,2512   72522 1                       STORDELT
 0544                              35,2513   57545 1   REVERS      DLOAD   DCOMP
 0545     REF   3  LAST   476      35,2514   03450 0                       DELTEEO
 0546                              35,2515   70406 1               PUSH    SR1
 0547     REF   4  LAST   476      35,2516   03450 0               STORE   DELTEEO
 0548                              35,2517   77615 0               DAD
 0549                              35,2520   77650 1               GOTO
 0550     REF   1                  35,2521   72523 0                       ADTIME
 0551     REF   5  LAST   476      35,2522   03450 0   STORDELT    STORE   DELTEEO
 0552                              35,2523   77615 0   ADTIME      DAD
 0553     REF   3  LAST   467      35,2524   02355 0                       NOMTPI            SUM OF DELTA T:S
 0554     REF   4  LAST   476      35,2525   02355 0               STORE   NOMTPI
 0555                              35,2526   63375 0               VLOAD   PDVL
 0556     REF   2  LAST   473      35,2527   03570 0                       VAPREC
 0557     REF   2  LAST   473      35,2530   03576 0                       RAPREC
 0558                              35,2531   77624 1               CALL
 0559     REF   1                  35,2532   72734 1                       GOINT
 0560                              35,2533   77624 1               CALL
 0561     REF   1                  35,2534   45304 1                       ACTIVE            STORE NEW RACT3 VACT3
 0562                              35,2535   63375 0               VLOAD   PDVL
 0563     REF   2  LAST   473      35,2536   03612 1                       VPPREC
 0564     REF   2  LAST   473      35,2537   03620 0                       RPPREC
 0565                              35,2540   77624 1               CALL
 0566     REF   2  LAST   476      35,2541   72734 1                       GOINT
 0567                              35,2542   77624 1               CALL
 0568     REF   1                  35,2543   45314 0                       PASSIVE           STORE NEW RPASS3 VPASS3
 0569                              35,2544   77650 1               GOTO
 0570     REF   1                  35,2545   72271 0                       ELCALC
 0571                              35,2546   43345 1   ELEX        DLOAD   DAD
 0572     REF   9  LAST   468      35,2547   03663 1                       TTPI
 0573     REF   5  LAST   476      35,2550   02355 0                       NOMTPI
 0574     REF  10  LAST   476      35,2551   17663 1               STODL   TTPI
 0575                              35,2552   77614 1               BON
 0576     REF   7  LAST   467      35,2553   01310 1                       ETPIFLAG
 0577     REF   2  LAST   474      35,2554   72556 1                       TIMEX
 0578     REF  11  LAST   475      35,2555   03744 0               STORE   ELEV
 0579                              35,2556   52145 0   TIMEX       DLOAD   GOTO
 0580   REF   7  LAST  467   35,2557   15336 0                 ZEROVECS
 0581   REF   5  LAST  474   35,2560   01023 1                 NORMEX
```

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L       P34-P35, P74-P75                                                            USER'S PAGE NO. 16       E4 S3

P0582   ***** S34/35.1 *****

R0583   COMPUTE UNIT NORMAL AND LINE OF SIGHT VECTORS GIVEN THE ACTIVE AND
R0584   PASSIVE POS AND VEL AT TIME T3
 05845  REF   1                 36,2000                          SETLOC S3435LOC
 05846                          36,2000                          BANK

 05848  REF   1                                                  COUNT* $$/P3474
 0585                           36,2000    52375 1  S34/35.1 VLOAD  VSU
 0586   REF   7  LAST  474      36,2001    03554 0                  RPASS3
 0587   REF  12  LAST  474      36,2002    03540 0                  RACT3
 0588                           36,2003    41456 0           UNIT   PUSH
 0589   REF   5  LAST  473      36,2004    26625 1           STOVL  ULOS
 0590   REF  13  LAST  478      36,2005    03540 0                  RACT3
 0591                           36,2006    53435 0           VXV    UNIT
 0592   REF   7  LAST  474      36,2007    03546 0                  VACT3
 0593   REF   4  LAST  475      36,2010    02617 0           STORE  UNRM
 0594                           36,2011    77616 0           RVQ
```

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P0595    ..... S34/35.2  .....

R0596    ADVANCE PASSIVE VEH TO RENDEZVOUS TIME AND GET REQ VEL FROM LAMBERT
  05965  REF   2  LAST  466   35,2000                           SETLOC  CSI/CDH
  05966                       35,2561                           BANK

  05968  REF   2 LAST  466 TO  472:    134   134*               COUNT*  $$/P3474
  0597                        35,2561   77220 1  S34/35.2 STQ           VLOAD
  0598   REF   5  LAST  466   35,2562   02360 0                         SUBEXIT
  0599   REF   8  LAST  474   35,2563   03562 0                         VPASS3
  0600                        35,2564   65315 0           PDVL          PDDL
  0601   REF   8  LAST  478   35,2565   03554 0                         RPASS3
  0602   REF   4  LAST  472   35,2566   03503 1                         INTIME
  0603                        35,2567   65325 0           PDDL          PDDL
  0604   REF   5  LAST  468   35,2570   03656 1                         TPASS4
  0605   REF   2  LAST  475   35,2571   33143 1                         TWOPI              CONIC
  0606                        35,2572   46125 0           PDDL          BHIZ
  06061  REF   8  LAST  466   35,2573   03766 0                         NN
  06062  REF   1              35,2574   72577 1                         S3435.23
  06063                       35,2575   65345 0           DLOAD         PDDL
  06065  REF   8  LAST  477   35,2576   15336 0                         ZEROVECS           PRECISION
  06066                       35,2577   77624 1  S3435.23 CALL
  0607   REF   1              35,2600   72740 1                         INTINT             GET TARGET VECTOR
  0608   REF   6  LAST  217   35,2601   27415 1  S3435.25 STOVL         RTARG
  0609   REF   2  LAST  457   35,2602   00007 0                         VATT
  0610   REF   2  LAST  468   35,2603   27640 0           STOVL         VPASS4
  0611   REF   7  LAST  479   35,2604   03415 1                         RTARG
R0612    COMPUTE PHI = PI +(ACOS(UNIT RA.UNIT RP)-PI)SIGN(RA*RP.U)
  0613                        35,2605   63256 0           UNIT          PDVL               UNIT RP
  0614   REF  14  LAST  478   35,2606   03540 0                         RACT3
  0615                        35,2607   41456 0           UNIT          PUSH               UNIT RA
  0616                        35,2610   50235 0           VXV           DOT
  0617                        35,2611   00001 0                         00
  0618   REF   5  LAST  478   35,2612   02617 0                         UNRM               RA*RP.U
  0619                        35,2613   77715 1           PDVL
  0620                        35,2614   72441 0           DOT           SL1                UNIT RA.UNIT RP
  0621                        35,2615   00001 0                         00
  0622                        35,2616   75326 1           ACOS          SIGN
  0623                        35,2617   43244 1           BPL           DAD
  0624   REF   1              35,2620   72622 1                         NOPIE
  0625   REF   5  LAST  473   35,2621   15344 0                         DPPOSMAX           REASONABLE TWO PI
  0626   REF   3  LAST  292   35,2622   16633 0  NOPIE    STODL         ACTCENT
  0627   REF   6  LAST  479   35,2623   03656 1                         TPASS4
  0628                        35,2624   77625 0           DSU
  0629   REF   5  LAST  479   35,2625   03503 1                         INTIME
  0630   REF   4  LAST  185   35,2626   03423 1           STORE         DELLT4
  0631                        35,2627   40335 0           SLOAD         SETPD
  0632   REF   9  LAST  479   35,2630   03766 0                         NN                 NUMBER OF OFFSETS
  0633                        35,2631   00001 0                         0D
  06331                       35,2632   63325 0           PDDL          PDVL
```

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 06332  REF   1              35,2633   33156 0                 EPSFOUR
 06333  REF  15  LAST  479   35,2634   03540 0                 RACT3
 06334  REF   3  LAST  127   35,2635   27570 0         STOVL   RINIT
 06335  REF   8  LAST  478   35,2636   03546 0                 VACT3
 06336  REF   3  LAST  127   35,2637   37576 1         STCALL  VINIT
 06337  REF   1              35,2640   22000 1                 INITVEL
 0634                        35,2641   77624 1         CALL
 0635   REF   1              35,2642   72721 0                 LCMAT
 0636                        35,2643   64375 1         VLOAD   MXV
 0637   REF   6  LAST  468   35,2644   03646 0                 DELVEET3
 0638                        35,2645   00001 0                 0D
 0639                        35,2646   77772 0         VSL1
 0640   REF  10  LAST  294   35,2647   37405 1         STCALL  DELVLVC
 0641   REF   6  LAST  479   35,2650   02360 0                 SUBEXIT
```

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P0642    *****  S34/35.3  *****

 0643                             35,2651   45020 1  S34/35.3 STQ     CALL
 0644    REF   6  LAST  477       35,2652   01023 1                   NORMEX
 0645    REF   2  LAST  480       35,2653   72721 0                   LOMAT            GET MATRIX IN PUSH LIST
 0646                             35,2654   61375 1           VLOAD   VXM
 0647    REF  11  LAST  480       35,2655   03405 0                   DELVLVC          NEW DEL V TPI
 0648                             35,2656   00001 0                   0D
 0649                             35,2657   77772 0           VSL1
 0650    REF   7  LAST  480       35,2660   03646 0           STORE   DELVEET3         SAVE FOR TRANSFORM
 0651                             35,2661   63255 0           VAD     PDVL
 0652    REF   9  LAST  480       35,2662   03546 0                   VACT3            NEW V REQ
 0653    REF  16  LAST  480       35,2663   03540 0                   RACT3
 0654                             35,2664   65325 0           PDDL    PDDL
 0655    REF  21  LAST  472       35,2665   03413 1                   TIG
 0656    REF   7  LAST  479       35,2666   03656 1                   TPASS4
 0657                             35,2667   41525 0           PDDL    PUSH
 0658    REF   6  LAST  479       35,2670   15344 0                   OPPOSMAX
 0659                             35,2671   77624 1           CALL                     INTEG. FOR NEW TARGET VEC
 0660    REF   2  LAST  479       35,2672   72740 1                   INTINT
 0661                             35,2673   77775 1           VLOAD
 0662    REF   3  LAST  457       35,2674   00001 0                   RATT
 0663    REF   8  LAST  479       35,2675   03415 1           STORE   RTARG
 0664                             35,2676   41575 0  NOVRWRT  VLOAD   PUSH
 0665    REF   6  LAST  478       35,2677   02625 1                   ULOS
 0666                             35,2700   57435 1           VXV     VCOMP
 0667    REF   6  LAST  479       35,2701   02617 0                   UNRM
 0668                             35,2702   41456 0           UNIT    PUSH
 0669                             35,2703   76435 1           VXV     VSL1
 0670    REF   7  LAST  481       35,2704   02625 1                   ULOS
 0671                             35,2705   77715 1           PDVL
 0672                             35,2706   64315 1           PDVL    MXV
 0673    REF   8  LAST  481       35,2707   03646 0                   DELVEET3
 0674                             35,2710   00001 0                   0D
 0675                             35,2711   77772 0           VSL1
 0676    REF   7  LAST  292       35,2712   36611 1           STCALL  DVLOS
 0677    REF   7  LAST  481       35,2713   01023 1                   NORMEX
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P0678   ..... S34/35.4 .....

 0679                         35,2714   40220 0  S34/35.4 STQ     SETPD              NO ASTRONAUT OVERWRITE
 0680    REF   8  LAST  481   35,2715   01023 1                   NORMEX
 0681                         35,2716   00001 0                   0D
 0682                         35,2717   77650 1           GOTO
 0683    REF   1              35,2720   72676 0                   NOVRWRT
```

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P0684    ***** LOMAT     *****

 0685                             35,2721   57575 1  LOMAT     VLOAD   VCOMP
 0686   REF   7  LAST  481        35,2722   02617 0                    UNRM
 0687                             35,2723   24007 0            STOVL   6D              Y
 0688   REF  17  LAST  481        35,2724   03540 0                    RACT3
 0689                             35,2725   57456 1            UNIT    VCOMP
 0690                             35,2726   00015 0            STORE   12D
 0691                             35,2727   76435 1            VXV     VSL1
 0692   REF   8  LAST  483        35,2730   02617 0                    UNRM            Z*-Y
 0693                             35,2731   00001 0            STORE   0D
 0694                             35,2732   43401 0            SETPD   RVQ
 0695                             35,2733   00023 0                    18D
 0696                             35,2734   65325 0  GOINT     PDDL    PDDL            DO
 0697   REF   9  LAST  479        35,2735   15336 0                    ZEROVECS          NOT
 0698   REF   6  LAST  476        35,2736   02355 0                    NCMTPI
 0699                             35,2737   41406 0            PUSH    PUSH                         ORDER OR INSERT BEFORE INTINT
 0700                             35,2740   45020 1  INTINT    STQ     CALL
 0701   REF   2  LAST   95        35,2741   02357 1                    RTRN
 0702   REF   7  LAST  456        35,2742   27516 0                    INTSTALL
 0703                             35,2743   71214 0            CLEAR   DLOAD
 0704   REF   2  LAST  456        35,2744   01673 1                    INTYPFLG
 0705                             35,2745   43054 1            BZE     SET
 0706                             35,2746   72750 0                    +2
 0707   REF   3  LAST  483        35,2747   01473 0                    INTYPFLG
 0708                             35,2750   45545 1            DLOAD   STADR
 0709   REF   5  LAST  472        35,2751   63736 0            STODL   TDEC1
 0710                             35,2752   73014 0            SET     LXA,2
 0711   REF   3  LAST  457        35,2753   00063 1                    MOONFLAG
 0712   REF   2  LAST  130        35,2754   03746 1                    RTX2
 0713                             35,2755   43014 0            BON     CLEAR
 0714   REF   6  LAST  461        35,2756   04303 0                    CMOONFLG
 0715   REF   1                   35,2757   72761 1                    ALLSET
 0716   REF   4  LAST  483        35,2760   00263 0                    MOONFLAG
 0717   REF   7  LAST  457        35,2761   25517 0  ALLSET    STOVL   TET
 0718                             35,2762   77657 0            VSR*
 0719                             35,2763   57176 0                    0,2
 0720   REF   5  LAST  457        35,2764   25535 0            STOVL   RCV
 0721                             35,2765   77657 0            VSR*
 0722                             35,2766   57176 0                    0,2
 0723   REF   5  LAST  457        35,2767   35543 0            STCALL  VCV
 0724   REF   2  LAST  457        35,2770   27211 0                    INTEGRVS
 0725                             35,2771   52175 0            VLOAD   GOTO
 0726   REF   4  LAST  481        35,2772   00001 0                    RATT
 0727   REF   3  LAST  483        35,2773   02357 1                    RTRN
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P0728   ..... S34/35.5  .....
R0729   SUBROUTINES USED

R0730           BANKCALL
R0731           GOFLASH
R0732           GOTOPOOH
R0733           S34/35.3
R0734           S34/35.4
R0735           VNPOOH

 0736                              35,2774   43020 1  S34/35.5 STQ     BCN
 0737   REF   7  LAST  480         35,2775   02360 0                   SUBEXIT
 0738   REF   3  LAST  472         35,2776   01311 0                   FINALFLG
 0739   REF   1                    35,2777   73003 0                   FLAGON
 0740                              35,3000   52014 0           SET     GOTO
 0741   REF   2  LAST  270         35,3001   00470 1                   UPDATFLG
 0742   REF   2  LAST  484         35,3002   73005 0                   FLAGON +2
 07422                             35,3003   77614 1  FLAGON   SET
 07424  REF   3  LAST  466         35,3004   05074 1                   TPIMNFLG        INDICATE TPI MANEUVER DONE
 0743                              35,3005   77775 1        +2 VLOAD
 0744   REF  12  LAST  481         35,3006   03405 0                   DELVLVC
 0745   REF   4  LAST  468         35,3007   03620 0           STORE   VTPRIME         SAVE DELTA V BEFORE DISPLAY
 0746                              35,3010   77776 1           EXIT
 0747   REF   1                    35,3011  3 4535 0           CAF     V06N81
 0748   REF   8  LAST  468         35,3012  0 5535 1           TC      VNFLASH
 0749   REF  49  LAST  472         35,3013  0 6006 1           TC      INTPRET
 0750                              35,3014   52375 1           VLOAD   VSU             TEST FOR OVERWRITE OF COMPUTED
 0751   REF  13  LAST  484         35,3015   03405 0                   DELVLVC                              DELTA V
 0752   REF   5  LAST  484         35,3016   03620 0                   VTPRIME
 0753                              35,3017   53046 0           ABVAL   BZE
 0754   REF   1                    35,3020   73023 1                   FLAGOFF
 0755                              35,3021   77624 1           CALL
 0756   REF   1                    35,3022   72651 0                   S34/35.3        COMPUTE NEW TARGET VECTOR
R0762   TRANSFER OF DELVEET3 TO DELVSIN OUT...THEY SHARE SAME ERASABLE.
 0763                              35,3023   77624 1  FLAGOFF  CALL
 0764   REF   1                    35,3024   72714 0                   S34/35.4
 0769                              35,3025   77650 1  FLAGEND  GOTO
 0770   REF   8  LAST  484         35,3026   02360 0                   SUBEXIT
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P0771      ..... VN1645    .....

R0772      SUBROUTINES USED

R0773           P3XORP7X
R0774           GET+MGA
R0775           BANKCALL
R0776           DELAYJOB
R0777           COMPTGO
R0778           GOFLASHR
R0779           GOTOPOOH
R0780           FLAGUP

 0781                             35,3027    71220 1  VN1645     STQ       DLOAD
 0782   REF    9  LAST  484       35,3030    02360 0                       SUBEXIT
 0783   REF    1                  35,3031    33154 1                       DP-.01
 0784   REF    3  LAST  292       35,3032    03626 0             STORE     +MGA                MGA = -.01
 0785                             35,3033    71214 0             BOFF      DLOAD
 0786   REF    4  LAST  484       35,3034    01351 1                       FINALFLG
 0787   REF    1                  35,3035    73055 0                       GET45
 0788   REF    2  LAST  485       35,3036    33154 1                       DP-.01
 0789                             35,3037    77615 0             DAD
 0790   REF    3  LAST  485       35,3040    33154 1                       DP-.01
 0791   REF    4  LAST  485       35,3041    03626 0             STORE     +MGA                MGA = -.02
 0792                             35,3042    77414 0             BOFF      EXIT
 0793   REF    1                  35,3043    01742 1                       REFSMFLG
 0794   REF    2  LAST  485       35,3044    73055 0                       GET45
 0795   REF    1                  35,3045  0 3137 1              TC        P3XORP7X
 0796                             35,3046  0 3050 1              TC        +2                  P3X
 0797   REF    3  LAST  485       35,3047  0 3056 1              TC        GET45 +1            P7X
 0798   REF   50  LAST  484       35,3050  0 6006 1              TC        INTPRET
 0799                             35,3051    41575 0             VLOAD     PUSH
 0800   REF    3  LAST  127       35,3052    03646 0                       DELVSIN
 0801                             35,3053    77624 1             CALL                          COMPUTE MGA
 0802   REF    1                  35,3054    56444 0                       GET+MGA
 0803                             35,3055    77776 1  GET45      EXIT
 0804   REF    1                  35,3056  0 3525 0     +1       TC        COMPTGO             INITIATE TASK TO UPDATE TTOGO
 0805   REF   10  LAST  485       35,3057  3 1760 1              CA        SUBEXIT
 0806   REF    3  LAST   95       35,3060    55'756 0            TS        QSAVED
 0808   REF   88  LAST  467       35,3061  0 4636 0              TC        BANKCALL
 0809   REF    1                  35,3062    01730 1             CADR      1SECDELY
 0810   REF    1                  35,3063  3 4536 0              CAF       V16N45              TRKMKCNT, TTOGO, +MGA
 0811   REF   89  LAST  485       35,3064  0 4636 0              TC        BANKCALL
 0812   REF   10  LAST  467       35,3065    20743 0             CADR      GOFLASH
 0813   REF   12  LAST  467       35,3066  0 4103 1              TC        GOTOPOOH            TERMINATE
 0814   REF    1                  35,3067  0 3071 1              TC        N45PROC             PROCEED
 0815   REF    1                  35,3070  0 3101 1              TC        CLUPDATE            RECYCLE - RETURN FOR INITIAL COMPUTATION
 0819   REF   10  LAST  315       35,3071  4 0076 1  N45PROC     CS        FLAGWRD2
 0820   REF    1                  35,3072  7 4763 0              MASK      FINALBIT
 0821                             35,3073  0 0006 1              EXTEND
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0822     REF   1                 35,3074  1 3113 0             BZF      N45ENAJ        FINAL FLAG SET - FINAL PASS
0823     REF  24  LAST  453      35,3075  0 5402 1  N45NORM    TC       PHASCHNG
0824                             35,3076   04024 0             OCT      04024
0825     REF  30  LAST  456      35,3077  0 5547 1             TC       UPFLAG         SET
0826     REF   5  LAST  485      35,3100   00047 1             ADRES    FINALFLG       FINALFLG
0827     REF  25  LAST  428      35,3101  0 5561 0  CLUPDATE   TC       DOWNFLAG
0828     REF   1                 35,3102   00155 0             ADRES    TIMRFLAG       TERMINATE CLOKTASK
08282    REF   1                 35,3103  3 3136 0             CAF      VN1645AD       CHANGE BACK TO 4.1 FOR
08284    REF   3  LAST  213      35,3104  54 373 1             TS       TEMPFLSH       FUTURE DISPLAYS
0829     REF  25  LAST  486      35,3105  0 5402 1             TC       PHASCHNG
0830                             35,3106   00014 1             OCT      14

0831     REF  51  LAST  485      35,3107  0 6006 1  VN1645R    TC       INTPRET
0832                             35,3110   52014 0             CLEAR    GOTO
0833     REF   3  LAST  484      35,3111   00670 0                      UPDATFLG
0834     REF   4  LAST  485      35,3112   02356 0    +3                QSAVED
083402   REF  26  LAST  486      35,3113  0 5402 1  N45ENAJ    TC       PHASCHNG       PROTECT MANEVFLG, WRENDPOS
083404                           35,3114   04024 0             OCT      04024
083411   REF  52  LAST  486      35,3115  0 6006 1             TC       INTPRET
083412                           35,3116   77745 1             DLOAD
083414   REF  22  LAST  461      35,3117   03413 1                      TIG
083416   REF   3  LAST  220      35,3120   03450 0             STORE    NOMTIG
08342                            35,3121   43014 0             BON      SET
083421   REF   2  LAST  216      35,3122   05316 0                      PCFLAG
083422   REF   1                 35,3123   73125 0                      CHGRMS
083423   REF   2  LAST  216      35,3124   05072 1                      MANEUFLG       DONT SET FLAG IF PC MANEUVER
083424                           35,3125   71214 0  CHGRMS     BOFF     DLOAD
083425   REF   9  LAST  467      35,3126   05350 1                      AUTOSEQ
083426   REF   1                 35,3127   73132 0                      SAMERMS
083427   REF   1                 35,3130   33135 0                      POSVEL2        CHANGE RMS ONLY IN MINKEY
083428   REF   1                 35,3131   02001 1             STORE    WRENDPOS
083429                           35,3132   77776 1  SAMERMS    EXIT
08343    REF   1                 35,3133  1 4105 0             TCF      MNKGOPOO
083431                           35,3134   00023 0  POSVEL2    DEC      608 B-19       2000 FT IN METERS
083432                           35,3135   00144 0  POSVEL3    DEC      .00608         2 FT/SEC IN M/CS
0835     REF   1                 35,3136   73112 1  VN1645AD   CADR     VN1645R +3
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L        P34-P35, P74-P75                                                                          USER'S PAGE NO.  25        24 53

P0853    ***** P3XORP7X  *****

 0854    REF    1                  35,3137  3 7677 0   P3XORP7X CAF      HIGH9
 0855    REF    9  LAST   447      35,3140  7 1214 0            MASK     MODREG
 0856    REF    4  LAST   261      35,3141  1 5651 1            TCF      INCRQCK
 0860    REF    1                     4000                      SETLOC  P35SUBS
 0861                                 4532                      BANK

 0862    REF    1                                               COUNT*  $$/P3474
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P0874   ..... CONSTANTS .....

 0875                          4532   01445 0  V06N37    VN       0637
 0876                          4533   01457 0  V06N55    VN       0655
 0877                          4534   01472 1  V06N58    VN       0658
 0879                          4535   01521 0  V06N81    VN       0681
 0880                          4536   04055 0  V16N45    VN       1645
 08801                         4537   01006 0  V04N06    VN       0406

 08805  REF   3  LAST  479   35,2000                     SETLOC CS1/COH
 08806                       35,3142                     BANK

 08808  REF   3 LAST  479 TO  487:   241   375*          COUNT* $$/P3474
 0881                        35,3142   14441 0  TWOPI    2DEC   6.283185307 B-4
 0881                        35,3143   37325 1
 0882                        35,3144   00001 0  MAX250   2DEC   25 E3
 0882                        35,3145   20650 0
 0883                        35,3146   12525 0  THIRD    2DEC   .333333333
 0883                        35,3147   12525 0
 0884                        35,3150   00004 0  ELEPS    2DEC   .27777777 E-3
 0884                        35,3151   21505 1
 0885                        35,3152   00002 0  DECTWO   DEC    2
 0886                        35,3153   77777 0  DP-.01   OCT    77777            CONSTANTS
 0887                        35,3154   61337 1           OCT    61337            ADJACENT        -.01 FOR MGA DSP
 08871                       35,3155   01252 0  EPSFOUR  2DEC   .0416666666
 08871                       35,3156   25253 1
 08872                       35,3157   01473 0  V06N59   VN     0659
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P0888    ..... INITVEL .....

R0889    MOD NO -1          LOG SECTION - P34-P35, P74-P75
R0890    MOD BY WHITE.P  DATE  21NOV67

R0891    FUNCTIONAL DESCRIPTION

R0892             THIS SUBROUTINE COMPUTES THE REQUIRED INITIAL VELOCITY VECTOR FOR
R0893             A TRAJECTORY OF SPECIFIED TRANSFER TIME BETWEEN SPECIFIED INITIAL
R0894             AND TARGET POSITIONS.  THE TRAJECTORY MAY BE EITHER CONIC OR
R0895             PRECISION DEPENDING ON AN INPUT PARAMETER (NAMELY, NUMBER OF
R0896             OFFSETS).  IN ADDITION, IN THE PRECISION TRAJECTORY CASE, THE
R0897             SUBROUTINE ALSO COMPUTES AN OFFSET TARGET VECTOR, TO BE USED
R0898             DURING PURE-CONIC CROSS-PRODUCT STEERING.  THE OFFSET TARGET
R0899             VECTOR IS THE TERMINAL POSITION VECTOR OF A CONIC TRAJECTORY WHICH
R0900             HAS THE SAME INITIAL STATE AS A PRECISION TRAJECTORY WHOSE
R0901             TERMINAL POSITION VECTOR IS THE SPECIFIED TARGET VECTOR.

R0902             IN ORDER TO AVOID THE INHERENT SINGULARITIES IN THE 180 DEGREE
R0903             TRANSFER CASE WHEN THE (TRUE OR OFFSET) TARGET VECTOR MAY BE
R0904             SLIGHTLY OUT OF THE ORBITAL PLANE, THIS SUBROUTINE ROTATES THIS
R0905             VECTOR INTO A PLANE DEFINED BY THE INPUT INITIAL POSITION VECTOR
R0906             AND ANOTHER INPUT VECTOR (USUALLY THE INITIAL VELOCITY VECTOR),
R0907             WHENEVER THE INPUT TARGET VECTOR LIES INSIDE A CONE WHOSE VERTEX
R0908             IS THE ORIGIN OF COORDINATES, WHOSE AXIS IS THE 180 DEGREE
R0909             TRANSFER DIRECTION, AND WHOSE CONE ANGLE IS SPECIFIED BY THE USER.

R0910             THE LAMBERT SUBROUTINE IS UTILIZED FOR THE CONIC COMPUTATIONS AND
R0911             THE COASTING INTEGRATION SUBROUTINE IS UTILIZED FOR THE PRECISION
R0912             TRAJECTORY COMPUTATIONS.

R0913    CALLING SEQUENCE

R0914             L            CALL
R0915             L+1                  INITVEL
R0916             L+2          (RETURN - ALWAYS)

R0917    INPUT

R0918             (1) RINIT    INITIAL POSITION RADIUS VECTOR
R0919             (2) VINIT    INITIAL POSITION VELOCITY VECTOR
R0920             (3) RTARG    TARGET POSITION RADIUS VECTOR
R0921             (4) DELLT4   DESIRED TIME OF FLIGHT FROM RINIT TO RTARG
R0922             (5) INTIME   TIME OF RINIT
R0923             (6) 0D       NUMBER OF ITERATIONS OF LAMBERT/INTEGRVS
R0924             (7) 2D       ANGLE TO 180 DEGREES WHEN ROTATION STARTS
R0925             (8) RTX1     -2 FOR EARTH, -100 FOR LUNAR
R09251            (9) RTX2     COORDINATE SYSTEM ORIGIN - 0 FOR EARTH, 2 FOR LUNAR
R0926             PUSHLOC SET AT 4D
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L        P34-P35, P74-P75                                                                  USER'S PAGE NO.  28       E4 53

R0927    OUTPUT

R0928            (1) RTARG     OFFSET TARGET POSITION VECTOR
R0929            (2) VIPRIME   MANEUVER VELOCITY REQUIRED
R0930            (3) VTPRIME   VELOCITY AT TARGET AFTER MANEUVER
R0931            (4) DELVEET3  DELTA VELOCITY REQUIRED FOR MANEUVER

R0932    SUBROUTINES USED

R0933            LAMBERT
R0934            INTSTALL
R0935            INTEGRVS

 0936    REF   1                 11,2000                             SETLOC  INTVEL
 0937                            11,2000                             BANK

 0938    REF   1                                                     COUNT*  $$/INITV
 0958                            11,2000    77614 1   INITVEL        SET                      COGA GUESS NOT AVAILABLE
 0959    REF   1                 11,2001    00475 1                          GUESSW
 0960                            11,2002    44175 1   HAVEGUES       VLOAD   STQ
 0961    REF   9  LAST  481      11,2003    03415 1                          RTARG
 0962    REF   9  LAST  482      11,2004    01023 1                          NORMEX
 0963    REF   2  LAST  126      11,2005    03604 0                  STORE   RTARG1
 0964                            11,2006    46135 1                  SLOAD   BHIZ
 0965    REF   3  LAST  483      11,2007    03747 0                          RTX2
 0967    REF   1                 11,2010    22022 1                          INITVEL1
 0968                            11,2011    72575 0                  VLOAD   VSL2
 0969    REF   4  LAST  480      11,2012    03570 0                          RINIT            B29
 0970    REF   5  LAST  490      11,2013    27570 0                  STOVL   RINIT            B27
 0971    REF   4  LAST  480      11,2014    03576 0                          VINIT            B7
 0972                            11,2015    77752 1                  VSL2
 0973    REF   5  LAST  490      11,2016    27576 0                  STOVL   VINIT            B5
 0974    REF   3  LAST  490      11,2017    03604 0                          RTARG1
 0975                            11,2020    77752 1                  VSL2
 0976    REF   4  LAST  490      11,2021    03604 0                  STORE   RTARG1
R0977            INITIALIZATION

 0978                            11,2022    71331 0   INITVEL1 SSP           DLOAD            SET ITCTR TO -1,LOAD MPAC WITH E4(PL 2D)
 0979    REF   1                 11,2023    03505 1                          ITCTR
 0980                            11,2024    77776 1                          0 -1
 0981                            11,2025    70546 1                  COSINE  SR1              CALCULATE COSINE (E4)  (+2)
 0982    REF   2  LAST  127      11,2026    17630 1                  STODL   COZY4            SET COZY4 TO COSINE(E4)             (PL 0D)
 0983                            11,2027    67154 0                  LXA,2   SXA,2
 0984    REF 228  LAST  474      11,2030    00154 1                          MPAC
 0985    REF   2  LAST  100      11,2031    02703 1                          VTARGTAG         SET VTARGTAG TO 0D (SP)
 0986                            11,2032    77775 1                  VLOAD
 0987    REF   6  LAST  490      11,2033    03570 0                          RINIT
 0988    REF   4  LAST  100      11,2034    26657 1                  STOVL   R1VEC            R1VEC EQ RINIT
 0989    REF   5  LAST  490      11,2035    03604 0                          RTARG1
 0990    REF   2  LAST  100      11,2036    16665 0                  STODL   R2VEC            R2VEC EQ RTARG
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0991    REF  5  LAST  479   11,2037   03423 1                     DELLT4
0992    REF  2  LAST  100   11,2040   02673 1            STORE    TDESIRED         TDESIRED EQ DELLT4
0993                        11,2041   77201 1            SETPD    VLOAD
0994                        11,2042   00001 0                     0D               INITIALIZE PL TO 0D
0995    REF  7  LAST  490   11,2043   03570 0                     RINIT            MPAC EQ RINIT (+29)
0996                        11,2044   41456 0            UNIT     PUSH             UNIT(RI)  (+1)                    (PL 6D)
0997                        11,2045   53435 0            VXV      UNIT
0998    REF  6  LAST  490   11,2046   03576 0                     VINIT            MPAC EQ UNIT(RI) X VI   (+8)
0999    REF  2  LAST  100   11,2047   26676 1            STOVL    UN
1000    REF  6  LAST  490   11,2050   03604 0                     RTARG1
1001                        11,2051   50256 0            UNIT     DOT              TEMP=URT.URI  (+2)                (PL 0D)
1002                        11,2052   43015 1            DAD      CLEAR
1003    REF  3  LAST  490   11,2053   03630 1                     COZY4
1004    REF  1              11,2054   03665 1                     NORMSW
1005    REF  4  LAST  491   11,2055   03630 1            STORE    COZY4
1006                        11,2056   43044 0  INITVEL2  BPL      SET
1007    REF  1              11,2057   22101 1                     INITVEL3         UN CALCULATED IN LAMBERT
1008    REF  2  LAST  491   11,2060   03465 0                     NORMSW
R1009        ROTATE  RC INTO YC PLANE - SET UNIT NORMAL TO YC

1010                        11,2061   41575 0            VLOAD    PUSH                                               (PL 6D)
1011    REF  3  LAST  490   11,2062   02665 0                     R2VEC            RC TO 6D  (+29)
1012                        11,2063   63246 1            ABVAL    PDVL             RC TO MPAC, ABVAL(RC) (+29) TO 0D(PL 2D)
1013                        11,2064   46206 1            PUSH     VPROJ                                              (PL 8D)
1014    REF  3  LAST  491   11,2065   02676 1                     UN
1015                        11,2066   51352 1            VSL2     BVSU
1016                        11,2067   74256 0            UNIT     VXSC                                               (PL 0D)
1017                        11,2070   77772 0            VSL1
1018    REF  4  LAST  491   11,2071   02665 0            STORE    R2VEC
1019                        11,2072   67351 1            TLOAD    SLOAD
1020    REF  2  LAST   34   11,2073   11762 1                     ZEROVEC
1021    REF  2  LAST  490   11,2074   03505 1                     ITCTR
1022                        11,2075   77244 0            BPL      VLOAD
1023    REF  2  LAST  491   11,2076   22101 1                     INITVEL3
1024    REF  5  LAST  491   11,2077   02665 0                     R2VEC
1025    REF  7  LAST  491   11,2100   03604 0            STORE    RTARG1
1026                        11,2101   63345 0  INITVEL3  DLOAD    PDVL                                               (PL 2D)
1027    REF  1              11,2102   27740 1                     MUEARTH          POSITIVE VALUE
1028    REF  6  LAST  491   11,2103   02665 0                     R2VEC
102802                      11,2104   63256 0            UNIT     PDVL             2D = UNIT(R2VEC)                  (PL 8D)
102804  REF  5  LAST  490   11,2105   02657 1                     R1VEC
102806                      11,2106   41456 0            UNIT     PUSH             8D = UNIT(R1VEC)                  (PL14D)
102808                      11,2107   57435 1            VXV      VCOMP            -N = UNIT(R2VEC) X UNIT(R1VEC)
10281                       11,2110   00003 1                     2D
10282                       11,2111   77606 1            PUSH                                                        (PL20D)
10283                       11,2112   71350 1            LXA,1    DLOAD
10284   REF  3  LAST  468   11,2113   03745 1                     RTX1
10285                       11,2114   00023 0                     18D
10286                       11,2115   62040 1            BMN      INCR,1
10287                       11,2116   22120 1                     +2
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 10288                          11,2117   77767 1              DEC     -8
 10289                          11,2120   67310 1              INCR,1  SLOAD
 10290                          11,2121   00012 1                      10D
 10291  REF    4  LAST  475     11,2122   00047 1                      X1
 10292                          11,2123   77230 0              BHIZ    VLOAD                                  (PL14D)
 10293                          11,2124   22126 1                      +2
 10294                          11,2125   41476 1              VCOMP   PUSH                                   (PL20D)
 10295                          11,2126   77775 1              VLOAD                                          (PL14D)
 10296                          11,2127   50235 0              VXV     DOT                                    (PL 2D)
 1032                           11,2130   71244 0              BPL     DLOAD                                  (PL 0D)
 1033   REF    1                11,2131   22133 0                      INITVEL4
 1034                           11,2132   41476 1              DCOMP   PUSH                                   (PL 2D)
 1035                           11,2133   67154 0   INITVEL4 LXA,2   SXA,2
 1036                           11,2134   00000 1                      0D
 1037   REF    2  LAST  100     11,2135   02674 0                      GEOMSGN
R1038      SET INPUTS UP FOR LAMBERT

 1039                           11,2136   45150 1              LXA,1   CALL
 1040   REF    4  LAST  491     11,2137   03745 1                      RTX1
R1041       OPERATE THE LAMBERT CONIC ROUTINE (COASTFLT SUBROUTINE)

 1042   REF    1                11,2140   25255 1                      LAMBERT

 1045                           11,2141   77214 0              CLEAR   VLOAD
 1046   REF    2  LAST  490     11,2142   00675 0                      GUESSW
 1047   REF    4  LAST  468     11,2143   02746 0                      VVEC
R1048   STORE CALCULATED INITIAL VELOCITY REQUIRED IN VIPRIME
R1049
 1050   REF    4  LAST  468     11,2144   17612 1              STODL   VIPRIME            INITIAL VELOCITY REQUIRED  (+7)
R1051
R1052       IF NUMIT IS ZERO, CONTINUE AT INITVEL8, OTHERWISE
R1053   SET UP INPUTS FOR ENCKE INTEGRATION (INTEGRVS).

 1054   REF    3  LAST  490     11,2145   02704 0                      VTARGTAG
 1055                           11,2146   45030 0              BHIZ    CALL
 1056   REF    1                11,2147   34003 0                      INITVEL7
 1057   REF    8  LAST  483     11,2150   27516 0                      INTSTALL
 1061                           11,2151   43135 1              SLOAD   CLEAR
 1062   REF    4  LAST  490     11,2152   03747 0                      RTX2
 1063   REF    5  LAST  483     11,2153   00263 0                      MOONFLAG
 1064                           11,2154   43030 0              BHIZ    SET
 1065   REF    1                11,2155   22157 1                      INITVEL5
 1066   REF    6  LAST  492     11,2156   00063 1                      MOONFLAG
 1067                           11,2157   77775 1   INITVEL5 VLOAD
 1068   REF    8  LAST  491     11,2160   03570 0                      RINIT
 1069   REF    6  LAST  491     11,2161   02657 1              STORE   RIVEC
 1070   REF    6  LAST  483     11,2162   25535 0              STOVL   RCV
 1071   REF    5  LAST  492     11,2163   03612 1                      VIPRIME
 1072   REF    6  LAST  483     11,2164   15543 1              STODL   VCV
 1073   REF    6  LAST  479     11,2165   03503 1                      INTIME
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  1074   REF   8  LAST  483   11,2166   01517 0           STORE   TET
  1075                        11,2167   43015 1           DAD     CLEAR
  1076   REF   6  LAST  491   11,2170   03423 1                   DELLT4
  1077   REF   4  LAST  483   11,2171   01673 1                   INTYPFLG
  1078   REF   6  LAST  483   11,2172   34041 0           STCALL  TDEC1
  1079   REF   3  LAST  483   11,2173   27211 0                   INTEGRVS
  1080                        11,2174   77775 1           VLOAD
  1081   REF   2  LAST  457   11,2175   00025 0                   VATT1
  1082   REF   2  LAST  100   11,2176   02705 1           STORE   VTARGET
R1083     IF ITERATION COUNTER (ITCTR) EQ NO. ITERATIONS (NUMIT), CONTINUE AT
R1084    INITVELC, OTHERWISE REITERATE LAMBERT AND ENCKE

  1085                        11,2177   63154 1           LXA,2   INCR,2
  1086   REF   3  LAST  491   11,2200   03504 0                   ITCTR
  1087                        11,2201   00001 0                   1D          INCREMENT ITCTR
  1088                        11,2202   55134 1           SXA,2   XSU,2
  1089   REF   4  LAST  493   11,2203   03504 0                   ITCTR
  1090   REF   4  LAST  492   11,2204   02703 1                   VTARGTAG
  1091                        11,2205   46135 1           SLOAD   BHIZ        IF SP(MPAC) EQ 0, CONTINUE AT INITVELC
  1092   REF   2  LAST  457   11,2206   00050 1                   X2
  1093   REF   1              11,2207   34000 0                   INITVEL6
R1094
R1095      OFFSET CONIC TARGET VECTOR

  1096                        11,2210   52375 1           VLOAD   VSU
  1097   REF   8  LAST  491   11,2211   03604 0                   RTARG1
  1098   REF   2  LAST  457   11,2212   00017 1                   RATT1
  1099                        11,2213   77655 1           VAD
  1100   REF   7  LAST  491   11,2214   02665 0                   R2VEC
  1101   REF   8  LAST  493   11,2215   16665 0           STODL   R2VEC
  1102   REF   5  LAST  491   11,2216   03630 1                   CDZY4
  1103                        11,2217   77650 1           GOTO
  1104   REF   1              11,2220   22056 1                   INITVEL2    CONTINUE ITERATING AT INITVEL2
 11041   REF   1              16,2000                     SETLOC  INITVEL1
 11042                        16,2000                     BANK

 11045   REF   1                                          COUNT*  $$/INITV
R1105    COMPUTE THE DELTA VELOCITY

  1106                        16,2000   77775 1  INITVEL6 VLOAD
  1107   REF   9  LAST  493   16,2001   02665 0                   R2VEC
  1108   REF   9  LAST  493   16,2002   03604 0           STORE   RTARG1
  1109                        16,2003   52375 1  INITVEL7 VLOAD   VSU
  1110   REF   6  LAST  492   16,2004   03612 1                   VIPRIME
  1111   REF   7  LAST  491   16,2005   03576 0                   VINIT
  1112   REF   9  LAST  481   16,2006   27646 0           STOVL   DELVEET3    DELVEET3 = VIPRIME-VINIT  (+7)
  1113   REF   3  LAST  493   16,2007   02705 1                   VTARGET
  1114   REF   6  LAST  484   16,2010   37620 1           STCALL  VIPRIME
 11141   REF   1              16,2011   22221 0                   INITVEL8
 11142   REF   2  LAST  490   11,2000                     SETLOC  INITVEL
 11143                         11,2221                       BANK

 11145  REF   2 LAST  490 TO  493:    145   145*             COUNT* $$/INITV
 1115                          11,2221   46135 1  INITVEL8 SLOAD   BHIZ
 1116   REF   5  LAST  492     11,2222   03747 0                   RTX2
 1117   REF   1                11,2223   22240 1                   INITVELX
 11171                         11,2224   70575 1           VLOAD   VSR2
 11172  REF   7  LAST  493     11,2225   03620 0                   VTPRIME
 1118   REF   8  LAST  494     11,2226   27620 0           STOVL   VTPRIME
 1119   REF   7  LAST  493     11,2227   03612 1                   VIPRIME
 1120                          11,2230   77742 0           VSR2
 1121   REF   8  LAST  494     11,2231   27612 1           STOVL   VIPRIME
 1122   REF  10  LAST  493     11,2232   03604 0                   RTARG1
 1123                          11,2233   77742 0           VSR2
 1124   REF  11  LAST  494     11,2234   27604 0           STOVL   RTARG1
 1125   REF  10  LAST  493     11,2235   03646 0                   DELVEET3
 1126                          11,2236   77742 0           VSR2
 1127   REF  11  LAST  494     11,2237   03646 0           STORE   DELVEET3
 1128                          11,2240   77201 1  INITVELX SETPD   VLOAD
 1129                          11,2241   00001 0                   0D
 1130   REF  12  LAST  494     11,2242   03604 0                   RTARG1
 1131   REF  10  LAST  490     11,2243   03415 1           STORE   RTARG
 1132                          11,2244   77614 1           CLRGO
 1133   REF   1                11,2245   01227 1                   XDELVFLG
 1134   REF  10  LAST  490     11,2246   01023 1                   NORMEX
R1135
R1136      ..... END OF INITVEL ROUTINE .....
```

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L        P34-P35, P74-P75                                                                       USER'S PAGE NO. 33      E4 S3

P1165    MIDDLE GIMBAL ANGLE COMPUTATION.

 1166    REF   1                27,2000                         SETLOC MGIM
 1167                           27,2442                         BANK

 1168    REF   1                                                COUNT* $$/MIDG

 1169                           27,2442   20000 0   HALFREV    2DEC    1 B-1
 1169                           27,2443   00000 1
 1176                           27,2444   53575 0   GET+MGA    VLOAD   UNIT           (PL 0D) V (+7) TO MPAC, UNITIZE  UV (+1)
 1177                           27,2445   72441 0              DOT     SL1            DOT UV WITH Y(STABLE MEMBER) AND RESCALE
 1178    REF   4  LAST  183     27,2446   01742 1                      REFSMMAT +6     FROM +2 TC +1 FOR ASIN ROUTINE
 1179                           27,2447   51136 1              ARCSIN  BPL
 1180    REF   1                27,2450   56454 1                      SETMGA
 1181                           27,2451   43215 0              DAD     DAD            CONVERT -MGA TO +MGA BY
 1182    REF   1                27,2452   16443 0                      HALFREV        ADDING ONE REVOLUTION
 1183    REF   2  LAST  495     27,2453   16443 0                      HALFREV
 1184    REF   5  LAST  485     27,2454   03626 0   SETMGA     STORE   +MGA
 1185                           27,2455   77616 0              RVQ

 1186    REF   1                04,2000                         SETLOC MIDDGIM
 1187                           04,3200                         BANK

 1188    REF   1                                                COUNT* $$/MIDG
R1190    TRANSFORM INPUT VECTOR INTO LOCAL VERTICAL COORDINATES.

 1191                           04,3200   53575 0   GET.LVC    VLOAD   UNIT           (PL 6D)   R (+29) IN MPAC, UNITIZE  UR
 1192    REF   9  LAST  492     04,3201   03570 0                      RINIT
 1193                           04,3202   77676 0              VCOMP                  U(-R)
 1194                           04,3203   00023 0              STORE   18D            U(-R) TO 18D
 1195                           04,3204   53435 0              VXV     UNIT           U(-R)*V EQ V*U(R), U(V*R)
 1196    REF   8  LAST  493     04,3205   03576 0                      VINIT
 1197                           04,3206   00015 0              STORE   12D            U(V*R) TO 12D
 1198                           04,3207   53435 0              VXV     UNIT           U(V*R)*U(-R), U((V*R)*(-R))
 1199                           04,3210   00023 0                      18D
 1200                           04,3211   24007 0              STOVL   6D             TRANSFORMATION MATRIX IS IN 6D (+1)
 1201                           04,3212   00001 0                      0D             DELTA V (+7) IN 0D
 1202                           04,3213   76521 0              MXV     VSL1           CONVERT FROM INER COOR TO LV COOR (+8)
 1203                           04,3214   00007 0                      6D              AND SCALE +7 IN MPAC
 1204    REF  14  LAST  484     04,3215   03405 0              STORE   DELVLVC        STORE IN DELVLVC (+7)
 1205                           04,3216   77616 0              RVQ
```

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P1208
 1209                          04,3217   77160 0   SELECTMU AXC,1   AXT,2
 1210                          04,3220   00002 0                    2D
 1211                          04,3221   00000 1                    0D
 1212                          04,3222   77614 1            BOFF
 1213   REF   7  LAST  483     04,3223   04343 1                    CMOONFLG
 1214   REF   1                04,3224   11230 0                    SETMUER
 1215                          04,3225   77160 0            AXC,1   AXT,2
 1216                          04,3226   00012 1                    10D
 1217                          04,3227   00002 0                    2D
 1218                          04,3230   66143 1   SETMUER  DLOAD*  SXA,1
 1219   REF   1                04,3231   22305 1                    MUTABLE +4,1
 1220   REF   5  LAST  492     04,3232   03745 1                    RTX1
 1221   REF   2  LAST  130     04,3233   23752 0            STODL*  RTSR1/MU
 1222   REF   2  LAST  496     04,3234   22277 0                    MUTABLE -2,1
 1223                          04,3235   54214 1            BOFF    SR
 1224   REF   8  LAST  496     04,3236   04343 1                    CMOONFLG
 1225   REF   1                04,3237   11241 0                    RTRNMU
 1226                          04,3240   20607 1                    6D
 1227   REF   2  LAST  130     04,3241   03750 0   RTRNMU   STORE   RTMU
 1228                          04,3242   43134 0            SXA,2   CLEAR
 1229   REF   6  LAST  494     04,3243   03746 1                    RTX2
 1230   REF   6  LAST  486     04,3244   01271 1                    FINALFLG
 12302                         04,3245   52014 0            BON     GOTO
 12304  REF   3  LAST  486     04,3246   05316 0                    PCFLAG
 1234   REF   1                04,3247   45343 1                    P36A
 1235   REF   3  LAST  472     04,3250   73027 0                    VN1645
```

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P1236   ***** PERIAPO *****

R1237   MOD NO -1          LOG SECTION - P34-P35, P74-P75
R1238   MOD BY WHITE.P   DATE  18JAN68

R1239   FUNCTIONAL DESCRIPTION

R1240             THIS SUBROUTINE COMPUTES THE TWO BODY APOCENTER AND PERICENTER
R1241             ALTITUDES GIVEN THE POSITION AND VELOCITY VECTORS FOR A POINT ON
R1242             THE TRAJECTORY AND THE PRIMARY BODY.

R1243             SETRAD IS CALLED TO  DETERMINE THE RADIUS OF THE PRIMARY BODY.

R1244             APSIDES IS CALLED TO SOLVE FOR THE TWO BODY RADII OF APOCENTER AND
R1245             PERICENTER AND THE ECCENTRICITY OF THE TRAJECTORY.

R1246   CALLING SEQUENCE

R1247             L          CALL
R1248             L+1                 PERIAPO
R1249             L+2        (RETURN - ALWAYS)

R1250   INPUT

R1251             (1) RVEC     POSITION VECTOR IN METERS
R1252                          SCALE FACTOR - EARTH +29, MOON +27
R1253             (2) VVEC     VELOCITY VECTOR IN METERS/CENTISECOND
R1254                          SCALE FACTOR - EARTH +7, MOON +5
R1255             (3) X1       PRIMARY BODY INDICATOR
R1256                          EARTH -2, MOON -10

R1257   OUTPUT

R1258             (1) 2D       APOCENTER RADIUS IN METERS
R1259                          SCALE FACTOR - EARTH +29, MOON +27
R1260             (2) 4D       APOCENTER ALTITUDE IN METERS
R1261                          SCALE FACTOR - EARTH +29, MOON P27
R1262             (3) 6D       PERICENTER RADIUS IN METERS
R1263                          SCALE FACTOR - EARTH +29, MOON +27
R1264             (4) 8D       PERICENTER ALTITUDE IN METERS
R1265                          SCALE FACTOR - EARTH +29, MOON +27
R1266             (5) ECC      ECCENTRICITY OF CONIC TRAJECTORY
R1267                          SCALE FACTOR - +3
R1268             (6) XXXALT   RADIUS OF THE PRIMARY BODY IN METERS
R1269                          SCALE FACTOR - EARTH +29, MOON +27
R1270             (7) PUSHLOC  EQUALS 10D

R1271   SUBROUTINES USED

R1272             SETRAD
```

```
R1273          APSIDES

 1274   REF   1                  22,2000                            SETLOC APOPERI
 1275                            22,3172                            BANK

 1276   REF   1                                                     COUNT* $$/PERAP

 1277                            22,3172   00302 0   RPAD           2DEC   6373338 B-29   STANDARD RADIUS  OF PAD 37-B
 1277                            22,3173   17755 0
A1278                                                                                     = 20 909 901.57 FT

 1279                            22,3174   53754 1   PERIAPO1 LXA,2   VSR*
 1280   REF   7  LAST   496      22,3175   03746 1                    RTX2
 1281                            22,3176   57176 0                    0,2
 1282   REF   5  LAST   492      22,3177   26746 0            STOVL   VVEC
 1283                            22,3200   53750 0            LXA,1   VSR*
 1284   REF   6  LAST   496      22,3201   03745 1                    RTX1
 1285                            22,3202   57176 0                    0,2
 1286   REF   3  LAST   468      22,3203   02657 1            STORE   RVEC
 1287                            22,3204   45020 1   PERIAPO  STQ     CALL
 1288   REF  11  LAST   494      22,3205   01023 1                    NORMEX
 1289   REF   1                  22,3206   45222 1                    SETRAD
 1290   REF   2  LAST   126      22,3207   37456 1            STCALL  XXXALT
 1291   REF   1                  22,3210   25717 1                    APSIDES
 1292                            22,3211   41401 1            SETPD   PUSH            2D = APOCENTER RADIUS   B29 OR B27
 1293                            22,3212   00003 1                    2D
 1294                            22,3213   65225 1            DSU     POOL            4D = APOGEE ALTITUDE    B29 OR B27
 1295   REF   3  LAST   498      22,3214   03456 0                    XXXALT
 1296                            22,3215   00001 0                    0D
 1297                            22,3216   45206 1            PUSH    DSU             6D = PERICENTER RADIUS  B29 OR B27
 1298   REF   4  LAST   498      22,3217   03456 0                    XXXALT
 1299                            22,3220   52006 0            PUSH    GOTO            8D = PERIGEE ALTITUDE   B29 OR B27
 1300   REF  12  LAST   498      22,3221   01023 1                    NORMEX
```

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P1301    SETRAD
 1302                              22,3222    41545 0  SETRAD    DLOAD   PUSH
 1303    REF   1                   22,3223    05173 1                    RPAD
 1304                              22,3224    63130 0            SXA,1   INCR,2
 1305    REF   3  LAST   493       22,3225    00047 1                    X2
 1306                              22,3226    00002 0                    2D
 1307                              22,3227    46135 1            SLOAD   BHIZ
 1308    REF   4  LAST   499       22,3230    00050 1                    X2
 1309    REF   1                   22,3231    45235 1                    SETRADX
 1310                              22,3232    51575 1            VLOAD   ABVAL
 1311    REF   3  LAST   189       22,3233    02026 1                    RLS
 1312                              22,3234    77725 1            PDDL
 1313                              22,3235    43545 1  SETRADX   DLOAD   RVQ
```

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P1314    PRECSET
 1315                          22,3236   77620 0  PRECSET  STQ
 1316    REF  13  LAST  498    22,3237   01023 1                   NORMEX
 1317    REF   1               22,3240   36635 1           STCALL  TDEC2
 1318    REF   1               22,3241   27202 1                   LEMCONIC           CONIC INTEG
 1319                          22,3242   77624 1           CALL
 1320    REF   1               22,3243   45300 0                   LEMSTORE
 1321                          22,3244   77745 1           DLOAD
 1322    REF   2  LAST  500    22,3245   02635 0                   TDEC2
 1323    REF   7  LAST  493    22,3246   34041 0           STCALL  TDEC1
 1324    REF   1               22,3247   27170 1                   CSMCONIC           CONIC INTEG
 1325                          22,3250   77624 1           CALL
 1326    REF   1               22,3251   45310 1                   CSMSTORE
 13261                         22,3252   53575 0           VLOAD   UNIT
 13262   REF   9  LAST  479    22,3253   03554 0                   RPASS3
 13263                         22,3254   53435 0           VXV     UNIT
 13264   REF   9  LAST  479    22,3255   03562 0                   VPASS3
 13265   REF   2  LAST  105    22,3256   26611 0           STOVL   UP1                UNIT(RPASS3) X VPASS3
 13266   REF  10  LAST  481    22,3257   03546 0                   VACT3
 13267                         22,3260   72441 0           DOT     SL1
 13268   REF   3  LAST  500    22,3261   02611 0                   UP1
 13269   REF   3  LAST  221    22,3262   26603 0           STOVL   CMYDOT             -YDOT (CSM)
 1327    REF  18  LAST  483    22,3263   03540 0                   RACT3
 13271                         22,3264   72441 0           DOT     SL1
 132715  REF   4  LAST  500    22,3265   02611 0                   UP1
 13272   REF   2  LAST   97    22,3266   26601 1           STOVL   AUTOY              -Y(CSM)
 13273   REF  19  LAST  500    22,3267   03540 0                   RACT3
 13274                         22,3270   53435 0           VXV     UNIT
 13275   REF  11  LAST  500    22,3271   03546 0                   VACT3
 13276   REF   9  LAST  483    22,3272   26617 0           STOVL   UNRM
 13277   REF  10  LAST  500    22,3273   03562 0                   VPASS3
 13278                         22,3274   72441 0           DOT     SL1
 13279   REF  10  LAST  500    22,3275   02617 0                   UNRM               RACT3 X VACT3
 132755  REF   2  LAST  221    22,3276   36605 1           STCALL  LMYDOT             -YDOT(LM)
 1328    REF  14  LAST  500    22,3277   01023 1                   NORMEX
 1329                          22,3300   43175 0  LEMSTORE VLOAD   BOFF
 1330    REF   5  LAST  483    22,3301   00001 0                   RATT
 1331    REF   3  LAST  220    22,3302   01352 1                   AVFLAG
 1332    REF   2  LAST  476    22,3303   45314 0                   PASSIVE
 1333    REF  20  LAST  500    22,3304   27540 0  ACTIVE   STOVL   RACT3
 1334    REF   3  LAST  479    22,3305   00007 0                   VATT
 1335    REF  12  LAST  500    22,3306   03546 0           STORE   VACT3
 1336                          22,3307   77616 0           RVQ
 1337                          22,3310   43175 0  CSMSTORE VLOAD   BOFF
 1338    REF   6  LAST  500    22,3311   00001 0                   RATT
 1339    REF   4  LAST  500    22,3312   01352 1                   AVFLAG
 1340    REF   2  LAST  476    22,3313   45304 1                   ACTIVE
 1341    REF  10  LAST  500    22,3314   27554 0  PASSIVE  STOVL   RPASS3
 1342    REF   4  LAST  500    22,3315   00007 0                   VATT
 1343    REF  11  LAST  500    22,3316   03562 0           STORE   VPASS3
 1344                    22,3317  77616 0          RVQ
```

```
P1345   VECSHIFT
 1346                           22,3320   53754 1  VECSHIFT LXA,2  VSR*
 1347   REF   8  LAST  498      22,3321   03746 1                  RTX2
 1348                           22,3322   57176 0                  0,2
 1349                           22,3323   63350 1           LXA,1  PDVL
 1350   REF   7  LAST  498      22,3324   03745 1                  RTX1
 1351                           22,3325   63257 1           VSR*   PDVL
 1352                           22,3326   57176 0                  0,2
 1353                           22,3327   77616 0           RVQ
```

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1         P34-P35, P74-P75                                                                USER'S PAGE NO.  41      E4 53

P1354    SHIFTR1
 1355                            22,3330   53754 1   SHIFTR1   LXA,2   SL*
 1356    REF    9  LAST   502    22,3331   03746 1                     RTX2
 1357                            22,3332   57576 1                     0,2
 1358                            22,3333   77616 0             RVQ
```

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R1359   PROGRAM DESCRIPTION
R1360   SUBROUTINE NAME        R36  OUT-OF-PLANE RENDEZVOUS ROUTINE
R1361   MOD NO. 3       DATE    18 NOVEMBER 1969
R1362   MOD BY   T.E.CROCKER
R1363   FUNCTIONAL DESCRIPTION

R1364   TO DISPLAY AT ASTRONAUT REQUEST LGC CALCULATED RENDEZVOUS
R1365            OUT-OF-PLANE PARAMETERS (YDOT CSM,YDOT LEM,Y).
R1366   CALLING SEQUENCE

R1367   ASTRONAUT REQUEST THROUGH DSKY  V 90 E

R1368   SUBROUTINES CALLED

R1369   EXDSPRET  TIMEOPT
R1370   GOMARKF   VEHOPT
R1371   CSMCONIC
R1372   LEMCONIC
R1374   LOADTIME

R1375   NORMAL EXIT MODES

R1376   ASTRONAUT REQUEST THROUGH DSKY TO TERMINATE PROGRAM V 34 E

R1377   ALARM OR ABORT EXIT MODES

R1378   NONE

R1379   OUTPUT

R1380   DECIMAL DISPLAY OF YDOT CSM, YDOT LEM, Y, TIME.
R1381   DISPLAYED VALUES YDOT, YDOT, Y ARE STORED IN ERASABLE
R1382   REGISTERS RRATE, RRATE2, RANGE RESPECTIVELY.
R1383   ERASABLE INITIALIZATION REQUIRED

R1384   CSM AND LEM STATE VECTORS

R1385   DEBRIS

R1386   CENTRALS A,Q,L

R1387   OTHER THOSE USED BY THE ABOVE LISTED SUBROUTINES

 1389   REF   1                 24,2000                    SETLOC R36CM
 1390                           24,2000                    BANK

 1391   REF  23  LAST  486   E7,1412                       EBANK= TIG
 1392   REF   1                                            COUNT* $$/R36

 1393   REF  53  LAST  486   24,2000  0 6006 1  R36        TC      INTPRET
 1394                          24,2001   45145 0               DLOAD   CALL
 1395   REF  24  LAST  504     24,2002   03413 1                       TIG
 1396   REF   1                24,2003   46424 1                       TIMEOPT
 1397                          24,2004   77624 1  R36A         CALL
 1398   REF   2  LAST  500     24,2005   27202 1                       LEMCONIC
 1399                          24,2006   63375 0               VLOAD   PDVL          VL TO PDL0
 1400   REF   5  LAST  500     24,2007   00007 0                       VATT
 1401   REF   7  LAST  500     24,2010   00001 0                       RATT
 1402                          24,2011   63256 0               UNIT    PDVL          UNIT RL TO PDL0, VL TO MPAC
 14021                         24,2012   77626 0               STADR
 1403   REF   2  LAST   94     24,2013   75457 0               STORE   VPASS36       VL TO VPASS36
 1404                          24,2014   53435 0               VXV     UNIT          VL(MPAC) X RL(PDL0)
 1405                          24,2015   77626 0               STADR
 1406   REF   2  LAST   94     24,2016   61451 0               STODL   UNP36         UNIT(VL X RL) TO UNP36
 1407   REF   3  LAST  458     24,2017   00015 0                       TAT
 1408   REF   8  LAST  500     24,2020   34041 0               STCALL  TDEC1
 1409   REF   2  LAST  500     24,2021   27170 1                       CSMCONIC
 1410                          24,2022   63375 0               VLOAD   PDVL          VC TO PDL0
 1411   REF   6  LAST  505     24,2023   00007 0                       VATT
 1412   REF   8  LAST  505     24,2024   00001 0                       RATT
 1413                          24,2025   00007 0               STORE   6D            RC TO PDL6
 1414                          24,2026   63256 0               UNIT    PDVL          UNIT(RC) TO PDL0, VC TO MPAC
 14141                         24,2027   77626 0               STADR
 1415                          24,2030   77762 1               STORE   12D           VC TO PDL12
 1416                          24,2031   53435 0               VXV     UNIT          VC(MPAC) X RC(PDL0)
 1417                          24,2032   77626 0               STADR
 1418   REF   1                24,2033   51443 0               STOVL   UNA36         UNIT(VC X RC) TO UNA36
 1419                          24,2034   00007 0                       6D            RC TO MPAC
 1420                          24,2035   72441 0               DOT     SL1
 1421   REF   3  LAST  505     24,2036   02326 1                       UNP36         RC . UNIT(VL X RL)
 1422   REF  10  LAST  295     24,2037   26312 0               STOVL   RANGE          EQUALS RANGE
 1423                          24,2040   00015 0                       12D           VC TO MPAC
 1424                          24,2041   72441 0               DOT     SL1
 1425   REF   4  LAST  505     24,2042   02326 1                       UNP36         VC . UNIT(VL X RL)
 1426   REF   7  LAST  295     24,2043   26314 0               STOVL   RRATE          EQUALS R. RATE OF CSM
 1427   REF   3  LAST  505     24,2044   02320 1                       VPASS36       VL TO MPAC
 1428                          24,2045   72441 0               DOT     SL1
 1429   REF   2  LAST  505     24,2046   02334 1                       UNA36
 1430   REF   2  LAST  295     24,2047   02316 1               STORE   RRATE2        VL . UNIT(VC X RC)
 1431                          24,2050   77776 1               EXIT                   EQUALS R. RATE OF LEM
 1432   REF   1                24,2051   3 2103 1              CAF     V06N96        DISPLAY Y, YDOTCM,YDOTLM
 1433   REF  90  LAST  485     24,2052   0 4636 0              TC      BANKCALL
 1434   REF   2  LAST  258     24,2053    20576 1              CADR    GOMARKF
 1435   REF  21  LAST  429     24,2054   1 5524 0              TCF     ENDEXT        T OR
 1436   REF  22  LAST  505     24,2055   1 5524 0              TCF     ENDEXT         P....EXIT R36
A1437                                                                                  R....DISPLAY TIME
 1472   REF  54  LAST  504     24,2056   0 6006 1              TC      INTPRET
 14721                         24,2057   77624 1               CALL
 14722  REF   2  LAST  505     24,2060   46425 0                       TIMEOPT +1
 1473                          24,2061   77650 1               GOTO
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  1474    REF    1              24,2062   50004 0                      R36A
  1482                          24,2063   01420 0  V06N16N    VN       0616
  148305                        24,2064   77420 1  VEHOPT     STQ      EXIT                  ALLOW VEHICLE OPTION
  14831   REF    1              24,2065   00734 1                      VEHRET
  148315                        24,2066  0 0006 1             EXTEND
  14832   REF   26  LAST  450   24,2067  3 4770 0             DCA      TWO
  148325  REF    5  LAST  283   24,2070  53'256 0             DXCH     OPTIONX
  14833   REF    1              24,2071  3 2102 0             CAF      OPTIONVN
  148335  REF   91  LAST  505   24,2072  0 4636 0             TC       BANKCALL
  14834   REF   10  LAST  279   24,2073   20576 1             CADR     GOXDSPF
  148345  REF   23  LAST  505   24,2074  0 5524 1             TC       ENDEXT
  14835                         24,2075  0 2077 0             TC       +2
  148355                        24,2076  0 2071 0             TC       -5
 A14836
  148365  REF   55  LAST  505   24,2077  0 6006 1             TC       INTPRET
  14837                         24,2100   77650 1             GOTO
  14838   REF    2  LAST  506   24,2101   00734 1                      VEHRET
  14839                         24,2102   01014 0  OPTIONVN   VN       0412
  148355                        24,2103   01540 1  V06N96     VN       0696

  1484    REF    7  LAST  456   30,2000                       SBANK=   LOWSUPER
```

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1        R31

P3000
 3002    REF   1                 31,2000                       SETLOC R31
 3003                            31,2000                       BANK

 3004    REF   1                                               COUNT* $$/R3134
 30041   REF   1                 31,2000  3 5045 0  R31CALL    CAF    PRIO3
 30042   REF  20  LAST  438      31,2001  0 5135 0             TC     FINOVAC
 30043   REF  11  LAST  485      E4,1760                       EBANK= SUBEXIT
 30044   REF   2  LAST   35      31,2002   02031 1             2CADR  V83CALL
 30044                           31,2003   62064 1
 30046   REF  92  LAST  506      31,2004  0 4636 0  DSPDELAY   TC     BANKCALL
 30047   REF   2  LAST  485      31,2005   01730 1             CADR   1SECDELY
 30048   REF   7  LAST  250      31,2006  3 1247 1             CA     EXTVBACT
 300485  REF  21  LAST  379      31,2007  7 4755 0             MASK   BIT12
 30049                           31,2010  0 0006 1             EXTEND
 300495  REF   1                 31,2011  1 2004 0             BZF    DSPDELAY

 3005    REF   6  LAST  275      31,2012  3 0105 0  DISPN5X    CA     FLAGWRD9          TEST R31FLAG (IN SUNDANCE R31FLAG WILL
 30051   REF   1                 31,2013  7 4765 0             MASK   R31FLBIT          ALWAYS BE SET AS R34 DOES NOT EXIST
 300515                          31,2014  0 0006 1             EXTEND
 30052                           31,2015  1 2020 0             BZF    +3
 30053   REF   1                 31,2016  3 2135 1             CAF    V16N54            R31     USE NOUN 54
 30054                           31,2017  0 2021 0             TC     +2
 30055   REF   1                 31,2020  3 2136 1             CAF    V16N53            R34     USE NOUN 53
 3006    REF  93  LAST  507      31,2021  0 4636 0             TC     BANKCALL
 3007    REF   3  LAST  505      31,2022   20576 1             CADR   GOMARKF
 3008    REF   1                 31,2023  0 5626 0             TC     B5OFF
 3009    REF   2  LAST  507      31,2024  0 5626 0             TC     B5OFF
 3010    REF   1                 31,2025  1 2012 1             TCF    DISPN5X

 3014    REF  56  LAST  506      31,2026  0 6006 1  V83        TC     INTPRET
 3017                            31,2027   77650 1             GOTO
 3018    REF   1                 31,2030   62177 1                    HAVEBASE          INTEG STATE VECTORS
 3019    REF  57  LAST  507      31,2031  0 6006 1  V83CALL    TC     INTPRET
 3020                            31,2032   77650 1             GOTO
 3021    REF   1                 31,2033   62146 0                    STATEXTP          EXTRAPOLATE STATE VECTORS
 3022                            31,2034   52375 1  COMPDISP   VLOAD  VSU
 3023    REF   9  LAST  505      31,2035   00001 0                    RATT
 3024    REF   3  LAST   94      31,2036   02320 1                    RONE
 3025                            31,2037   51406 1             PUSH   ABVAL             RATT-RONE TO 0D              PD= 6
 3029    REF  11  LAST  505      31,2040   02312 0             STORE  RANGE             METERS B-29
 3030                            31,2041   77301 0             NORM   VLOAD
 3031    REF   5  LAST  492      31,2042   00047 1                    X1                RATT-RONE                    PD=
 30315                           31,2043   77762 1             VSR1
 3032                            31,2044   53457 1             VSL*   UNIT
 3033                            31,2045   20201 0                    0,1
 3034                            31,2046   52315 1             PDVL   VSU               UNIT(LOS) TO 0D              PD= 6
 3035    REF   7  LAST  505      31,2047   00007 0                    VATT
 3036    REF   3  LAST   95      31,2050   02326 1                    VONE
 3037                            31,2051   77641 1             DOT                      (VATT-VONE).UNIT(LOS)        PD= 0
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L         R31                                                                         USER'S PAGE NO.   2        E  S3

  3039                            31,2052   77752 1              SL1
  3040    REF    8  LAST   505    31,2053   36314 1              STCALL RRATE            RANGE RATE M/CS B-7
  3041    REF    1                31,2054   47530 1                     CDUTRIG          TO INITIALIZE FOR *NBSM*
  30411                           31,2055   77624 1              CALL
  30412   REF    1                31,2056   62317 0                     R34LOS           NOTE. PDL MUST = 0.
  3042                            31,2057   53575 0  R34ANG      VLOAD  UNIT
  3043    REF    4  LAST   507    31,2060   02320 1                     RONE
  3044                            31,2061   77715 1              PDVL                    UR TO 0D                     PD= 6
  3045    REF    1                31,2062   15334 1                     THISAXIS         UNITX FOR CM, UNITZ FOR LM
  30452                           31,2063   77214 0              BON    VLOAD            CHK R31FLAG. ON=R31 THETA, OFF=R34 PHI
  30454   REF    3  LAST   267    31,2064   04713 0                     R31FLAG
  30455                           31,2065   62067 1                     +2                   R31-THETA
  30456                           31,2066   00015 0                     12D
  30458                           31,2067   77624 1              CALL
  3046    REF    1                31,2070   47647 1                     *NBSM*
  3047                            31,2071   41505 1              VXM    PUSH             UXORZ TO 6D                  PD=12D
  3048    REF    5  LAST   495    31,2072   01734 0                     REFSMMAT
  3049                            31,2073   72431 1              VPROJ  VSL2
  3050                            31,2074   00001 0                     0D
  3051                            31,2075   53445 1              BVSU   UNIT
  3052                            31,2076   00007 0                     6D
  3053                            31,2077   47315 0              PDVL   VXV              UP/2 TO 12D                  PD=18D
  3054    REF    5  LAST   508    31,2100   02320 1                     RONE
  3055    REF    4  LAST   507    31,2101   02326 1                     VONE
  3056                            31,2102   47256 0              UNIT   VXV
  3057    REF    6  LAST   508    31,2103   02320 1                     RONE
  3058                            31,2104   63241 0              DOT    PDVL             SIGN TO 12D, UP/2 TO MPAC    PD=18D
  3059                            31,2105   00015 0                     12D
  3060                            31,2106   50372 1              VSL1   DOT              UP.UXORZ
  3061                            31,2107   00007 0                     6D
  3062                            31,2110   72565 1              SIGN   SL1
  3063                            31,2111   00015 0                     12D
  3064                            31,2112   77726 1              ACOS
  3065    REF    8  LAST   292    31,2113   26316 1              STOVL  RTHETA
  3066    REF    7  LAST   508    31,2114   02320 1                     RONE
  3067                            31,2115   51041 0              DOT    BPL
  3068                            31,2116   00007 0                     6D
  3069                            31,2117   62124 1                     +5
  3070                            31,2120   44345 0              DLOAD  BDSU             IF UXORZ.R NEG, RTHETA = 1 - RTHETA
  3071    REF    9  LAST   508    31,2121   02316 1                     RTHETA
  3072    REF    7  LAST   481    31,2122   15344 0                     DPPOSMAX
  3073    REF   10  LAST   508    31,2123   02316 1              STORE  RTHETA           RTHETA BETWEEN 0 AND 1 REV.
  3074                            31,2124   77776 1     +5       EXIT
  3075    REF   20  LAST   447    31,2125 3 4764 0               CAF    BIT5             HAVE WE BEEN ANSWERED
  30751   REF    8  LAST   507    31,2126 7 1247 0               MASK   EXTVBACT
  3076                            31,2127 0 0006 1               EXTEND
  3077    REF    1                31,2130 1 2137 1               BZF    ISITP79

  3078    REF    9  LAST   508    31,2131 4 1247 0               CS     EXTVBACT
  3079    REF   22  LAST   507    31,2132 7 4755 0               MASK   BIT12
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L        R31                                                                                         USER'S PAGE NO.   3        ED 53

  3080    REF  10  LAST  508   31,2133  27'247 0              ADS      EXTVBACT

  30805   REF   1              31,2134  1 2026 0              TCF      VB3
  3081                         31,2135    04066 0  V16N54      VN       1654
  3082                         31,2136    04065 0  V16N53      VN       1653
  30821   REF  14  LAST  427   31,2137  0 5354 0  ISITP79     TC       CHECKMM
  30822                        31,2140    00117 0              MM       79
  30823   REF  24  LAST  506   31,2141  1 5524 0              TCF      ENDEXT              NO, DIE

  30824   REF   4  LAST  241   31,2142  0 5527 1              TC       CLEARMRK
  308241*REF   26  LAST  486   31,2143  0 5561 0              TC       DOWNFLAG
  308242*REF    5  LAST  219   31,2144    00226 1              ADRES    PCMANFLG
  30825   REF  13  LAST  485   31,2145  1 4103 0              TCF      GOTOPOOH
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P3083    STATEXTP DOES AN INITIAL PRECISION EXTRAPOLATION OF THE
R30835   LEM STATE VECTOR TO PRESENT TIME OR TO PIPTIME IF AV G
R3084    IS ON AND SAVES AS BASE VECTOR. IF AV G IS ON RN + VN
R30845   ARE USED AS THE CM STATE VECTOR AND THE INITIAL R RDOT
R3085    RTHETA ARE COMPUTED WITH NO FURTHER INTEGRATION. IF AV
R3086    G IS OFF A PRECISION EXTRAPOLATION IS MADE OF THE CM
R3087    STATE VECTOR TO PRESENT TIME AND.....
R3088      THE CM + LM STATE VECTORS ARE INTEGRATED TO PRES TIME
R3089      USING PRECISION OR CONIC AS SURFFLAG IS SET OR CLEAR.
R30895     IF AV G IS ON THEN SUBSEQUENT PASSES WILL PROVIDE
R3090      USE OF RN + VN AS CM STATE VECTOR AND THE LM STATE
R30905     VECTOR WILL BE PRECISION INTEGRATED USING LEMPREC
R3091      IF SURFFLAG IS SET.
R30915       CM STATE VECTOR RONE VONE + LM STATE VECTOR RATT
R3092        VATT ARE USED IN COMPUTING R RDOT RTHETA.
R30925
 3093                         31,2146   43034 1  STATEXTP RTB      BOF                INITIAL INTEGRATION
 30933  REF   5  LAST  472    31,2147   51751 0                    LOADTIME
 30936  REF   1               31,2150   03751 1                    V37FLAG
 3094   REF   1               31,2151   62154 0                    BOTHGO             AV G OFF, USE PRESENT TIME
 30943                        31,2152   77624 1           CALL
 30946  REF   1               31,2153   62301 1                    GETRVN                  ON,  USE RN, VN, PIPTIME
 3095   REF   1               31,2154   02334 1  BOTHGO   STORE    BASETIME
 3096   REF   9  LAST  505    31,2155   34041 0           STCALL   TDEC1
 3097   REF   2  LAST   34    31,2156   27161 1                    LEMPREC
 3098                         31,2157   77775 1           VLOAD                       BASE VECTOR, LM
 3099   REF   3  LAST  493    31,2160   00017 1                    RATT1
 3100   REF   1               31,2161   26224 1           STOVL    BASEOTP              POS.
 3101   REF   3  LAST  493    31,2162   00025 0                    VATT1
 3102   REF   1               31,2163   02240 0           STORE    BASEOTV              VEL.
 3103                         31,2164   71214 0           BON      DLOAD
 3104   REF   2  LAST  510    31,2165   03711 0                    V37FLAG
 3105   REF   1               31,2166   62034 1                    COMPDISP           COMPUTE R RDOT RTHETA FROM
R3106                                   RONE(RN) VONE(VN) RATT+VATT(LEMPREC)
 3107   REF   4  LAST  505    31,2167   00015 0                    TAT
 3109   REF  10  LAST  510    31,2170   34041 0           STCALL   TDEC1
 31093  REF   2  LAST   35    31,2171   27145 1                    CSMPREC
 31096                        31,2172   77775 1           VLOAD                       BASE VECTOR, CM
 3110   REF   4  LAST  510    31,2173   00017 1                    RATT1
 31103  REF   1               31,2174   26254 0           STOVL    BASETHP             POS
 31106  REF   4  LAST  510    31,2175   00025 0                    VATT1
 3111   REF   1               31,2176   02262 0           STORE    BASETHV             VEL
 3112                         31,2177   47014 1  HAVEBASE BON      RTB                SUBSEQUENT INTEGRATIONS
 3113   REF   3  LAST  510    31,2200   03711 0                    V37FLAG
 3114   REF   1               31,2201   62264 0                    GETRVN5
 3115   REF   6  LAST  510    31,2202   51751 0                    LOADTIME
 3116   REF  11  LAST  510    31,2203   34041 0           STCALL   TDEC1              AV G OFF. SET INTEG. OF CM
 3117   REF   9  LAST  492    31,2204   27516 0                    INTSTALL
 3118                         31,2205   43175 0           VLOAD    CLEAR
 3119   REF   2  LAST  510    31,2206   02254 0                    BASETHP
 3120   REF  7 LAST 492  31,2207  00263 0                   MOONFLAG
 3121   REF  7 LAST 492  31,2210  25535 0          STOVL    RCV
 3122   REF  2 LAST 510  31,2211  02262 0                   BASETHV
 3123   REF  7 LAST 492  31,2212  15543 1          STODL    VCV
 3124   REF  2 LAST 510  31,2213  02334 1                   BASETIME
 3125                    31,2214  43014 0          BOF      SET           GET APPROPRIATE MOONFLAG SETTING
 3126   REF  4 LAST 275  31,2215  04343 1                   MOONTHIS
 3127                    31,2216  62220 0                   +2
 3128   REF  8 LAST 511  31,2217  00063 1                   MOONFLAG
 3129                    31,2220  77614 1          CLEAR
 31293  REF  5 LAST 493  31,2221  01673 1                   INTYPFLG
 31296                   31,2222  43014 0          BON      SET
 3130   REF  3 LAST 277  31,2223  04307 1                   SURFFLAG
 31303                   31,2224  62226 0                   +2            PREC. IF LM DOWN
 31306  REF  6 LAST 511  31,2225  01473 0                   INTYPFLG      CONIC IF LM NOT DOWN
 3131   REF  9 LAST 493  31,2226  35517 1          STCALL   TET
 3132   REF  4 LAST 493  31,2227  27211 0                   INTEGRVS      INTEGRATION --- AT LAST---
 3133                    31,2230  77775 1          VLOAD
 3134   REF 10 LAST 507  31,2231  00001 0                   RATT
 3135   REF  8 LAST 508  31,2232  26320 1          STOVL    RONE
 3136   REF  8 LAST 507  31,2233  00007 0                   VATT
 3137   REF  5 LAST 508  31,2234  16326 1          STODL    VONE          GET SET FOR CONIC EXTRAP.,OTHER
 31395  REF  5 LAST 510  31,2235  00015 0                   TAT
 3140                    31,2236  45014 0          BON      CALL
 31405  REF  4 LAST 511  31,2237  04307 1                   SURFFLAG
 3141   REF  1           31,2240  62275 0                   GETRVN6       LEMPREC IF LM DOWN
 31413  REF 10 LAST 510  31,2241  27516 0                   INTSTALL      LEMCONIC IF NOT DOWN
 31415                   31,2242  77614 1          SET
 31417  REF  7 LAST 511  31,2243  01473 0                   INTYPFLG
 3142   REF 12 LAST 510  31,2244  00041 1 OTHINT   STORE    TDEC1         ENTERED IF AV G ON TO INTEG LM
 3143                    31,2245  43175 0          VLOAD    CLEAR
 3144   REF  2 LAST 510  31,2246  02224 1                   BASEOTP
 3145   REF  9 LAST 511  31,2247  00263 0                   MOONFLAG
 3146   REF  8 LAST 511  31,2250  25535 0          STOVL    RCV
 3147   REF  2 LAST 510  31,2251  02240 0                   BASEOTV
 3148   REF  8 LAST 511  31,2252  15543 1          STODL    VCV
 3149   REF  3 LAST 511  31,2253  02334 1                   BASETIME
 3150                    31,2254  43014 0          BOF      SET
 3151   REF  5 LAST 511  31,2255  04343 1                   MOONTHIS
 3152                    31,2256  62260 1                   +2
 3153   REF 10 LAST 511  31,2257  00063 1                   MOONFLAG
 3154   REF 10 LAST 511  31,2260  35517 1          STCALL   TET
 3155   REF  5 LAST 511  31,2261  27211 0                   INTEGRVS
 3156                    31,2262  77650 1          GOTO
 3157   REF  2 LAST 510  31,2263  62034 1                   COMPDISP      COMPUTE R RDOT RTHETA
 3158                    31,2264  77624 1 GETRVN5  CALL                   AV G ON
 31585  REF  2 LAST 510  31,2265  62301 1                   GETRVN
 31595                   31,2266  45014 0          BON      CALL
 3160   REF  5 LAST 511  31,2267  04307 1                   SURFFLAG
 31603  REF  2 LAST 511  31,2270  62275 0                   GETRVN6       LM DOWN, LMPREC
 31613  REF  11  LAST  511   31,2271   27516 0                          INTSTALL
 31616                       31,2272   52014 0            CLEAR   GOTO         INTEGRVS (PREC) IF LM NOT DOWN
 3162   REF   8  LAST  511   31,2273   01673 1                    INTYPFLG
 31623  REF   1              31,2274   62244 1                    OTHINT
 31626  REF  13  LAST  511   31,2275   34041 0   GETRVN6  STCALL  TDEC1
 3163   REF   3  LAST  510   31,2276   27161 1                    LEMPREC
 31635                       31,2277   77650 1            GOTO
 3164   REF   3  LAST  511   31,2300   62034 1                    COMPDISP     COMPUTE R ROOT RTHETA
 31645                       31,2301   77620 0   GETRVN   STQ
 31646                       31,2302   00000 1                    0D
 31647                       31,2303   52175 0            VLOAD   GOTO         AV G ON, RONE = RN  VONE = VN
 3165   REF   5  LAST  301   31,2304   01030 0                    RN            AND USE PIPTIME
 31655                       31,2305   62306 0                    +1
 3166   REF   9  LAST  511   31,2306   36320 0            STCALL  RONE
 3167                        31,2307   62310 1                    +1
 3168                        31,2310   52175 0            VLOAD   GOTO
 3169   REF   5  LAST  301   31,2311   01036 0                    VN
 31695                       31,2312   62313 1                    +1
 3170   REF   6  LAST  511   31,2313   16326 1            STODL   VONE
 31705  REF   4  LAST  301   31,2314   01044 0                    PIPTIME
 3171                        31,2315   77650 1            GOTO
 31711                       31,2316   00000 1                    0D
 3172   REF   1              31,2000                      SETLOC  R34
 3173                        31,2317                      BANK
 31735  REF   2 LAST  507 TO  512:    207    207*         COUNT*  $$/R3134
 3174                        31,2317   77776 1   R34LOS   EXIT
 3175   REF   8  LAST  294   31,2320  3 0036 1            CA      CDUS
 3176   REF   1              31,2321  50 120 1            INDEX   FIXLOC
 3177                        31,2322  54 011 0            TS      9D
 3178   REF   7  LAST  294   31,2323  3 0035 1            CA      CDUT
 3179   REF   2  LAST  512   31,2324  50 120 1            INDEX   FIXLOC
 3180                        31,2325  54 013 1            TS      11D
 3181   REF   3  LAST  512   31,2326  3 0120 1            CA      FIXLOC
 3182   REF  16  LAST  450   31,2327  6 6211 0            AD      SIX
 3183                        31,2330  4 0000 0            COM
 3184   REF   4  LAST  512   31,2331  50 120 1            INDEX   FIXLOC
 3185   REF   6  LAST  507   31,2332  54 046 1            TS      X1
 3186   REF  58  LAST  507   31,2333  0 6006 1            TC      INTPRET
 3187                        31,2334   77624 1            CALL
 3188   REF   1              31,2335   46000 0                    SXTNB
 3189                        31,2336   34015 1            STCALL  12D
 3190   REF   1              31,2337   62057 1                    R34ANG
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L        P76                                                                                USER'S PAGE NO.   1      E 53

P5000    1) PROGRAM NAME - TARGET DELTA V PROGRAM (P76).
R5001    2) FUNCTIONAL DESCRIPTION - UPON ENTRY BY ASTRONAUT ACTION, P76 FLASHES DSKY REQUESTS TO THE ASTRONAUT
R5003          TO PROVIDE VIA DSKY (1) THE DELTA V TO BE APPLIED TO THE OTHER VEHICLE STATE VECTOR AND (2) THE
R5005          TIME (TIG) AT WHICH THE OTHER VEHICLE VELOCITY WAS CHANGED BY  EXECUTION OF A THRUSTING MANEUVER. THE
R5007          OTHER VEHICLE STATE VECTOR IS INTEGRATED TO TIG AND UPDATED BY THE ADDITION OF DELTA V (DELTA V HAVING
R5009          BEEN TRANSFORMED FROM LV TO REF COSYS). USING INTEGRVS, THE    PROGRAM THEN INTEGRATES THE OTHER
R5011    VEHICLE STATE VECTOR TO THE STATE VECTOR OF THIS VEHICLE, THUS INSURING THAT THE W-MATRIX AND BOTH VEHICLE
R5013    STATES CORRESPOND TO THE SAME TIME.
R5014    3) ERASABLE INITIALIZATION REQUIRED - NONE.
R5015    4) CALLING SEQUENCES AND EXIT MODES - CALLED BY ASTRONAUT REQUEST THRU DSKY V 37 E 76 E.
R5017          EXITS BY TCF ENDOFJOB.
R5018    5) OUTPUT - OTHER VEHICLE STATE VECTOR INTEGRATED TO TIG AND INCREMENTED BY DELTA V IN REF COSYS.
R5020          THE PUSHLIST CONTAINS THE MATRIX BY WHICH THE INPUT DELTA V MUST BE POST-MULTIPLIED TO CONVERT FROM LV
R5022          TO REF COSYS.
R5023    6) DEBRIS - OTHER VEHICLE STATE VECTOR.
R5024    7) SUBROUTINES CALLED - BANKCALL,GOXDSPF,CSMPREC (OR LEMPREC),ATOPCSM (OR ATOPLEM),INTSTALL,INTWAKE, PHASCHNG
R5026          INTPRET, INTEGRVS, AND MINIRECT.

R5027    8) FLAG USE - MOONFLAG,CMOONFLAG,INTYPFLG,RASFLAG, AND MARKCTR.

 5029    REF   1                13,2000                         SETLOC P76LOC
 5030                           13,2071                         BANK

 5031    REF   1                                                COUNT* $$/P7677
 5032    REF  25  LAST  505     E7,1412                         EBANK= TIG

 50321   REF  10  LAST  487     13,2071  3 1214 1   P76ER77     CA      MODREG
 50322   REF  26  LAST  449     13,2072  7 4770 1               MASK    BIT1
 50323   REF   1                13,2073  55'545 0               TS      OPTFLAG           OPTFLAG = 0  LM (P76)
 5033                           13,2074  0 0006 1               EXTEND                              = 1 CSM (P77)
 5034    REF   4  LAST  486     13,2075  3 1450 1               DCA     NOMTIG
 50345   REF  26  LAST  513     13,2076  53'413 1               DXCH    TIG

 5035    REF   1                13,2077  3 5026 0               CAF     V06N33
 5040    REF  94  LAST  507     13,2100  0 4636 0               TC      BANKCALL          AND WAIT FOR KEYBOARD ACTION.
 5041    REF  11  LAST  485     13,2101   20743 0               CADR    GOFLASH
 5042    REF   1                13,2102  1 2234 1               TCF     ENDP76
 5043                           13,2103  0 2105 1               TC      +2                PROCEED
 5044                           13,2104  0 2077 0               TC      -5                STORE DATA AND REPEAT FLASHING
 50441   REF  27  LAST  486     13,2105  0 5402 1               TC      PHASCHNG
 50442                          13,2106   04024 0               OCT     04024
 50445   REF   2  LAST  513     13,2107  51'545 1               INDEX   OPTFLAG
 5045    REF   1                13,2110  3 2237 0               CAF     V06N84            FLASH V06 N84 OR N81
 5046    REF  95  LAST  513     13,2111  0 4636 0               TC      BANKCALL          AND WAIT FOR KEYBOARD ACTION.
 5047    REF  12  LAST  513     13,2112   20743 0               CADR    GOFLASH
 5048    REF   2  LAST  513     13,2113  1 2234 1               TCF     ENDP76
 5049                           13,2114  0 2116 0               TC      +2
 5050                           13,2115  0 2107 0               TC      -6                STORE DATA AND REPEAT FLASHING
 5051    REF  59  LAST  512     13,2116  0 6006 1               TC      INTPRET           RETURN TO INTERPRETIVE CODE
 5052                           13,2117   43145 0               DLOAD   SET               SET D(MPAC)=TIG IN CSEC B28
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  5053    REF  27  LAST  513    13,2120   03413 1                     TIG
  50535   REF   2  LAST  228    13,2121   01076 1                     NODOFLAG         DISALLOW V37
  5054    REF  14  LAST  512    13,2122   00041 1            STORE    TDEC1
  5055                          13,2123   77711 0            CCALL
  50553   REF   3  LAST  513    13,2124   03546 0                     OPTFLAG
  50556   REF   1               13,2125   26241 1                     INTADR
  5056                          13,2126   53575 0  COMPMAT   VLOAD    UNIT
  5057    REF  11  LAST  511    13,2127   00001 0                     RATT
  5058                          13,2130   77676 0            VCOMP                     U(-R)
  5059                          13,2131   00031 0            STORE    240              U(-R) TO 240
  5060                          13,2132   53435 0            VXV      UNIT             U(-R)XV = U(VXR)
  5061    REF   9  LAST  511    13,2133   00007 0                     VATT
  5062                          13,2134   00023 0            STORE    18D
  5063                          13,2135   53435 0            VXV      UNIT             U(VXR)XU(-R) = U((RXV)XR)
  5064                          13,2136   00031 0                     240
  5065                          13,2137   00015 0            STORE    120
  50652                         13,2140   46135 1            SLOAD    BHIZ
  50654   REF   4  LAST  514    13,2141   03546 0                     OPTFLAG
  50656                         13,2142   26146 0                     +4
  50658                         13,2143   52175 0            VLOAD    GOTO
  5066    REF  15  LAST  495    13,2144   03405 0                     DELVLVC          FROM CSM
  50662   REF   1               13,2145   26150 1                     DVTRANS
  50664                         13,2146   77775 1            VLOAD
  50666   REF  13  LAST  294    13,2147   03540 0                     DELVOV           FROM LM
  5067                          13,2150   76505 0  DVTRANS   VXM      VSL1             V(MPAC)=DELTA-V IN REFCOSYS
  5068                          13,2151   00015 0                     12D
  5069                          13,2152   77655 1            VAD
  5070    REF  10  LAST  514    13,2153   00007 0                     VATT
  5071                          13,2154   00007 0            STORE    6                V(PD6)=VATT + DELTA V
  5072                          13,2155   77624 1            CALL                      PREVENT WOULD-BE USER OF ORBITAL
  5073    REF  12  LAST  512    13,2156   27516 0                     INTSTALL         INTEG FROM INTERFERING WITH UPDATING
  5074                          13,2157   77624 1            CALL
  5075    REF   1               13,2160   26245 0                     P76SUB1
  5076                          13,2161   53775 1            VLOAD    VSR*
  5077                          13,2162   00007 0                     6
  5078                          13,2163   57176 0                     0,2
  5079    REF   9  LAST  511    13,2164   25543 1            STOVL    VCV
  5080    REF  12  LAST  514    13,2165   00001 0                     RATT
  5081                          13,2166   77657 0            VSR*
  5082                          13,2167   57176 0                     0,2
  5083    REF   9  LAST  511    13,2170   15535 0            STODL    RCV
  5084    REF  28  LAST  514    13,2171   03413 1                     TIG
  5085    REF  11  LAST  511    13,2172   01517 0            STORE    TET
  5086                          13,2173   71214 0            CLEAR    DLOAD
  5087    REF   9  LAST  512    13,2174   01673 1                     INTYPFLG
  5088    REF   1               13,2175   01571 0                     TETTHIS
  5089    REF  15  LAST  514    13,2176   34041 0  INTOTHIS  STCALL   TDEC1
  5090    REF   6  LAST  511    13,2177   27211 0                     INTEGRVS
  5091                          13,2200   77624 1            CALL
  5093    REF  13  LAST  514    13,2201   27516 0                     INTSTALL
```

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 50933                        13,2202   77624 1              CALL
 50936  REF   2  LAST  514    13,2203   26245 0                       P76SUB1       SET/CLEAR MOONFLAG
 5094                         13,2204   77775 1              VLOAD
 5095   REF   5  LAST  510    13,2205   00017 1                       RATT1
 5096   REF   2  LAST   89    13,2206   01503 0              STORE    RRECT
 5097   REF  10  LAST  514    13,2207   15535 0              STODL    RCV
 5098   REF   6  LAST  511    13,2210   00015 0                       TAT
 5099   REF  12  LAST  514    13,2211   25517 0              STOVL    TET
 5100   REF   5  LAST  510    13,2212   00025 0                       VATT1
 5101                         13,2213   77624 1              CALL
 5102   REF   1               13,2214   23434 0                       MINIRECT
 5103                         13,2215   77776 1              EXIT
 5104   REF  28  LAST  513    13,2216  0 5402 1              TC       PHASCHNG
 5105                         13,2217   04024 0              OCT      04024

 5109   REF  60  LAST  513    13,2220  0 6006 1              TC       INTPRET
 5110                         13,2221   62214 1              SET      CCALL
 51105  REF   1               13,2222   05062 0                       REINTFLG
 51106  REF   5  LAST  514    13,2223   03546 0                       OPTFLAG
 5111   REF   1               13,2224   26243 0                       UPDATADR
 5116                         13,2225   77624 1              CALL
 5117   REF   2  LAST  274    13,2226   27525 0                       INTWAKE0      PERMIT USE OF ORBITAL INTEGRATION
 5121                         13,2227   77414 0  OUT         CLEAR    EXIT          ALLOW V37. NO NEED TO CLEAR NODOFLAG AT
 5122   REF   3  LAST  514    13,2230   01276 0                       NODOFLAG       ENDP76 SINCE FLAG NOT SET WHEN DISPLAY
A5123                                                                                 RESPONSES TRANSFER THERE FROM P76+.
 5124   REF  10  LAST  313    13,2231  3 7702 0              CAF      NEGONE
 51242  REF  24  LAST  452    13,2232  55'722 0              TS       MRKBUF1
 51244  REF   2  LAST  486    13,2233  1 4105 0              TCF      MNKGOPOO

 5127   REF  11  LAST  515    13,2234  3 7702 0  ENDP76      CAF      NEGONE
 5128   REF  25  LAST  515    13,2235  55'722 0              TS       MRKBUF1       INVALIDATE MARK BUFFER

 5129   REF  14  LAST  509    13,2236  1 4103 0              TCF      GOTOPOOH

 5130                         13,2237   01524 0  V06N84      NV       0684
 5131                         13,2240   01521 0              NV       0681          MUST BE EQUAL TO V06N84 +1
 51312  REF   1               13,2241   27161 1  INTADR      CADR     OTHPREC
 51314  REF   1               13,2242   27145 1              CADR     THISPREC      MUST BE EQUAL TO INTADR +1
 51316  REF   1               13,2243   27034 0  UPDATADR    CADR     ATOPOTH
 51318  REF   1               13,2244   26761 0              CADR     ATOPTHIS      MUST BE EQUAL TO UPDATADR +1
 5132                         13,2245   67214 1  P76SUB1     CLEAR    SLOAD
 5133   REF  11  LAST  511    13,2246   00263 0                       MOONFLAG
 5134   REF   5  LAST  499    13,2247   00050 1                       X2
 5135                         13,2250   43030 0              BHIZ     SET           X2=0...CLEAR MOONFLAG
 5136                         13,2251   26253 1                       +2              =2.... SET MOONFLAG
 5137   REF  12  LAST  515    13,2252   00063 1                       MOONFLAG
 5138                         13,2253   77616 0              RVQ
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L          R30                                                                              USER'S PAGE NO.  1      E. 53

R5200    SUBROUTINE NAME:      V82CALL
R5201    MOD NO:  0                                                                   DATE:               16 FEB 67
R5203    MOD BY:  RR BAIRNSFATHER                                                     LOG SECTION:        R30
R5205    MOD NO: 1                 MOD BY: RR BAIRNSFATHER        DATE: 11 APR 67     SR30.1 CHANGED TO ALLOW MONITOR OPERN
R5208    MOD  NO: 2                MOD  BY ALONSO                 DATE : 11 DEC 67    V882 PROGRAM REWRITTEN
R52095   MOD NO: 3                 MOD  BY ALONSO                 DATE: 26 MAR 68     PROG MOD TO HANDLE DIF EARTH/MOON SCALE
R5210    MOD NO- 4                 MOD  BY CROCKER                DATE- 27 AUG 69     PROG MOD FOR TIME OPTION.
R5211     NEW FUNCTIONAL DESCRIPTION-    CALLED BY VERB 82 ENTER.  PRIORITY 7
R52111      USED THROUGHOUT.             CALCULATE AND DISPLAY ORBITAL PARAMETERS
R52119
R5212    1. IF AVERAGE G IS OFF:
                  FLASH DISPLAY V04N12. R2 INDICATES WHICH SHIP,S STATE VECTOR IS
R5214              TO BE UPDATED. INITIAL CHOICE IS THIS SHIP (R2=1)  ASTRONAUT
R5215              CAN CHANGE TO OTHER SHIP BY V22EXE, WHERE X NOT EQ 1.
R5216              FLASH DISPLAY TIME V06N16. INITIAL CHOICE = 0 = PRESENT TIME.
R52161             ASTRONAUT CAN INSERT A TIME BY V25E, R1=HR R2=MIN R3=CSEC.
R52162             CHOSEN STATE VECTOR UPDATED TO CHOSEN TIME BY THISPREC/OTHPREC
R5217             CALLS SR30.1 (WHICH CALLS TFFCONMU + TFFRP/RA) TO CALCULATE
R5218              RPER (PERIGEE RADIUS), RAPO (APOGEE RADIUS), HPER (PERIGEE
R5219              HEIGHT ABOVE LAUNCH PAD OR LUNAR LANDING SITE), HAPO (APOGEE
R5220              HEIGHT AS ABOVE), TPER (TIME TC PERIGEE), TFF (TIME TO
R5221              INTERSECT 300 KFT ABOVE PAD OR 35KFT ABOVE LANDING SITE).
R5222             FLASH MONITOR V16N44 (HAPO, HPER, TFF).TFF IS -59M59S IF IT WAS
R5223              NOT COMPUTABLE, OTHERWISE IT INCREMENTS ONCE PER SECOND.
R52235             IF P00 IS RUNNING, CALL DELRSPL SPLASH ERROR COMPUTATION.
R5224              ASTRONAUT HAS OPTION TO MONITOR TPER BY KEYING IN N 32 E.
R5225              DISPLAY IS IN HMS, IS NEGATIVE (AS WAS TFF), AND INCREMENTS
R5226              ONCE PER SECOND ONLY IF TFF DISPLAY WAS -59M59S.

R5227    2. IF AVERAGE G IS ON:
R5228             CALLS SR30.1 APPROX EVERY TWO SECS.  STATE VECTOR IS ALWAYS
R5229              FOR THIS VEHICLE. V82 DOES NOT DISTURB STATE VECTOR.  RESULTS
R5230              OF SR30.1 ARE RAPO, RPER, HAPO, HPER, TPER, TFF.
R5231             FLASH MONITOR V16N44 (HAPO, HPER, TFF).
R5232             IF MODE IS P11, THEN CALL DELRSFL SO ASTRONAUT CAN MONITOR
R5233              RESULTS BY N50E. SPLASH COMPUTATION DONE ONCE PER TWO SECS.


R52331   ACDENDUM: HAPO AND HPER SHOULD BE CHANGED TO READ HAPOX AND HPERX IN THE
R52332             ABOVE REMARKS.

R5234    CALLING SEQUENCE:  VERB 82 ENTER.


R5235    SUBROUTINES CALLED:  SR30.1, GOXDSPF
R5236                         MAYBE - THISPREC, OTHPREC, LOADTIME, DELRSPL,
R52361                                VEHOPT, TIMEOPT
R5237    NORMAL EXIT MODES:  TC ENDEXT

R5238    ALARMS:  NONE
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R5239    OUTPUT:  HAPOX      (-29) M
R5240             HPERX      (-29) M
R5241             RAPO       (-29) M EARTH
R52411                       (-27) M MOON
R5242             RPER       (-29) M EARTH
R52421                       (-27) M MOON
R5243             TFF        (-28) CS       CONTAINS NEGATIVE QUANTITY
R5244             -TPER      (-28) CS       CONTAINS NEGATIVE QUANTITY
R5245             RSP-RREC (-29) M          IF DELRSPL CALLED

R5246    ERASABLE INITIALIZATION REQUIRED: STATE VECTOR.

R5247    DEBRIS:  QPRET, RONE, VONE,TFF/RTMU, HPERMIN, RPADTEM, V82EMFLG.
R5248             MAYBE: TSTART82, V82FLAGS, TDEC1.

  5249   REF   5  LAST  291   E4,1742                          EBANK=  HAPOX
  52495  REF   3  LAST  276   40,2000                          SBANK=  PINSUPER
  5251   REF   1              23,2000                          SETLOC  R30LOC
  5252                        23,2330                          BANK
  5253   REF   1                                               COUNT*  $$/R30

  5254   REF  61  LAST  515   23,2330  0 6006 1  V82CALL   TC      INTPRET
  5255                        23,2331   45014 0            BON     CALL
  5256   REF   1              23,2332   00716 1                    AVEGFLAG
  5257   REF   1              23,2333   46551 1                    V82GON        IF AVERAGE G ON
  5258   REF   1              23,2334   50064 0                    VEHUPT        IF OFF, ALLOW VEHICLE OPTION
  5270                        23,2335   77776 1            EXIT
  5271   REF  23  LAST  391   23,2336  3 4765 1            CAF     BIT4          80 MS
  5272   REF  11  LAST  419   23,2337  0 5233 0            TC      WAITLIST
  5273   REF   4  LAST  292   E4,1734                      EBANK=  TFF
  5274   REF   1              23,2340   02514 0            2CADR   TICKTEST
  5274   REF   1              23,2341   46104 0
  5275                        23,2342  0 0003 1            RELINT
  52755  REF   8  LAST  506   30,2000                      SBANK=  LOWSUPER
  5276   REF   1              23,2343  3 2372 0  V82GOFLP  CAF     TFFBANK       MAJOR RECYCLE LOOP ENTRY
  5277   REF  13  LAST  428   23,2344  54 003 0            TS      EBANK
  5278   REF 106  LAST  456   23,2345  3 4772 1            CAF     ZERO
  5279   REF   3  LAST   95   23,2346  55'733 0            TS      V82FLAGS      ZERO FLAGS FOR TICKTEST. INHIBITS
 A5280                                                                         DECREMENTING OF TFF AND -TPER.
  5281   REF   5  LAST  276   23,2347  3 5051 0            CAF     PRIO7
  5282   REF  21  LAST  507   23,2350  0 5135 0            TC      FINDVAC       V82GOFF1 WILL EXECUTE STATE VECTOR
  5283   REF   5  LAST  517   E4,1734                      EBANK=  TFF           UPDATE AND ORBIT CALCULATIONS FOR
  5284   REF   1              23,2351   02373 1            2CADR   V82GOFF1      SELECTED VEHICLE ABOUT PROPER BODY.
  5284   REF   1              23,2352   46064 1
  5285                        23,2353  0 0003 1            RELINT
  5286   REF  17  LAST  395   23,2354  3 6214 0  V82STALL  CAF     THREE         STALL IN THIS LOOP AND WITHOLD V 16 N 44
  5287   REF   4  LAST  517   23,2355  7 1733 0            MASK    V82FLAGS      UNTIL STATE VECTOR UPDATE SETS ONE OF
  5288   REF 138  LAST  448   23,2356  10 000 0            CCS     A             OUR FLAG BITS.
  5289   REF   1              23,2357  0 2363 0            TC      FLAGGON       EXIT FROM STALL LOOP.
 5291     REF  96  LAST  513    23,2360  0 4636 0             TC      BANKCALL
 5292     REF   3  LAST  507    23,2361   01730 1             CADR    1SECDELY
 5293     REF   1               23,2362  0 2354 1             TC      V82STALL

 5294     REF   1               23,2363  3 2371 0  FLAGGON    CAF     V16N44                MONITOR HAPO,HPER,TFF.
 5295     REF  97  LAST  518    23,2364  0 4636 0             TC      BANKCALL
 5296     REF  11  LAST  506    23,2365   20576 1             CADR    GOXDSPF
 5297     REF   3  LAST  507    23,2366  0 5626 0             TC      B5OFF                 TERM  THIS TELLS TICKTEST TO KILL ITSELF
 5298     REF   4  LAST  516    23,2367  0 5626 0             TC      B5OFF                 PROCEED  DITTO
 5299     REF   1               23,2370  0 2343 1             TC      V82GOFLP              RECYCLE  RECOMPUTE STATE VECT + DISPLAY

 5301                           23,2371   04054 1  V16N44     VN      1644
 5302     REF   6  LAST  517    23,2372   02334 1  TFFBANK    ECADR   TFF


 5303     REF  62  LAST  517    23,2373  0 6006 1  V82GOFF1   TC      INTPRET
 5304                           23,2374   45145 0             DLOAD   CALL
 53045    REF  10  LAST  483    23,2375   15336 0                     ZEROVECS              INITIAL TIME = 0 = PRES. TIME
 5305     REF   3  LAST  505    23,2376   46424 1                     TIMEOPT               ALLOW TIME SELECTION
 5307     REF   1               23,2377   16316 1             STODL   TSTART82              TIME FOR INTERNAL USE (=TDEC1 TIME)
 5309     REF   1               23,2400   01257 0                     OPTIONEV
 5310                           23,2401   46142 1             SR1     BHIZ
 5312     REF   1               23,2402   46420 0                     THISSHIP
 5314                           23,2403   77624 1             CALL                          CALL STATE VECTOR UPDATE FOR OTHER SHIP.
 5315     REF   2  LAST  515    23,2404   27161 1                     OTHPREC
 5316                           23,2405   77775 1  BOTHSHIP   VLOAD                         MOVE RESULTS INTO TFFCONIC STORAGE AREAS
 5317     REF  13  LAST  514    23,2406   00001 0                     RATT                   TO BE CALLED BY SR30.1.
 5318     REF  10  LAST  512    23,2407   26320 1             STOVL   RONE                  RATT AT (-29)M FOR EARTH OR MOON
 5321     REF  11  LAST  514    23,2410   00007 0                     VATT
 5322     REF   7  LAST  512    23,2411   16326 1             STODL   VONE
 5323     REF   6  LAST  515    23,2412   00050 1                     X2
 5329                           23,2413   45030 0             BHIZ    CALL
 5331     REF   1               23,2414   46457 0                     EARTHPAD
 5332     REF   1               23,2415   46635 0                     MOONGON
 5333                           23,2416   77650 1             GOTO
 53335    REF   1               23,2417   46461 0                     BOTHPAD
 5335                           23,2420   77624 1  THISSHIP   CALL                          CALL STATE VECTOR UPDATE FOR THIS SHIP.
 5336     REF   2  LAST  515    23,2421   27145 1                     THISPREC
 5337                           23,2422   77650 1             GOTO
 5338     REF   1               23,2423   46405 1                     BOTHSHIP

 533805   REF   3  LAST  283    23,2424   01255 1  TIMEOPT    STORE   DSPTEMX
 53381                          23,2425   77420 1    +1       STQ     EXIT
 53382    REF   3  LAST  506    23,2426   00734 1                     VEHRET
 53383    REF   1               23,2427  3 2446 0             CAF     V06N16X
 533835   REF  98  LAST  518    23,2430  0 4636 0             TC      BANKCALL
 53384    REF  12  LAST  518    23,2431   20576 1             CADR    GOXDSPF
 533845   REF  25  LAST  509    23,2432  0 5524 1             TC      ENDEXT
 53385                          23,2433  0 2435 1             TC      +2
 533855                         23,2434  0 2427 1             TC      -5
 53386  REF  63  LAST  518   23,2435  0 6006 1             TC       INTPRET
 533865                      23,2436   53145 1             DLOAD    BZE
 53387  REF   4  LAST  518   23,2437   01255 1                      DSPTEMX
 533875 REF   1              23,2440   46443 0                      GETNOW
 53388  REF  16  LAST  514   23,2441   34041 0  STRTDEC1   STCALL   TDEC1
 533883 REF   4  LAST  518   23,2442   00734 1                      VEHRET
 533886                      23,2443   52034 1  GETNOW     RTB      GOTO
 53389  REF   7  LAST  510   23,2444   51751 0                      LOADTIME
 533893 REF   1              23,2445   46441 1                      STRTDEC1
 533896                      23,2446   01420 0  V06N16X    VN       0616
R5339   THE FOLLOWING CONSTANTS ARE PAIRWISE INDEXED. DO NOT SEPARATE PAIRS.

 5340                        23,2447   27533 1  1/RTMUM    2DEC*    .45162595 E-4 B14*
 5340                        23,2450   07571 0
 5341                        23,2451   25004 1  1/RTMUE    2DEC*    .50087529 E-5 B17*
 5341                        23,2452   06702 1
 5342                        23,2453   00001 0  MINPERM    2DEC     10668 B-27         35 KFT MIN PERIGEE HEIGHT FOR MOON(-27)M
 5342                        23,2454   11530 1
 5343                        23,2455   00002 0  MINPERE    2DEC     91440 B-29         300 KFT (-29)M FOR EARTH
 5343                        23,2456   31230 1

 5344                        23,2457   77624 1  EARTHPAD   CALL
 5345   REF   1              23,2460   46647 0                      EARTHGUN
 5350   REF   2  LAST   94   23,2461   36314 1  BOTHPAD    STCALL   RPADTEM
 5352   REF   1              23,2462   46660 0                      SR30.1             CALCULATE ORBITAL PARAMETERS
 53521                       23,2463   46135 1             SLOAD    BHIZ
 53522  REF  11  LAST  513   23,2464   01215 0                      MODREG             ARE WE IN P00
 53524  REF   1              23,2465   46611 0                      CANDEL             YES, DO DELRSPL
 5353                        23,2466   45234 0  SPLRET1    RTB      DSU
 5354   REF   8  LAST  519   23,2467   51751 0                      LOADTIME
 5356   REF   2  LAST  518   23,2470   02316 1                      TSTART82           PRESENT TIME - TIME V82GOFF1 BEGAN
 5357   REF   3  LAST  519   23,2471   16316 1             STODL    TSTART82                          SAVE IT.
 5358   REF   3  LAST  284   23,2472   02337 1                      -TPER              SR30.1 SETS -TPER=0 IF HPER L/
 5359                        23,2473   77654 0             BZE                          HPERMIN (300 OR 35) KFT.
 5360   REF   1              23,2474   46504 1                      TICKTFF            (-TPER = 0)
 5361                        23,2475   43345 1  TICKTPER   DLOAD    DAD                (-TPER NON ZERO)  TFF WAS NOT COMPUTED,
 5362   REF   4  LAST  519   23,2476   02337 1                      -TPER              BUT WAS SET TO 59M59S.DONT TICK TFF, DO
 5363   REF   4  LAST  519   23,2477   02316 1                      TSTART82           TICK -TPER, DISPLAY BOTH.
 5364   REF   5  LAST  519   23,2500   02337 1             STORE    -TPER              -TPER CORRECTED FOR TIME SINCE V82GOFF1
 5365                        23,2501   77776 1             EXIT                        BEGAN.
 5366   REF  27  LAST  513   23,2502  3 4770 0             CAF      BIT1               INFORMS TICKTEST TO INCREMENT ONLY -TPER
 5368   REF   2  LAST  519   23,2503  0 2512 0             TC       TICKTFF +6
 5369                        23,2504   43345 1  TICKTFF    DLOAD    DAD                (-TPER=0)  TFF WAS COMPUTED.TICK TFF.
 5370   REF   7  LAST  518   23,2505   02335 0                      TFF                DO NOT TICK -TPER.DISPLAY TFF, BUT NOT
 5371   REF   5  LAST  519   23,2506   02316 1                      TSTART82           -TPER.
 5372   REF   8  LAST  519   23,2507   02335 0             STORE    TFF                TFF CORRECTED FOR TIME SINCE V82GOFF1
 5373                        23,2510   77776 1             EXIT                        BEGAN.
 5374   REF  21  LAST  456   23,2511  3 4767 0             CAF      BIT2
 5375   REF   5  LAST  517   23,2512  55'733 0     +6      TS       V82FLAGS           INFORMS TICKTEST TO INCREMENT ONLY TFF.
 5376   REF  51  LAST  458   23,2513  0 5205 0             TC       ENDOFJOB
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  5377   REF  21  LAST  508   23,2514  3 4764 0  TICKTEST CAF     BITS          THIS WAITLIST PROGRAM PERPETUATES ITSELF
  5378   REF  11  LAST  509   23,2515  7 1247 0           MASK    EXTVBACT      ONCE A SEC UNTIL BIT 5 OF EXTVBACT =0.
  5379   REF 139  LAST  517   23,2516  10 000 0           CCS     A
  5380   REF   1              23,2517  0 2525 1           TC      DOTICK
  5381   REF   1              23,2520  3 7647 0           CAF     PRIO25
  5382   REF   8  LAST  365   23,2521  0 5121 0           TC      NOVAC         TERMINATE V 82.CANT CALL ENDEXT IN RUPT.
  5383   REF  12  LAST  520      1247                     EBANK=  EXTVBACT
  5384   REF  26  LAST  518   23,2522   05524 1           2CADR   ENDEXT
  5384                        23,2523   04062 1
  5385   REF  18  LAST  438   23,2524  0 5314 1           TC      TASKOVER
  5386   REF   8  LAST  432   23,2525  3 5016 0  DOTICK   CAF     1SEC          RE-REQUEST TICKTEST.
  5387   REF  12  LAST  517   23,2526  0 5233 0           TC      WAITLIST
  5388   REF   9  LAST  519   E4,1734                     EBANK=  TFF
  5389   REF   2  LAST  517   23,2527   02514 0           2CADR   TICKTEST
  5389                        23,2530   46064 1
  5390   REF  18  LAST  517   23,2531  3 6214 0           CAF     THREE
  5391   REF   6  LAST  519   23,2532  7 1733 0           MASK    V82FLAGS
  5392   REF 140  LAST  520   23,2533  50 000 1           INDEX   A
  5393                        23,2534  0 2535 0           TC      +1
  5394   REF  19  LAST  520   23,2535  0 5314 1           TC      TASKOVER      IF NO FLAGBITS SET DONT CHANGE TFF OR
 A5395                                                                          -TPER, BUT CONTINUE LOOP.
  5396   REF   1              23,2536  0 2544 0           TC      TPERTICK      ONLY BIT 1 SET. INCR -TPER BY 1 SEC.
  5397   REF   9  LAST  520   23,2537  3 5016 0  TFFTICK  CAF     1SEC          ONLY BIT 2 SET. INCR TFF BY 1 SEC.
  5398   REF  62  LAST  449   23,2540  54 001 1           TS      L
  5399   REF 107  LAST  517   23,2541  3 4772 1           CAF     ZERO
  5400   REF  10  LAST  520   23,2542  21'735 0           DAS     TFF
  5401   REF  20  LAST  520   23,2543  0 5314 1           TC      TASKOVER
  5402   REF  10  LAST  520   23,2544  3 5016 0  TPERTICK CAF     1SEC
  5403   REF  63  LAST  520   23,2545  54 001 1           TS      L
  5404   REF 108  LAST  520   23,2546  3 4772 1           CAF     ZERO
  5405   REF   6  LAST  519   23,2547  21'737 1           DAS     -TPER
  5406   REF  21  LAST  520   23,2550  0 5314 1           TC      TASKOVER
 5407                           23,2551    77776 1  V82GON    EXIT                 AVERAGE G ON. USE CURRENT STATE VECTOR
A5408                                                                              FOR ORBITAL PARAMETER CALCULATIONS.
 5409   REF   6  LAST  517      23,2552  3 5051 0             CAF      PRIO7       LESS THAN LAMBERT
 5410   REF  22  LAST  517      23,2553  0 5135 0             TC       FINDVAC     V82GON1 WILL PERFORM ORBIT CALCULATIONS
 5411   REF  11  LAST  520      E4,1734                       EBANK=   TFF         ABOUT PROPER BODY APPROX ONCE PER SEC.
 5412   REF   1                 23,2554    02567 1            2CADR    V82GON1
 5412   REF   1                 23,2555    46064 1
 5413                           23,2556  0 0003 1             RELINT
 5414   REF   4  LAST  250      23,2557 10 067 1              CCS      NEWJOB      WITHOLD V16 N44 UNTIL FIRST ORBIT CALC
 5415   REF   2  LAST  250      23,2560  0 5152 1             TC       CHANG1      IS DONE. NOTE: V82GON1 (PRIO7, FINDVAC
A5416                                                                              JOB) IS COMPLETED BEFORE V82GON (PRIO7,
A54161                                                                             NOVAC JOB).
 5417   REF   2  LAST  518      23,2561  3 2371 0  V82REDSP   CAF      V16N44      MONITOR HAPO, HPER, TFF
 5418   REF  99  LAST  518      23,2562  0 4636 0             TC       BANKCALL
 5419   REF  13  LAST  518      23,2563    20576 1            CADR     GOXDSPF
 5420   REF   5  LAST  518      23,2564  0 5626 0             TC       B5OFF       TERM THIS TELLS V82GON1 TO KILL ITSELF.
 5421   REF   6  LAST  521      23,2565  0 5626 0             TC       B5OFF       PROC DITTO.
 5422   REF   1                 23,2566  0 2561 1             TC       V82REDSP    RECYCLE

 5423   REF  64  LAST  519      23,2567  0 6006 1  V82GON1    TC       INTPRET     THIS EXEC PROGRAM PERPETUATES ITSELF
A5424                                                                              ONCE A SEC UNTIL BIT 5 OF EXTVBACT =0.
 5425                           23,2570    52175 0            VLOAD    GOTO        HOLDS OFF CCS NEWJOB BETWEEN RN AND
 5426   REF   6  LAST  512      23,2571    01030 0                     RN            VN FETCH SO RN , VN ARE FROM SAME
 5427   REF   1                 23,2572    46573 1                     NEXTLINE       STATE VECTOR UPDATE.
 5428   REF  11  LAST  518      23,2573    26320 1  NEXTLINE  STOVL    RONE         RN AT (-29)M FOR EARTH OR MOON
 5429   REF   6  LAST  512      23,2574    01030 0                     VN
 5430   REF   8  LAST  518      23,2575    02326 1            STORE    VONE        VN AT (-7)M/CS FOR EARTH OR MOON
 5431                           23,2576    45014 0            BON      CALL
 5432   REF   1                 23,2577    00315 0                     AMOONFLG    FLAG INDICATES BODY ABOUT WHICH ORBITAL
 5433   REF   1                 23,2600    46631 1                     MOONGONA     CALCULATIONS ARE TO BE PERFORMED.
 5434   REF   2  LAST  519      23,2601    46647 0                     EARTHGON       IF SET - MOON , IF RESET - EARTH.

 5451   REF   3  LAST  519      23,2602    36314 1  V82GON2   STCALL   RPADTEM     COMMON CODE FOR EARTH & MOON.
 5453   REF   2  LAST  519      23,2603    46660 0                     SR30.1
 5454                           23,2604    77776 1            EXIT
 5455   REF  15  LAST  509      23,2605  0 5354 0             TC       CHECKMM
 5456                           23,2606    00013 0            DEC      11
 5457   REF   1                 23,2607  0 2622 0             TC       V82GON3     NOT IN MODE 11.
 5458   REF  65  LAST  521      23,2610  0 6006 1             TC       INTPRET     IN MODE 11 OR P00
 54581                          23,2611    77624 1  CANDEL    CALL
 54582  REF  14  LAST  514      23,2612    27516 0                     INTSTALL    DELRSPL DOES INTWAKE
 5459                           23,2613    45145 0            DLOAD    CALL
 5460   REF  12  LAST  521      23,2614    02335 0                     TFF
 5461   REF   1                 23,2615    64027 0                     DELRSPL     RETURN IS TO NEXT LINE ( SPLRET ).
 5462                           23,2616    46135 1  SPLRET    SLOAD    BHIZ
 54621  REF  12  LAST  519      23,2617    01215 0                     MODREG
 54623  REF   1                 23,2620    46466 1                     SPLRET1
 54624                          23,2621    77776 1            EXIT
 5463   REF  22  LAST  520      23,2622  3 4764 0  V82GON3    CAF      BIT5
 5464   REF  13  LAST  520      23,2623  7 1247 0             MASK     EXTVBACT    SEE IF ASTRONAUT HAS SIGNALLED TERMINATE
 5465                           23,2624  0 0006 1                   EXTEND
 5466   REF  27  LAST  520      23,2625  1 5524 0                   BZF      ENDEXT              YES, TERMINATE V8 82 LOOP
 5469   REF 100  LAST  521      23,2626  0 4636 0                   TC       BANKCALL            WAIT ONE SECOND BEFORE REPEATING
 5470   REF   4  LAST  518      23,2627   01730 1                   CADR     1SECDELY               ORBITAL PARAMETER COMPUTATION.
 5471   REF   2  LAST  521      23,2630  0 2567 1                   TC       V82GON1

 5500                           23,2631   77624 1   MOONGONA CALL
 5501   REF   2  LAST  518      23,2632   46635 0                            MOONGON
 5502                           23,2633   77650 1            GOTO
 5503   REF   1                 23,2634   46602 1                            V82GON2
 5504                           23,2635   71214 0   MOONGON  SET             DLOAD
 5505   REF   1                 23,2636   04462 0                            V82EMFLG            INDICATES LUNAR SCALING FOR SR30.1
 5506   REF   1                 23,2637   06450 0                            1/RTMUM             LUNAR PARAMETERS LOADED HERE FOR SR30.1
 5507   REF   1                 23,2640   14037 0            STODL           TFF/RTMU
 5508   REF   1                 23,2641   06454 1                            MINPERM
 5509   REF   2  LAST   94      23,2642   26312 0            STOVL           HPERMIN
 5510   REF   4  LAST  499      23,2643   02026 1                            RLS                 SCALED AT (-27)M.
 5511                           23,2644   77646 0            ABVAL
 55112                          23,2645   43414 1            SET             RVQ
 55114  REF   5  LAST  459      23,2646   01463 1                            LUNAFLAG            FOR LAT-LONG SUBROUTINE
 5512                           23,2647   71214 0   EARTHGON CLEAR           DLOAD
 5513   REF   2  LAST  522      23,2650   04662 1                            V82EMFLG            INDICATE EARTH SCALING FOR SR30.1
 5514   REF   1                 23,2651   06452 1                            1/RTMUE             EARTH PARAMETERS LOADED HERE FOR SR30.1
 5515   REF   2  LAST  522      23,2652   14037 0            STODL           TFF/RTMU
 5516   REF   1                 23,2653   06456 0                            MINPERE
 5517   REF   3  LAST  522      23,2654   16312 0            STODL           HPERMIN
 5518   REF   2  LAST  499      23,2655   05173 1                            RPAD
 5519                           23,2656   43414 1            CLEAR           RVQ
 5520   REF   6  LAST  522      23,2657   01663 0                            LUNAFLAG            FOR LAT-LONG SUBROUTINE
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P5548    SUBROUTINE NAME:     SR30.1
R5549    MCD NO:  0                                                          DATE:            16 FEB 67
R5551    MCD BY:  RR BAIRNSFATHER                                            LOG SECTION:     R32
R5553    MCD NO:  1            MOD BY:  RR BAIRNSFATHER     DATE: 11 APR 67   SR30.1 CHANGED TO ALLOW MONITOR OPERN
R5555    MCD NO:  2            MOD BY:  RR BAIRNSFATHER     DATE:  14 APR 67  ADD OVFL CK FOR RAPO
R5557    MCO NO:  3            MOD BY ALONSO                DATE: 11 DEC 67   SUBROUTINE REWRITTEN
R55585   MCD NO: 4             MOD BY ALONSO                DATE: 26 MAR 68   PROG MOD TO HANDLE DIF EARTH/MOON SCALE
R5559    MCD NO:  5            MOD BY:  RR BAIRNSFATHER     DATE:  6 AUG 68   OVFL CK FOR HAPO & HPER.VOIDS MOD #2.
R5561

R5562    NEW FUNCTIONAL DESCRIPTION:     ORBITAL PARAMETERS DISPLAY FOR NOUNS 32  AND 44.
R5564    SR30.1 CALLS TFFCONMU AND TFFRP/RA TO CALCULATE RPER (PERIGEE RADIUS),
R5565    RAPO (APOGEE RADIUS), HPER (PERIGEE HEIGHT ABOVE LAUNCH PAD OR LUNAR
R5566    LANDING SITE), HAPO (APOGEE HEIGHT AS ABOVE), TPER (TIME TO PERIGEE),
R5567    TFF (TIME TO INTERSECT 300 KFT ABOVE PAD OR 35KFT ABOVE LANDING SITE).
R5568    IF HPER IS GREATER THAN OR EQUAL TO HPERMIN, CALCULATES TPER AND STORES
R5569    NEGATIVE    IN -TPER. OTHERWISE STORES +0 IN -TPER. WHENEVER TPER IS
R5570    CALCULATED, TFF IS NOT COMPUTABLE AND DEFAULTS TO -59MIN 59SEC. IF HAPO
R5571    WOULD EXCEED 9999.9 NM, IT IS LIMITED TO THAT VALUE FOR DISPLAY.

R5572    ACDENDUM: HAPO AND HPER SHOULD BE CHANGED TO READ HAPOX AND HPERX IN THE
R5573              ABOVE REMARKS.

R5574    CALLING SEQUENCE:          CALL
R5575                                     SR30.1
R5576    SUBROUTINES CALLED:        TFFCONMU, TFFRP/RA, CALCTPER, CALCTFF
R5577    NCRMAL EXIT MODE:          CALLING LINE +1 (STILL IN INTERPRETIVE MODE)
R5578    ALARMS:                    NONE
R5579    OUTPUT:  RAPO    (-29) M EARTH   APOGEE RADIUS   EARTH CENTERED COORD.
R5580                     (-27) M MOON                    MOON CENTERED COORD.
R5581             RPER    (-29) M EARTH   PERIGEE RADIUS  EARTH CENTERED COORD.
R5582                     (-27) M MOON                    MOON  CENTERED COORD.
R5583             HAPOX   (-29) M         APOGEE ALTITUDE ABOVE PAD OR LAND. SITE MAX VALUE LIMITED TO 9999.9 NM
R5585             HPERX   (-29) M         PERIGEE ALT. ABOVE PAD OR LAND. SITE    MAX VALUE LIMITED TO 9999.9 NM.
R5587             TFF     (-28) CS        TIME TO 300KFT OR 35KFT ALTITUDE
R5588             -TPER   (-28) CS        TIME TO PERIGEE
R5589    ERASABLE INITIALIZATION REQUIRED-
R5590             TFF/RTMU (+17) EARTH    RECIPROCAL OF PROPER GRAV CONSTANT FOR
R5591                      (+14) MOON     EARTH OR MOON = 1/SQRT(MU).
R5592             RONE     (-29) M        STATE VECTOR
R5593             VONE     (-7)  M/CS     STATE VECTOR
R5594             RPADTEM (-29) M EARTH   RADIUS OF LAUNCH PAD OR LUNAR LANDING
R5595                     (-27) M MOON    SITE.
R5596             HPERMIN (-29) M EARTH   (300 OR 35)KFT MINIMUM PERIGEE ALTITUDE
R5597                     (-27) M MOON    ABOVE LAUNCH PAD OR LUNAR LANDING SITE.
R5598             V82EMFLG (INT SW BIT) RESET FOR EARTH, SET FOR MOON.

R5599    CEBRIS:  QPRET, PDL, S2
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L       R30                                                                       USER'S PAGE NO.  9     E4 S3

 5600   REF   1                                         COUNT*  $$/SR30S

 5601                       23,2660  44001 0  SR30.1    SETPO   STQ          INITIALIZE PUSHDOWN LIST.
 5602                       23,2661  00001 0                    0
 5603   REF   4  LAST  449  23,2662  00051 0                    S2
A5604                                                                        SR30.1 INPUT: RONE AT (-29)M EARTH/MOON
A5605                                                                                      VONE AT (-7)M/CS
A5606                                                                         TFFCONMU,TFFRP/RA,CALCTPER AND CALCTFF
A5607                                                                         CALLS REQUIRE :
A5608                                                                         EARTH CENTERED (NO RESCALING REQUIRED)
A5609                                                                                       RONE SCALED TO B-29 M
A5610                                                                                       VONE SCALED TO B-7 M/CS
A5611                                                                         MOON CENTERED  (RESCALING REQUIRED)
A5612                                                                                       RONE SCALED TO B-27 M
A5613                                                                                       VONE SCALED TO B-5  M/CS
 5614                       23,2663  77214 0            BUFF    VLOAD
 5615   REF   3  LAST  522  23,2664  04742 1                    V82EMFLG       OFF FOR EARTH ,  ON FOR MOON.
 5616   REF   1             23,2665  46674 0                    TFFCALLS
 5617   REF  12  LAST  521  23,2666  02320 1                    RONE
 5618                       23,2667  77752 1            VSL2
 5619   REF  13  LAST  524  23,2670  26320 1            STOVL   RONE
 5620   REF   9  LAST  521  23,2671  02326 1                    VONE
 5621                       23,2672  77752 1            VSL2
 5622   REF  10  LAST  524  23,2673  02326 1            STORE   VONE
 5623                       23,2674  77624 1  TFFCALLS  CALL
 5624   REF   1             23,2675  57152 0                    TFFCONMU
 5625                       23,2676  77624 1            CALL                 TFFRP/RA COMPUTES RAPO,RPER.
 5626   REF   1             23,2677  57220 0                    TFFRP/RA
A5627                                                                        RETURNS WITH RAPO IN D(MPAC).
 5628                       23,2700  77625 0            DSU
 5629   REF   4  LAST  521  23,2701  02314 0                    RPADTEM
 5630                       23,2702  64414 1            BUFF    SR2R         NEED HAPO AT (-29)M FOR DISPLAY.
A5631                                                                        IF MOON CENTERED, RESCALE FROM (-27)M
A5632                                                                         IF EARTH CENTERED ALREADY AT (-29)M.
 5633   REF   4  LAST  524  23,2703  04742 1                    V82EMFLG      OFF FOR EARTH , ON FOR MOON.
 5634                       23,2704  46705 1                    +1
 5635                       23,2705  77624 1            CALL                 IF HAPO > MAXNM, SET HAPO =9999.9 NM
 5636   REF   1             23,2706  46745 0                    MAXCHK       OTHERWISE STORE (RAPO-RPADTEM) IN HAPO.
 5637   REF   6  LAST  517  23,2707  16343 1  STORHAPO  STODL   HAPOX
 5638   REF   1             23,2710  00017 1                    RPER
 5639                       23,2711  77625 0            DSU
 5640   REF   5  LAST  524  23,2712  02314 0                    RPADTEM      GIVES HPER AT (-29)M EARTH, (-27)M MOON
 5641   REF 229  LAST  490  23,2713  00161 1            STORE   MPAC +4      SAVE THIS FOR COMPARISON TO HPERMIN.
 5642                       23,2714  64414 1            BUFF    SR2R         NEED HPER AT (-29)M FOR DISPLAY.
A5643                                                                        IF MOON CENTERED, RESCALE FROM (-27)M
A5644                                                                        IF EARTH CENTERED ALREADY AT (-29)M.
 5645   REF   5  LAST  524  23,2715  04742 1                    V82EMFLG     OFF FOR EARTH,  ON FOR MOON.
 5646                       23,2716  46717 1                    +1
 5647                       23,2717  77624 1            CALL                 IF HPER > MAXNM, SET HPER = 9999.9 NM
 5648   REF   2  LAST  524  23,2720  46745 0                    MAXCHK
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GAP: ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971 MEDUSA 2055 PAGE 525

L        R30                                                                             USER'S PAGE NO. 10       E4 53

  5649    REF   5  LAST  292   23,2721   16345 1  STORHPER STODL  HPERX            STORE (RPER - RPADTEM) INTO HPERX.
  5650    REF 230  LAST  524   23,2722   00161 1                  MPAC +4
  5651                         23,2723   51025 1           DSU    BPL              HPERMIN AT (-29)M FOR EARTH, (-27)M MOON
  5652    REF   4  LAST  522   23,2724   02312 0                  HPERMIN          IF HPER L/   HPERMIN (300 OR 35)KFT,
  5653    REF   1              23,2725   46731 0                  DOTPER            THEN ZERO INTO -TPER.
  5654                         23,2726   52145 0           DLOAD  GOTO               OTHERWISE CALCULATE TPER.
  5655    REF   1              23,2727   15336 0                  HI6ZEROS
  5656    REF   1              23,2730   46735 1                  SKIPTPER
  5657                         23,2731   45145 0  DOTPER   DLOAD  CALL
  5658    REF   2  LAST  524   23,2732   00017 1                  RPER
  5659    REF   1              23,2733   57256 1                  CALCTPER
  5660                         23,2734   77676 0           DCOMP                   TPER IS PUT NEG INTO -TPER.
  5661    REF   7  LAST  520   23,2735   16337 1  SKIPTPER STODL  -TPER
  5662    REF   5  LAST  525   23,2736   02312 0                  HPERMIN          HPERMIN AT (-29)M FOR EARTH, (-27)M MOON
  5663                         23,2737   45015 1           DAD    CALL
  5664    REF   6  LAST  524   23,2740   02314 0                  RPADTEM          RPADTEM AT (-29)M FOR EARTH, (-27)M MOON
  5665    REF   1              23,2741   57261 0                  CALCTFF          GIVES 59M59S FOR TFF IF RPER G/
  5666                         23,2742   77676 0           DCOMP                     HPERMIN + RPADTEM. (TPER WAS NON ZERO)
  5667    REF  13  LAST  521   23,2743   36335 1           STCALL TFF              OTHERWISE COMPUTES TFF.          (GOTO)
  5668    REF   5  LAST  524   23,2744   00051 0                  S2

  5669                         23,2745   51025 1  MAXCHK   DSU    BPL              IF C(MPAC) > 9999.9 NM, MPAC = 9999.9 NM
  5670    REF   1              23,2746   06755 0                  MAXNM
  5671                         23,2747   46752 0                  +3               OTHERWISE C(MPAC) = B(MPAC).
  5672                         23,2750   43415 0           DAD    RVQ
  5673    REF   2  LAST  525   23,2751   06755 0                  MAXNM
  5674                         23,2752   43545 1  +3       DLOAD  RVQ              (USED BY P30 - P37 ALSO)
  5675    REF   3  LAST  525   23,2753   06755 0                  MAXNM

  5676                         23,2754   01065 0  MAXNM    2OCT   01065 05603
  5676                         23,2755   05603 1
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L         R30                                                                USER'S PAGE NO. 11        E4 53


*** END OF MEDUSA .035 ***
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L        P15                                                                                    USER'S PAGE NO.   1       E0 33

R0500    P15 TLI INITIATE/CUTOFF

R0505                   DISPLAYS N33 : TIME OF SIVB INJECTION SEQUENCE START (TB6)
R0510                   ESTABLISHES T6SET TO BE EXECUTED AT TB6 TIME
R0515                   SETS TLITIG = TB6 + 9:37.6
R0520                   DISPLAYS N14 : INERTIAL VELOCITY MAGNITUDE AT TLI C/O
R0525                   DISPLAYS N95 : TFI - TIME FROM TLITIG (DECREASING)
R0530                                  VG  - VELOCITY-TO-BE-GAINED
R0535                                  V   - INERTIAL VELOCITY MAGNITUDE
R0540                   T6SET : SETS THE SIVB INJECTION SEQUENCE START BIT,
R0545                   ESTABLISHES T6RESET (DT = 10 SECS), AND
R0550                   TURNS ON THE UPLINK ACTIVITY LIGHT
R0555                   T6RESET : CLEARS THE SIVB I.S.S. BIT AND
R0560                   TURNS OFF THE UPLINK ACTIVITY LIGHT
R0565                   P40S/SV : CALLS MIDTOAV1 TO INTEGRATE THE CSM
R0570                   STATE VECTOR TO TLITIG - 100 AND
R0575                   ESTABLISHES TIGBLNK AT TLITIG - 105
R0580                   TIGBLNK : BLANKS THE DSKY FOR 5 SECS AND
R0585                   ESTABLISHES TIGAVEG FOR TLITIG - 100
R0590                   TIGAVEG : STARTS READACCS AND REDISPLAYS
R0595                   N95 (VG AND V NOW DYNAMIC)
R0600                   SIVBCOMP : UPDATES VG AND V AND
R0605                   AFTER TLITIG + 10 CALCULATES TGO AND
R0610                   CHANGES THE N95 R1 DISPLAY TO TFC
R0615                   WHEN TGO < 4 SECS, SIVBCOMP ESTABLISHES SIVBOFF (DT = TGO)
R0620                   SIVBOFF : SHUTS DOWN THE SIVB AND CALLS POSTTLI
R0625                   POSTTLI : FLASHES N95 TO INDICATE TLI IS COMPLETED
R0630                   P15 EXITS VIA GOTOPOOH
  0900   REF   1                   33,2000                        SETLOC P15LOC1
  0901                             33,3455                        BANK
  0902   REF   1                                                  COUNT* $3/P15
  1000   REF  29  LAST  514        E7,1412                        EBANK= TIG
  1001   REF   2  LAST  513        33,3455  3 5026 0   P15JOB     CAF    V06N33                 DISPLAY TB6 TIME
  10012  REF   9  LAST  484        33,3456  0 5535 1              TC     VNFLASH
  10014  REF  66  LAST  521        33,3457  0 6006 1              TC     INTPRET
  10015                            33,3460   43345 1              DLOAD  DAD
  10016  REF  30  LAST  527        33,3461   03413 1                     TIG
  10017  REF   1                   33,3462   27533 1                     TLIDT
  10018  REF   1                   33,3463   03464 1              STORE  TLITMP
  1002                             33,3464   44234 1              RTB    BDSU
  1003   REF   9  LAST  519        33,3465   51751 0                     LOADTIME
  1004   REF  31  LAST  527        33,3466   03413 1                     TIG
  1005   REF  10  LAST  234        33,3467   03673 0              STORE  P40TMP                 TIG-TIME2
  1006                             33,3470   77776 1              EXIT                          .TO P40TMP
  1007   REF 231  LAST  525        33,3471  52 155 1              DXCH   MPAC                   ..AND A,L
  1008   REF   2  LAST  428        33,3472  0 5332 0              TC     LONGCALL
  1009   REF  11  LAST  527        E7,1672                        EBANK= P40TMP
  1010   REF   3  LAST  232        33,3473   02311 0              2CADR  T6SET
  1010                             33,3474   40067 1
  1011   REF   3  LAST  435        33,3475  0 5362 0              TC     2PHSCHNG
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 1012                          33,3476   00153 0              OCT      00153          A,3.15=T6SET IN P40TMP CSEC
 1013                          33,3477   24024 1              OCT      24024          C,JOB BELOW,LONGBASE FOR A ABOVE
 10135  REF   1                01,2077            3P15SPT1 =        3.15SPOT
 1014                          33,3500  0 0006 1              EXTEND
 1015   REF   2  LAST  527     33,3501  3 1464 0              DCA      TLITMP
 1016   REF  32  LAST  527     33,3502  53'413 1              DXCH     TIG            TLITIG = TB6 + 9:37.6
 1017   REF   1                33,3503  3 3536 1  DISP14      CAF      V06N14         DISPLAY V AT TLI C/O
 1018   REF  10  LAST  527     33,3504  0 5535 1              TC       VNFLASH
 1019   REF  67  LAST  527     33,3505  0 6006 1              TC       INTPRET
 1020                          33,3506   51575 1              VLOAD    ABVAL
 1021   REF   1                33,3507   01563 0                       VRECTCSM       M/CS B+7
 1022   REF   2  LAST  295     33,3510   03723 1              STORE    VNOW
 1023                          33,3511   43021 0              BDSU     SET
 1024   REF   2  LAST  283     33,3512   02356 0                       VC/0              B+7
 1025   REF   2  LAST  486     33,3513   03464 1                       TIMRFLAG       ENABLE CLOKTASK
 1026   REF   3  LAST  295     33,3514   17725 1              STODL    VGTLI          VGTLI = VC/0 - |VRECTCSM| B+7
 1027   REF   1                33,3515   27535 1                       S4BCOMP
 1028   REF   3  LAST   79     33,3516   01062 1              STORE    AVEGEXIT       SET AVERAGEG EXIT TO SIVBCOMP
 1029                          33,3517   77776 1              EXIT
 1030   REF   1                33,3520  3 3537 0              CAF      V06N95
 10301  REF   1                33,3521  54 777 1              TS       NVWORD1        ENABLE CLOCKJOB
 10302  REF  55  LAST  456     33,3522  3 4770 0  CLOKNOW     CAF      ONE
 10303  REF  13  LAST  520     33,3523  0 5233 0              TC       WAITLIST
 10304  REF  33  LAST  528     E7,1412                        EBANK=   TIG
 10305  REF   3  LAST  236     33,3524   03225 1              2CADR    CLOKTASK
 10305                         33,3525   50067 0
 10306  REF   4  LAST  527     33,3526  0 5362 0              TC       2PHSCHNG
 10307                         33,3527   40036 0              OCT      40036          6.3SPOT FOR CLOKTASK
 10308                         33,3530   00004 0              OCT      00004          KILL GROUP 4
 103085 REF   2  LAST  230     01,2325            6P3SPT4     =        6.3SPOT
 10309  REF  52  LAST  519     33,3531  1 5205 1              TCF      ENDOFJOB

 10314                         33,3532   00003 1  TLIDT       2DEC     57760          9 MIN 37.6 SEC (TB6 + TLIDT = TLITIG)
 10314                         33,3533   20640 1
 10316  REF  34  LAST  528     E7,1412                        EBANK=   TIG
 10317  REF   1                33,3534   03540 0  S4BCOMP     2CADR    SIVBCOMP
 10317  REF   1                33,3535   66067 0
 10318                         33,3536   01416 0  V06N14      VN       0614
 10319                         33,3537   01537 1  V06N95      VN       0695


 1032   REF   1                20,2000                        SETLOC   P15LOC
 10322                         20,2311                        BANK
 10324  REF  35  LAST  528     E7,1412                        EBANK=   TIG
 10326  REF   1                                               COUNT*   $$/P15
 1033                          20,2311  0 0006 1  T6SET       EXTEND
 10335  REF  14  LAST  420     20,2312  3 0025 0              DCA      TIME2
 1034   REF   5  LAST  183     20,2313  53'022 1              DXCH     TEVENT
 1035   REF   1                20,2314  3 2330 0              CAF      10SEC          T6RESET IN 10 SEC.
 1036   REF   7  LAST  437     20,2315  0 5223 1              TC       TWIDDLE
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L        P15                                                                                          USER'S PAGE NO.  3     E7 S3

  1037   REF  2  LAST  231   20,2316   02331 1             ADRES   T6RESET
  1038   REF 29  LAST  515   20,2317  0 5402 1             TC      PHASCHNG
  1039                       20,2320   40023 1             OCT     40023          A,3.2=T6CHNSET IMMED.,
A 1040                                                                                T6RESET IN 10 SEC,TBASE NOW

  10405  REF  3  LAST  230   01,2052                3P2SPT1   =       3.2SPOT
  1041   REF 22  LAST  351   20,2321  3 4754 0      T6CHNSET CAF     BIT13
  1042                       20,2322  0 0006 1               EXTEND                 SIVB INJECTION
  1043   REF 28  LAST  391   20,2323  05 012 1               WOR     CHAN12          SEQUENCE START
  1044   REF 22  LAST  386   20,2324  3 4766 1               CAF     BIT3
  1045                       20,2325  0 0006 1               EXTEND
  10455  REF 17  LAST  392   20,2326  05 011 1               WOR     DSALMOUT       UPLINK ACTIV. ON
  1046   REF 22  LAST  520   20,2327  0 5314 1               TC      TASKOVER

  10465                      20,2330   01750 1      10SEC    DEC     1000

  1047   REF 23  LAST  529   20,2331  4 4754 1      T6RESET  CS      BIT13          PROTECTED BY GROUP 3
  1048                       20,2332  0 0006 1               EXTEND                 CLEAR SIVB ISS
  1049   REF 29  LAST  529   20,2333  03 012 1               WAND    CHAN12
  1050   REF 23  LAST  529   20,2334  4 4766 0               CS      BIT3           TURN OFF UPLINK ACTIVITY
  1051                       20,2335  0 0006 1               EXTEND
  1052   REF 18  LAST  529   20,2336  03 011 1               WAND    DSALMOUT
  1053   REF  5  LAST  528   20,2337  0 5362 0               TC      2PHSCHNG
  1054                       20,2340   00003 1               OCT     00003          KILL GROUP 3
  1055                       20,2341   05014 1               OCT     05014
  1056                       20,2342   77777 0               DEC     -0             GROUP 4 CONTINUES BELOW
  1057                       20,2343  0 0006 1      P15INTEG EXTEND
  1058   REF  1              20,2344  3 2354 1               DCA     100SEC
  1059   REF  3  LAST  234   20,2345  53'460 0               DXCH    AVEGDT         START AVERAGEG AT TIG - 100.00
  1060   REF  2  LAST  194   20,2346  3 4664 1               CAF     PRIO12
  1061   REF 23  LAST  521   20,2347  0 5135 0               TC      FINDVAC
  1062   REF 36  LAST  528   E7,1412                         EBANK=  TIG
  1063   REF  2  LAST  233   20,2350   02523 1               2CADR   P40S/SV        COMMON CODE IN P40
  1063                       20,2351   50067 0
  1064   REF 23  LAST  529   20,2352  1 5314 0               TCF     TASKOVER

  1065                       20,2353   00000 1      100SEC   2DEC    10000
  1065                       20,2354   23420 0
```

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P1066     SIVB SHUTDOWN COMPUTATIONS

R1067     CALLED VIA AVEGEXIT EVERY 2 SECS STARTING AT TLITIG - 100
R1068                VG AND V (N95) ARE ALWAYS UPDATED
R1069                TGO CALCULATIONS FOR TLI SHUTDOWN AND TTOGO (N95)
R1070                ARE ENABLED (STEERSW = 1) AT TLITIG + 10
  1071    REF   2  LAST  527    33,2000                          SETLOC P15LOC1
  1072                          33,3540                          BANK
  1073    REF  37  LAST  529    E7,1412                          EBANK= TIG
  10735   REF   2 LAST  527 TO  528:      51      51*            COUNT* $$/P15
  1074    REF  68  LAST  528    33,3540  0 6006 1  SIVBCOMP TC     INTPRET
  1075                          33,3541   45345 1           DLOAD  DSU
  1076    REF   8  LAST  295    33,3542   03661 0                  TTOGO
  1077    REF   1               33,3543   27667 0                  TENSEC       TFI > +10 ? (TFC CAN NEVER EXCEED +2)
  1078                          33,3544   43040 1           BMN    SET          YES, SET STEERSW TO ENABLE TGO CALC
  1079                          33,3545   67547 0                  +2           NO
  1080    REF   1               33,3546   01064 1                  STEERSW
  1081                          33,3547   77624 1           CALL
  1082    REF   1               33,3550   70537 1                  S11.1        VMAG, HDOT, AND H FOR N62
  1083                          33,3551   44345 0           DLOAD  BDSU
  1084    REF   3  LAST  528    33,3552   03723 1                  VNOW         VMAG       M/CS B+7 FOR N95
  1085    REF   3  LAST  528    33,3553   02356 0                  VC/O         VMAG(C/O) M/CS B+7
  1086    REF   4  LAST  528    33,3554   17725 1           STODL  VGTLI        VG = VC/O - VNOW FOR N95
  1087    REF   4  LAST  530    33,3555   03723 1                  VNOW
  1088                          33,3556   45214 1           BOFF   DSU
  1089    REF   2  LAST  530    33,3557   01344 0                  STEERSW
  1090    REF   1               33,3560   67605 0                  SETVPAST     STEERSW = 0, EXIT
  1091    REF   2  LAST  128    33,3561   03462 1                  VPAST        MPAC = VNOW - VPAST (DV FOR LAST 2 SECS)
  1092                          33,3562   41440 1           BMN    PUSH         00D = DV FOR LAST 2 SECS
  1093    REF   2  LAST  530    33,3563   67605 0                  SETVPAST     DV NEGATIVE, EXIT
  1094                          33,3564   54345 1           DLOAD  SR
  1095    REF   5  LAST  530    33,3565   03725 1                  VGTLI        B+7
  1096                          33,3566   20612 0                  09D          SR9 NOW B+16
  1097                          33,3567   77671 1           DDV                 B+16 / B+7 NOW B+9
  1098                          33,3570   41200 0           BOV    DMP
  1099    REF   3  LAST  530    33,3571   67605 0                  SETVPAST     OVERFLOW, EXIT
  1100    REF   1               33,3572   27671 1                  200B+19      B+9 X B+19 NOW B+28
  1101                          33,3573   67206 1           PUSH   SLOAD        00D = TGO WITHOUT TAILOFF EFFECTS
  1102    REF   2  LAST   96    33,3574   02355 0                  DTF          TLI TAILOFF CONSTANT B+14
  1103                          33,3575   44261 1           SR     BDSU         COMPENSATE FOR TAILOFF
  1104                          33,3576   20617 0                  14D          B+28
  1105                          33,3577   43206 1           PUSH   DAD          00D = COMPENSATED TGO
  1106    REF   5  LAST  512    33,3600   01044 0                  PIPTIME
  1107    REF  38  LAST  530    33,3601   17413 1           STODL  TIG          FOR CLOKTASK (N95)
  1108                          33,3602   50025 0           DSU    BMN          TGO FROM 00D
  1109    REF   1               33,3603   27665 1                  4SEC         TGO < 4 SECS ?
  1110    REF   1               33,3604   67611 0                  KILLSIVB     YES : SET UP SIVB SHUTDOWN
  1111                          33,3605   77745 1  SETVPAST DLOAD
  1112    REF   5  LAST  530    33,3606   03723 1                  VNOW
  1113    REF   3  LAST  530    33,3607   37462 0           STCALL VPAST        VPAST = VNOW
```

```
 1114   REF   1                 33,3610   51603 0                  SERVXT1        ** NO RETURN ** SAME AS GOTO SERVXT1

 1115   REF  39  LAST  530      E7,1412                           EBANK= TIG
 1116                           33,3611   77776 1   KILLSIVB EXIT
 1117                           33,3612  0 0004 0            INHINT
 1118                           33,3613  0 0006 1            EXTEND
 1119   REF  40  LAST  531      33,3614  3 1413 0            DCA     TIG
 1120  *REF 232  LAST  527      33,3615  52 155 1            DXCH    MPAC
 1121                           33,3616  0 0006 1            EXTEND
 1122   REF  15  LAST  528      33,3617  4 0025 1            DCS     TIME2
 1123  *REF 233  LAST  531      33,3620  20 155 1            DAS     MPAC
 11235 *REF   4  LAST  363      33,3621  0 7224 1            TCR     DPAGREE
 1124  *REF 234  LAST  531      33,3622  30 155 0            CAE     MPAC +1        DT TO C/O = TIG - TIME2 (< 4 SECS TO GO)
A1125                                                                                            PIPTIME + TGO - TIME2
 1126                           33,3623  0 0006 1            EXTEND                 DT <= 0 ?
 1127                           33,3624  6 3626 0            BZMF    +2             YES
 1128  *                        33,3625  1 3627 0            TCF     +2             NO
 1129   REF  56  LAST  528      33,3626  3 4770 0            CAF     ONE
 1130   REF   4  LAST  529      33,3627  55'460 0            TS      AVEGDT +1
 1131   REF   8  LAST  528      33,3630  0 5223 1            TC      TWIDDLE
 1132   REF   2  LAST  234      33,3631   03637 0            ADRES   SIVBOFF
 1133   REF   6  LAST  529      33,3632  0 5362 0            TC      2PHSCHNG
 1134                           33,3633   40614 0            OCT     40614          4.61 SIVBOFF IN (AVEGDT+1) CS
 1135                           33,3634   10035 0            OCT     10035

 11352  REF   1                 01,2231             4P61SPT1 =       4.61SPOT
 11354  REF   2  LAST  230      01,2250             5P3SPT16 =       5.3SPOT
 1136   REF  37  LAST  453      33,3635  0 4655 0            TC      POSTJUMP
 1137   REF   1                 33,3636   51134 0            CADR    CLEARSTR

 1138   REF   4  LAST  242      E7,1777                      EBANK=  WHOCARES
 1139   REF  29  LAST  388      33,3637  3 4753 1   SIVBOFF  CAF     BIT14
 1140                           33,3640  0 0006 1            EXTEND
 1141   REF  30  LAST  529      33,3641  05 012 1            WOR     CHAN12         SHUTDOWN THE SIVB
 1142                           33,3642  0 0006 1            EXTEND
 1143   REF  16  LAST  531      33,3643  3 0025 0            DCA     TIME2
 1144   REF   6  LAST  528      33,3644  53'022 1            DXCH    TEVENT         SET TEVENT
 1145   REF   1                 33,3645  0 5255 0            TC      FIXDELAY
 1146                           33,3646   00372 1            DEC     250            DELAY 2.5 SECS
 1147   REF 109  LAST  520      33,3647  3 4772 1            CAF     ZERO
 1148   REF   2  LAST  528      33,3650  54 777 1            TS      NVWORD1        ZERO NVWORD1 IN CASE CLOCKJOB WAITING
 1149   REF   1                 33,3651  4 4756 0            CS      TIMRBIT
 1150   REF   2  LAST  210      33,3652  7 0103 1            MASK    FLAGWRD7
 1151   REF   3  LAST  531      33,3653  54 103 1            TS      FLAGWRD7       DISABLE CLOCKTASK
 1152   REF  30  LAST  529      33,3654  0 5402 1            TC      PHASCHNG
 1153                           33,3655   05014 1            OCT     05014
 1154                           33,3656   77777 0            DEC     -0             START BELOW
 1155   REF   3  LAST  529      33,3657  3 4664 1            CAF     PRIO12
 1156   REF   9  LAST  520      33,3660  0 5121 0            TC      NOVAC
 1157   REF   5  LAST  531   E7,1777                       EBANK= WHOCARES
 1158   REF   1              33,3661   02012 0             2CADR  POSTTLI
 1158   REF   1              33,3662   74067 0
 1159   REF  24  LAST  529   33,3663  0 5314 1             TC     TASKOVER

 1160                        33,3664   00000 1  4SEC       2DEC   400
 1160                        33,3665   00620 0
 1161                        33,3666   00000 1  TENSEC     2DEC   1000
 1161                        33,3667   01750 1
 1162                        33,3670   00006 1  200B+19    2DEC   200 B-19
 1162                        33,3671   10000 0


 1163   REF   1              36,2000                       SETLOC P15LOC2
 1164                        36,2012                       BANK
 1165   REF   6  LAST  532   E7,1777                       EBANK= WHOCARES

 11655  REF   1                                            COUNT* $$/P15
 1166   REF   1              36,2012  3 2015 1  POSTTLI    CAF    V16N95
 1167   REF  11  LAST  528   36,2013  0 5535 1             TC     VNFLASH
 1169   REF  15  LAST  515   36,2014  1 4103 0             TCF    GOTOPOOH


 1170                        36,2015   04137 0  V16N95     VN     1695
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R0001   EARTH ORBIT INSERTION MONITOR PROGRAM
R0002   *************************************

R0003   PROGRAM DESCRIPTION -P11-

R0004       MOD NO. 1
R0005       MOD BY ELIASSEN

R0006   FUNCTIONAL DESCRIPTION

R0007       P11 IS INITIATED BY

R0008             A) GYROCOMPASS PRG P02 WHEN LIFTOFF DISCRETE IS RECEIVED OR
R0009             B) BACKUP THRU VERB 75 ENTER

R0010       PROGRAM WILL
R0011            1. ZERO CMC CLOCK AT LIFTOFF (OR UPON RECEIPT OF BACKUP)
R0012            2. UPDATE TEPHEM TO TIME CMC CLOCK WAS ZEROED
R0013            3. INITIATE SERVICER AT PREREAD1
R0014            4. CHANGE MAJOR MODE TO 11
R0015            5. CLEAR DSKY IN CASE OF V 75
R0016            6. STORE LIFTOFF IMU-CDU ANGLES FOR ATT. ERROR DISPLAY
R0017            7. TERMINATE GYROCOMPASSING -   -
R0018            8. COMPUTE INITIAL VECTORS  RN, VN                -  -  -
R0019            9. COMPUTE REFSMMAT FOR PRELAUNCH ALIGNMENT WHERE U ,U ,U  ARE
R0020                   -        -                                  X  Y  Z
R0021                   U =UNIT(-R) LOCAL VERTICAL AT TIME OF LIFTOFF
R0022                    Z
R0023                   -        -   -
R0024                   U =UNIT (A), A=HOR VECTOR AT LAUNCH AZIMUTH
R0025                    X
R0026                   -  -   -
R0027                   U =U * U
R0028                    U  Z   X

R0029           10. SET REFSMMAT KNOWN FLAG
R0030           11. SET AVGEXIT IN SERVICER TO VHHDOT TO
R0031               COMPUTE AND DISPLAY NOUN 62 EVERY 2 SECONDS

R0032               R1  V1   - INTERTIAL VELOCITY MAGNITUDE IN FPS
R0033               R2  HDOT - RATE OF CHANGE OF VEHICLE VEL IN FPS
R0034               R3  H    - VEHICLE ALTITUDE ABOVE PAD IN NM

R0035           12. DISPLAY BODY AXES ATT. ERRORS ON FDAI NEEDLES

R0036               A) FROM L.O. TO RPSTART (APPROX. 0 TO +10SECS AFTER L.O.)
R0037                  DESIRED ATTITUDE IS AS STORED AT L.O.
R0038               B) FROM RPSTART TO POLYSTOP(APPROX.+10 TO +133SECS AFTER LO)
R0039                  DESIRED ATTITUDE IS SPECIFIED BY CMC PITCH AND ROLL
R0040                  POLYMOMIALS  DURING SATURN ROLLOUT AND PITCHOVER
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R0041                 THE DISPLAY IS RUN AS LOW PRIORITY JOB APPROX.
R0042                 EVERY 1/2 SEC OR LESS AND IS DISABLED UPON OVFLO OF TIME1

R0057    SUBROUTINES CALLED

R0058              2PHSCHNG  BANKCALL  CALCGRA   CDUTRIG   CLEANDSP  DANZIG
R00581             DELAYJOB  EARTHR    ENDOFJOB  FINDVAC   IBNKCALL
R00582             INTPRET   LALOTORV  NEEDLER   NEWMODEX  PHASCHNG
R0059              POSTJUMP  POWRSERS  PREREAD1  REGODSPR  S11.1
R00591             SERVEXIT  TASKOVER  TCDANZIG  V1ST025   WAITLIST

R0060    ASTRONAUT REQUESTS (IF ALTITUDE ABOVE 300,000 FT)

R0061        DSKY -
R0062             MONITOR DISPLAY OF TIME TO PERICEE R1 HOURS
R0063                                                R2 MINUTES

R0064        DSKY -
R0065             MONITOR DISPLAY OF R1 APOGEE ALTITUDE IN NAUTICAL MILES
R0066                                R2 PERIGEE ALTITUDE IN NAUTICAL MILES
R0067                                R3 TFF IN MINUTES/SECS

R0068        IF ASTRONAUT HAS REQUESTED ANY OF THESE DISPLAYS HE MUST
R0069    HIT PROCEED TO RETURN TO NORMAL NOUN 62 DISPLAY
R0070    NORMAL EXIT MODE

R0071        ASTRONAUT  VERB 37 ENTER 00 ENTER

R0072    ALARM MODES - NONE

R00721   ABORT EXIT MODES -

R0073    OUTPUT

R0074        TLIFTOFF (DP)  TEPHEM (TP)
R0075        REFSMMAT
R0076        DSKY DISPLAY
R0077        FDAI DISPLAY

R0078    ERASABLE INITIALIZATION

R0079        AZ0, AX0, -AY0
R0080        LATITUDE
R0081        PADLONG
R0082        TEPHEM
R0083        PGNCSALT
R0084        POLYNUM THRU POLYNUM +14D)
R00841       RPSTART
R00842       POLYSTOP
R0085    FLAGS SET OR RESET
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L        P11                                                                                      USER'S PAGE NO.  3       E0 53

R0086         SET REFSMFLG
R0087         SET DVMON IDLE FLAG
R0088         CLEAR ERADFLAG

R0089    DEBRIS

R0090         LIFTTEMP
R0091         POLYNUM THRU POLYNUM +7
R0092         SPOLYARG
R0093         BODY1, BODY2, BODY3
R0094         VMAG2, ALTI, HDOT
R0095         CENTRALS, CORE SET AND VAC AREAS
  0097   REF   1                  5010               BITS5-6   =       SUPER011
  0099   REF   1               34,2000                         SETLOC  P11ONE
  0100                         34,2000                         BANK

  01005  REF   1                                               COUNT*  $$/P11
  0101   REF   5  LAST  236    E3,1706                         EBANK=  TEPHEM
  0102   REF   4  LAST  223    34,2000  3 5024 1  P11          CA      EBANK3
  0103   REF  14  LAST  517    34,2001  54 003 0               TS      EBANK

  0104                         34,2002  0 0006 1               EXTEND
  0105   REF   1               34,2003  3 2274 1               DCA     REP11S           DIRECT RESTARTS TO REP11
  0106   REF   2  LAST  196    34,2004  53'162 1               DXCH    -PHASE3
  010605 REF   1               01,2071            3P11SPT1 =       3.11SPOT
  01061  REF 110  LAST  531    34,2005  4 4772 0               CS      ZERO
  01062                        34,2006  22 007 0               ZL
  0107   REF   2  LAST   80    34,2007  55'126 1               TS      LIFTTEMP
  0108   REF   2  LAST  197    34,2010  53'166 0               DXCH    -PHASE5          INACTIVE GROUP 5, PRELAUNCH PROTECTION
  0111                         34,2011  0 0006 1  P11+7        EXTEND
  0112   REF   1               34,2012  3 2276 0               DCA     REP11SA
  0113   REF   1               34,2013  53'022 1               DXCH    TLIFTOFF

  0114                         34,2014  0 0006 1               EXTEND
  0115   REF  17  LAST  531    34,2015  3 0025 0  ZRUCLOCK DCA     TIME2
  0116   REF   3  LAST  536    34,2016  53'127 0               DXCH    LIFTTEMP         FOR RESTARTS

  0117   REF 111  LAST  536    34,2017  3 4772 1    -5         CAF     ZERO
  0118                         34,2020  22 007 0               ZL
  0119   REF  18  LAST  536    34,2021  52 025 1               DXCH    TIME2
  0120   REF   2  LAST  536    34,2022  53'022 1  REP11A-2 DXCH    TLIFTOFF
  0121   REF   3  LAST  536    34,2023  53'162 1  REP11A-1 DXCH    -PHASE3          RESET PHASE

  01215  REF   1               01,2074            3P13SPT1 =       3.13SPOT
  0122                         34,2024  0 0004 0  REP11A       INHINT
  0123                         34,2025  0 0006 1               EXTEND
  0124   REF   6  LAST  536    34,2026  3 1710 0               DCA     TEPHEM  +1
  0125   REF   3  LAST   80    34,2027  53'132 1               DXCH    TEPHEM1 +1
  0126   REF   7  LAST  536    34,2030  3 1706 1               CA      TEPHEM
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L        P11                                                                                USER'S PAGE NO.   4       E3 S3

0127   REF   4  LAST  536   34,2031  57'130 1           XCH      TEPHEM1

0128                        34,2032  0 0006 1           EXTEND
0129   REF   3  LAST  536   34,2033  3 1022 0           DCA      TLIFTOFF
0130   REF   5  LAST  537   34,2034  21'132 1           DAS      TEPHEM1 +1
0131   REF   6  LAST  537   34,2035  27'130 0           ADS      TEPHEM1          CORRECTOFOR OVERFLOW

0132   REF  31  LAST  531   34,2036  0 5402 1           TC       PHASCHNG
0133                        34,2037   05023 0           OCT      05023
0134                        34,2040   22000 1           OCT      22000

0135                        34,2041  0 0004 0           INHINT
0136                        34,2042  0 0006 1           EXTEND
0137   REF   7  LAST  537   34,2043  3 1131 0           DCA      TEPHEM1
0138   REF   8  LAST  536   34,2044  53'707 1           DXCH     TEPHEM
0139   REF   8  LAST  537   34,2045  3 1132 0           CA       TEPHEM1 +2
0140   REF   9  LAST  537   34,2046  57'710 0           XCH      TEPHEM  +2

0141   REF   2  LAST  217   34,2047  3 5046 0           CAF      EBANK7
0142   REF  15  LAST  536   34,2050  54 003 0           TS       EBANK
01421  REF   7  LAST  294   E7,1425                     EBANK=   DVTOTAL
0143   REF  19  LAST  422   34,2051  0 4714 1           TC       IBNKCALL
0144   REF   1              34,2052   76630 0           CADR     PREREAD1         ZERO PIPS AND INITIALIZE AVERAGEG

0145   REF  32  LAST  537   34,2053  0 5402 1           TC       PHASCHNG
0146                        34,2054   05023 0           OCT      05023            CONTINUE HERE ON RESTART
0147                        34,2055   22000 1           OCT      22000

0148   REF   4  LAST  448   34,2056  3 5011 1           CAF      .5SEC            START ATT ERROR DISPLAY
0150   REF  14  LAST  528   34,2057  0 5233 0           TC       WAITLIST         IN .5 SEC
0151   REF   4  LAST  262   E6,1704                     EBANK=   SPOLYARG
0152   REF   2  LAST  234   34,2060   02315 1           2CADR    ATERTASK
0152                        34,2061   70066 0

0153   REF   4  LAST  451   34,2062  0 5344 1           TC       NEWMODEX         DISPLAY MM 11
0154                        34,2063   00013 0           MM       11

01541  REF  31  LAST  486   34,2064  0 5547 1           TC       UPFLAG
01542  REF   1              34,2065   00022 1           ADRES    NODOP01

01543  REF   1              34,2066  3 6214 0           CA       POWONCOD         SWITCH TO POWERED FLIGHT DOWNLIST
01545  REF   6  LAST  212   34,2067  54 332 1           TS       DNLSTCOD

0155   REF 101  LAST  522   34,2070  0 4636 0           TC       BANKCALL
0156   REF   2  LAST  453   34,2071   20715 0           CADR     CLEANDSP         CLEAR DSKY IN CASE OF V75

0157   REF   7  LAST  531   34,2072  0 5362 0           TC       2PHSCHNG
0158                        34,2073   40514 0           OCT      40514            PROTECT ATERTASK
0159                        34,2074   00073 0           OCT      00073
01592  REF   1              01,2066          3P7SPT1    =        3.7SPOT
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L        P11

01594  REF   1                  01,2215                4P51SPT1 =      4.51SPOT
0160   REF   2  LAST  255       34,2075   3 5043 0              CAF    EBANK5
0161   REF  16  LAST  537       34,2076  54 0003 0              TS     EBANK

01611  REF   3  LAST  432       E5,1426                         EBANK= QPLACES
016111 REF   1                  34,2077   3 2277 1              CA     P11XIT           SET EXIT FROM PROUT IN EARTHR
016112 REF   4  LAST  538       34,2100  55'426 1               TS     QPLACES
0162   REF  69  LAST  530       34,2101   0 6006 1              TC     INTPRET
0163                            34,2102   64375 1               VLOAD  MXV
0164   REF   2  LAST  103       34,2103   02467 0                      THETAN
0165   REF  24  LAST  450       34,2104   02672 0                      XSM
0166                            34,2105   53372 1               VSL1   VAD
0167   REF   3  LAST  448       34,2106   02650 0                      ERCOMP
0168   REF   4  LAST  538       34,2107   16650 0               STODL  ERCOMP
0169   REF   4  LAST  537       34,2110   01022 0                      TLIFTOFF
0170                            34,2111   52131 0               SSP    GOTO
0171   REF   6  LAST  525       34,2112   00052 0                      S2
0172   REF   1                  34,2113   66202 1               CADR   PROUT            RETURN FROM EARTHR
0173   REF   2  LAST  431       34,2114   66151 1                      EARTHR +3
01731                           34,2115  22 0007 0     MATRXJOB ZL                      STORE OP GIMBAL ANGLES FOR ATTITUDE
01732  REF  10  LAST  442       34,2116   3 0032 0              CA     CDUX                   ERROR DISPLAY AFTER LIFTOFF
01733  REF  14  LAST  451       34,2117  53'760 0               DXCH   OGC
01734                           34,2120  22 0007 0              ZL
01735  REF   4  LAST  423       34,2121   3 0033 1              CA     CDUY
01736  REF   4  LAST  184       34,2122  53'762 1               DXCH   IGC
01737                           34,2123  22 0007 0              ZL
01738  REF   8  LAST  423       34,2124   3 0034 0              CA     CDUZ
01739  REF   3  LAST  184       34,2125  53'764 1               DXCH   MGC
0174   REF  70  LAST  538       34,2126   0 6006 1              TC     INTPRET            -
017403                          34,2127   74575 0               VLOAD  VSR1             SCALE OGC  B-1
017405 REF  15  LAST  538       34,2130   02760 1                      OGC
017407 REF  16  LAST  538       34,2131   02760 1               STORE  OGC
01741                           34,2132   77731 1               SSP                     ZERO RTX2
01742  REF  10  LAST  503       34,2133   03747 0                      RTX2             FOR
01743                           34,2134   00000 1                      0                EARTH
0175                            34,2135   65345 0               DLOAD  PODL
0176   REF   2  LAST   80       34,2136   01134 0                      PGNCSALT         ALTITUDE OF PGNCS
0177   REF   1                  34,2137   01136 1                      PADLONG          LONGITUDE
0178                            34,2140   55525 0               PODL   VDEF
0179   REF   3  LAST  431       34,2141   02403 1                      LATITUDE         GEODETIC LATITUDE
0180   REF   7  LAST  293       34,2142   14747 0               STODL  LAT              LAT,LONG,ALT ARE CONSECUTIVE
0181   REF   2  LAST  525       34,2143   15336 0                      HI6ZEROS         TIME = 0
0182                            34,2144   45014 0               CLEAR  CALL
0183   REF   3  LAST  459       34,2145   00662 0                      ERADFLAG
0184   REF   1                  34,2146   26524 0                      LALOTORV         CONVERT TO POSITION VECTOR IN REF.COORDS
                                                                                              -
0185   REF   2  LAST   79       34,2147   35071 1               STCALL RN1
01851  REF   1                  34,2150   70331 1                      GETDOWN          RETURN WITH VECTOR FOR DOWN DIRECTION
01852                           34,2151   53476 1               VCOMP  UNIT
01853  REF   6  LAST  508       34,2152   25750 1               STOVL  REFSMMAT +12D    UNITZ = UNIT(GRAV)
```

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01854   REF  3  LAST 538   34,2153    01071 0                    RN1
0186                       34,2154    74235 0            VXV     VXSC
0187    REF  5  LAST 305   34,2155    01712 1                    UNITW             SCALED AT 1
0188    REF  1             34,2156    30301 0                    -ERTHRAT          V = EARTHRATE X R
0189                       34,2157    77712 0            VSL4                      SCALE TO 2(7) M/CS
0190    REF  2  LAST  79   34,2160    25077 0            STOVL   VN1
0191    REF  7  LAST 538   34,2161    01750 1                    REFSMMAT +12D
0209                       34,2162    53435 0            VXV     UNIT
0210    REF  6  LAST 539   34,2163    01712 1                    UNITW             (REF3 X UNITW) = EAST
0211                       34,2164    47206 0            PUSH    VXV
0212    REF  8  LAST 539   34,2165    01750 1                    REFSMMAT +12D      (EAST X REF3) = -SOUTH
0213                       34,2166    65256 0            UNIT    PDDL
0214    REF  5  LAST 453   34,2167    02634 1                    LAUNCHAZ           COS(AZ)*SOUTH
0215                       34,2170    74346 0            COS     VXSC
0216                       34,2171    77626 0            STADR
0217    REF  9  LAST 539   34,2172    62043 1            STODL   REFSMMAT          TEMPORARY STORAGE
0218    REF  6  LAST 539   34,2173    02634 1                    LAUNCHAZ
0219                       34,2174    74356 1            SIN     VXSC               SIN(AZ)*EAST
0220                       34,2175    53455 0            VAD     UNIT               SIN(AZ)*EAST - COS(AZ)*SOUTH = REF1
0221    REF 10  LAST 539   34,2176    01734 0                    REFSMMAT
0222    REF 11  LAST 539   34,2177    01734 0            STORE   REFSMMAT

0223                       34,2200    53435 0            VXV     UNIT               (REF1 X REF3) = -REF3
0224    REF 12  LAST 539   34,2201    01750 1                    REFSMMAT +12D
0225                       34,2202    77676 0            VCOMP
0226    REF 13  LAST 539   34,2203    01742 1            STORE   REFSMMAT +6
02261                      34,2204    45345 1  TRNVNREF  DLOAD   DSU
02262   REF 13  LAST 475   34,2205    15334 1                    DPHALF            1/2 REV
02263   REF  7  LAST 539   34,2206    02634 1                    LAUNCHAZ
02264                      34,2207    65215 1            DAD     PDDL
02265   REF  3  LAST 427   34,2210    02401 0                    AZIMUTH
02266   REF  2  LAST 118   34,2211    03301 0                    SATRLRT           SET  SATRLRT = -SATRLRT IF
02267                      34,2212    45565 0            SIGN    STADR             (1/2REV -LAVNCHAZ +AZIMUTH) IS NEGATIVE
02268   REF  3  LAST 539   34,2213    74476 1            STORE   SATRLRT           FOR ROLL CALC IN FDAI ATT. ERROR DISPLAY
0227                       34,2214    77414 0            SET     EXIT
0228    REF  2  LAST 485   34,2215    01462 0                    REFSMFLG          SET REFSMMAT KNOWN FLAG

0229    REF 33  LAST 537   34,2216   0 5402 1            TC      PHASCHNG
0230                       34,2217    04023 1            OCT     04023

0231                       34,2220   0 0006 1            EXTEND
0232    REF  1             34,2221   3 2303 0            DCA     P11SCADR
0233    REF  1             34,2222   53'062 0            DXCH    AVGEXIT           SET AVGEXIT

0234    REF  2  LAST 317   34,2223   3 7652 1            CA      PRIO31            2 SECONDS AT 2(+8)
0235    REF  8  LAST 444   34,2224   55'277 0            TS      1/PIPADT

0236    REF  6  LAST 422   E6,1501                       EBANK=  RCSFLAGS
0237    REF  6  LAST 261   34,2225   0 4611 0            TC      E6SETTER
```

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0239                             34,2226  0 0004 0            INHINT
0240    REF 112  LAST  536       34,2227  4 4772 0            CS      ZERO
0247    REF   1                  34,2230  55'267 1            TS      TBASE5           RESTART READACCS 2 SECONDS AFTER LIFTOFF

0248    REF  14  LAST  438       34,2231  4 0025 1            CS      TIME1
0249    REF   1                  34,2232  6 5017 1            AD      2SECS            DO READACCS 2 SECONDS AFTER LIFTOFF

0250    REF 141  LAST  520       34,2233  10 000 0            CCS     A                CHECK TO INSURE DT IS POSITIVE
0251                             34,2234  1 2237 1            TCF     +3               TIME POSITIVE
0252                             34,2235  1 2237 1            TCF     +2               CANNOT GET HERE
0253    REF 113  LAST  540       34,2236  3 4772 1            CA      ZERO             TIME NEGATIVE - SET TO 1
0254    REF  57  LAST  531       34,2237  6 4770 0            AD      ONE              RESTORE TIME  -  OR MAKE POSITIVE

0255    REF  15  LAST  537       34,2240  0 5233 0            TC      WAITLIST
0256    REF  12  LAST  236       E6,1661                      EBANK=  ADG
0257    REF   1                  34,2241   02652 1            2CADR   READACCS
0257    REF   1                  34,2242   76066 0
0256    REF   8  LAST  537       34,2243  0 5362 0            TC      2PHSCHNG
0259                             34,2244   00003 1            OCT     00003            TURN OFF GROUP 3
0260                             34,2245   00025 0            OCT     00025            PROTECT NORMLIZE AND READACCS

02605   REF   2  LAST  230       01,2234            5P2SPT1   =       5.2SPOT
0261    REF  38  LAST  531       34,2246  0 4655 0            TC      POSTJUMP
0262    REF   2  LAST  234       34,2247   77154 1            CADR    NORMLIZE         DO NORMLIZE AND ENDOFJOB


0263    REF  10  LAST  537       E3,1706                      EBANK=  TEPHEM
0264                             34,2250  0 0004 0  REP11     INHINT
0265    REF   1                  34,2251  11'166 0            CCS     PHASE5
0266    REF  53  LAST  528       34,2252  0 5205 0            TC      ENDOFJOB

0267    REF   4  LAST  536       34,2253  11'126 1            CCS     LIFTTEMP
0268                             34,2254  1 2260 0            TCF     +4
0269                             34,2255  1 2260 0            TCF     +3
0270                             34,2256  1 2260 0            TCF     +2
0271    REF   1                  34,2257  1 2011 1            TCF     P11+7

0272    REF   5  LAST  538       34,2260  4 1021 1            CS      TLIFTOFF
0273                             34,2261  0 0006 1            EXTEND
0274    REF   1                  34,2262  6 2270 0            BZMF    ENDREP11

0275    REF  19  LAST  536       34,2263  10 024 0            CCS     TIME2            **TIME2 MUST BE NON-ZERO AT LIFTOFF**
0276    REF   2  LAST  232       34,2264  1 2017 1            TCF     REP11A -5        T2,T1 NOT YET ZEROED, GO AND DO IT

0277                             34,2265  0 0006 1            EXTEND                   T2,T1 ZEROED, SET TLIFTOFF
0279    REF   5  LAST  540       34,2266  3 1127 1            DCA     LIFTTEMP
0280    REF   1                  34,2267  1 2022 1            TCF     REP11A-2

0281                             34,2270  0 0006 1  ENDREP11  EXTEND
0282    REF   2  LAST  536       34,2271  3 2276 0            DCA     REP113A
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 0283   REF   1                34,2272  1 2023 0            TCF     REP11A-1


 0284                          34,2273   77766 0  REP11S    2OCT    77766 00011
 0284                          34,2274   00011 1
 0285                          34,2275   77764 1  REP11SA   2OCT    77764 00013
 0285                          34,2276   00013 0


 02851  REF   1                34,2277   02225 0  P11XIT    GENADR  P11OUT
 0286                          34,2300   71704 1  -ERTHRAT  2DEC*   -7.292115138 E-7 B18*   - EARTH RATE AT 2(18)
 0286                          34,2301   41735 0
 0288   REF   5  LAST  537     E6,1704                      EBANK=  SPOLYARG
 0289   REF   1                34,2302   02304 1  P11SCADR  2CADR   VHHDOT
 0289   REF   1                34,2303   70066 0
 02891  REF  19  LAST  520       6214             POWDNCOD  EQUALS  THREE


 0290   REF   6  LAST  541     E6,1704                      EBANK=  SPOLYARG
R0295   VHHDOT IS EXECUTED EVERY 2 SECONDS TO DISPLAY ON DSKY
R0296                          VI INERTIAL VELOCITY MAGNITUDE
R0297                          HDOT  RATE OF CHANGE OF ALT ABOVE L PAD RADIUS
R0298                          H   ALTITUDE ABOVE L PAD RADIUS

 0299   REF  71  LAST  538     34,2304  0 6006 1  VHHDOT    TC      INTPRET
 0300                          34,2305   77624 1            CALL                      LOAD VMAGI, ALTI,
 0301   REF   2  LAST  530     34,2306   70537 1                    S11.1             HDOT FOR DISPLAY
 0302                          34,2307   77776 1            EXIT
 03021  REF  34  LAST  539     34,2310  0 5402 1            TC      PHASCHNG
 03022                         34,2311   00035 1            OCT     00035

 03025  REF   3  LAST  531     01,2250            5P3SPT1   =       5.3SPOT
 0303   REF   1                34,2312  3 2617 0            CAF     V06N62            DISPLAY IN R1   R2    R3
 0304   REF 102  LAST  537     34,2313  0 4636 0            TC      BANKCALL                     VI   HDOT  H
 0305   REF   1                34,2314   20721 1            CADR    REGODSP

 0308   REF   1                34,2315  3 4757 0  ATERTASK  CAF     PRIO1             ESTABLISH JOB TO DISPLAY ATT ERRORS
 0309   REF  24  LAST  529     34,2316  0 5135 0            TC      FINDVAC           COMES HERE AT L.O. + .33 SEC
 0310   REF   7  LAST  541     E6,1704                      EBANK=  SPOLYARG
 0311   REF   1                34,2317   02342 0            2CADR   ATERJOB
 0311   REF   1                34,2320   70066 0
 03111  REF   7  LAST  539     34,2321  4 1501 0            CS      RCSFLAGS          SET BIT3 FOR
 03112  REF  24  LAST  529     34,2322  7 4766 0            MASK    BIT3              NEEDLER
 03113  REF   8  LAST  541     34,2323  27'501 0            ADS     RCSFLAGS          INITIALIZATION PASS
 03114  REF  20  LAST  537     34,2324  0 4714 1            TC      IBNKCALL          AND GO
 03115  REF   1                34,2325   42425 1            CADR    NEEDLER           DO IT
 03116  REF  28  LAST  519     34,2326  3 4770 0            CA      BIT1              SET SW
 03117  REF   2  LAST  119     34,2327  55'714 0            TS      SATSW             FOR DISPLAY
 0312   REF  25  LAST  532     34,2330  0 5314 1            TC      TASKOVER
 03121                         34,2331   40220 0  GETDOWN   STQ     SETPD
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03122  REF   1                34,2332   02241 1                 INCORPEX
03123                         34,2333   00001 0                 0D
03124                         34,2334   77745 1          DLOAD
03125  REF   3  LAST  538     34,2335   15336 0                 HI6ZEROS
03126                         34,2336   14007 0          STODL  6D
03127  REF  14  LAST  539     34,2337   15334 1                 DPHALF
03128                         34,2340   34011 0          STCALL 8D
03129  REF   2  LAST  538     34,2341   26531 1                 LALOTORV +5
R0313  THIS SECTION PROVIDES ATTITUDE ERROR DISPLAYS TO THE FDAI DURING SONE BOOST

A0315                                           COMPUTE DESIRED PITCH W.R.T. PAD LOCAL VERTICAL AT LIFTOFF
A0316                                                            2    3    4    5    6
A03161                                          PITCH= A0+A1T+A2T +A3T +A4T +A5T +A6T
A0317                                                  SCALED TO 32 REVS.                                   -14
A0318                                           IF TL = TIME IN SECS FROM L.O., THEN   T = 100(TL-RPSTART)2
A0319                                           WHERE    TL GE RPSTART
A0320                                                    TL LE (-POLYSTOP + RPSTART)
A0321                                           COMPUTE DESIRED ROLL WHERE ROLL EQUALS ANGLE FROM
A0322                                           LAUNCHAZ TO -Z(S/C) AS SEEN FROM X(S/C).
A0323                                           ROLL = LAUNCHAZ-AZIMUTH-.5 +SATRLRT*T        IN REV
A0324                                           SATRLRT = RATE OF ROLL IN REV/CENTI-SEC
A0325                                           T,IN CENTI-SEC,IS DEFINED AS ABOVE,INCLUSIVE OF TIME RESTRICTIONS

A0326                                           FOR SIMPLICITY, LET   P = 2*PI*PITCH
A0327                                                                 R = 2*PI*ROLL

A0328                                           CONSTRUCT THE TRANSFORMATION MATRIX, TSMV, GIVING DESIRED S/C AXES IN
A0329                                           TERMS OF SM COORDINATES. LET THE RESULTING ROWS EQUAL THE VECTORS XDC,
A0330                                           YDC,AND ZDC.

A0331                                            *     (     SIN(P)            0         -COS(P)     )   (XDC)
A0332                                           TSMV = (-SIN(R)*COS(P)   -COS(R)   -SIN(R)*SIN(P)) = (YDC)
A0333                                                  (-COS(R)*COS(P)    SIN(R)   -COS(R)*SIN(P))   (ZDC)

A0334                                           XDC,YDC,ZDC ARE USED AS INPUT TO CALCGTA FOR THE EXTRACTION OF THE
A0335                                           EULER SET OF ANGLES WHICH WILL BRING THE SM INTO THE DESIRED
A0336                                           ORIENTATION. THIS EULER SET, OGC, IGC, AND MGC, MAY BE IDENTIFIED
A0337                                           AS THE DESIRED CDU ANGLES.

A0338                                           (XDC)                   (OGC)
A0339                                           (YDC) ---) CALCGTA ---) (IGC)
A0340                                           (ZDC)                   (MGC)

A0341                                                                  -
A0342                                           DEFINE THE VECTOR DELTACDU.

A0343                                            -         (OGC)   (CDUX)
A0344                                           DELTACDU = (IGC) - (CDUY)
A0345                                                      (MGC)   (CDUZ)
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A0346                                                                      -           -     *    -
A0347                                                    COMPUTE ATTITUDE ERRORS, A, WHERE   A = TGSC*DELTACDU

A0348                                                     *     (1           SIN(CDUZ)              0      )   THE GIMBAL ANGLES
A0349                                                    TGSC = (0   COS(CDUX)*COS(CDUZ)   SIN(CDUX)) = TO SPACECRAFT AXES
A0350                                                           (0  -SIN(CDUX)*COS(CDUZ)   COS(CDUX))   CONVERSION MATRIX

A0351                                                                              -
A0352                                                    THE ATTITUDE ERRORS, A, ARE STORED ONE HALF SINGLE PRECISION IN
A0353                                                    THE REGISTERS AK, AK1, AK2 AS INPUT TO NEEDLER, THE FDAI ATTITUDE
A0354                                                    ERROR DISPLAY ROUTINE.

 0355   REF  11  LAST  265   34,2342  30 102 1  ATERJOB  CAE     FLAGWRD6         CHECK FLAGWRD6
 03551  REF   9  LAST  265   34,2343  7 4076 0           MASK    OPCONFIG         BITS 14,15
 03552                       34,2344  0 0006 1           EXTEND
 03553                       34,2345  1 2347 1           BZF     +2               OK - CONTINUE
 03554  REF  54  LAST  540   34,2346  0 5205 0           TC      ENDOFJOB         SATURN STICK ON - KILL JOB
 0356   REF  21  LAST  392   34,2347  3 4757 0           CAF     BIT10            CHECK IF S/C CONTROL
 03561                       34,2350  0 0006 1           EXTEND                   OF SATURN PANEL
 03562  REF   6  LAST  447   34,2351  02 030 0           RAND    CHAN30           SWITCH IS ON
 0357                        34,2352  0 0006 1           EXTEND
 0358   REF   1              34,2353  1 2505 1           BZF     STRSAT           IT IS - GO STEER
 0360   REF   3  LAST  541   34,2354  11'714 0           CCS     SATSW            IT IS NOT - WAS IT ON LAST CYCLE
 0361   REF   1              34,2355  1 2360 1  WASIU    TCF     ATTDISP          NO - CONTINUE
 0362   REF   1              34,2356  1 2510 0  WASINIT  TCF     ATRESET          YES - REINITIALIZE NEEDLER (2ND PASS)
 0363   REF   2  LAST  543   34,2357  1 2510 0  WASCMC   TCF     ATRESET          YES - REINITIALIZE NEEDLER

 0364   REF   2  LAST  118   34,2360  4 1702 1  ATTDISP  CS      RPSTART          PITCH/ROLL START TIME
 0365   REF  15  LAST  540   34,2361  6 0025 0           AD      TIME1
 03651                       34,2362  0 0006 1           EXTEND
 03652  REF   1              34,2363  6 2612 0           BZMF    NOPOLY           IF MINUS THEN ATTITUDE HOLD
 0366   REF 235  LAST  531   34,2364  54 154 0           TS      MPAC             MPAC=TIME1-RPSTART
 03661  REF   8  LAST  541   34,2365  55'704 1           TS      SPOLYARG         SAVE FOR USE IN ROLL CALUCLATION
 03662  REF   2  LAST  119   34,2366  6 1703 1           AD      POLYSTOP         NEG PITCHOVER TIME IN CSECS
 03663                       34,2367  0 0006 1           EXTEND
 0367                        34,2370  6 2372 0           BZMF    +2
 0368   REF   2  LAST  543   34,2371  0 2612 0  POSTPOLY TC      NOPOLY           GO TO ATTITUDE HOLD
 0369   REF  20  LAST  540   34,2372  3 0024 1           CA      TIME2
 0370                        34,2373  0 0006 1           EXTEND
 0371                        34,2374  6 2376 1           BZMF    +2
 03711  REF   3  LAST  543   34,2375  0 2612 0           TC      NOPOLY           GO TO ATTITUDE HOLD
 0372   REF   3  LAST  118   34,2376  31'661 1           CAE     POLYNUM
 0373   REF  64  LAST  520   34,2377  54 001 1           TS      L
 0374   REF   1              34,2400  3 2616 1           CAF     COEFPOLY         EVALUATE PITCH POLYNOMIAL
 0375   REF   1              34,2401  0 7164 0           TC      POWRSERS         SCALED TO 32 REVOLUTIONS

 0387   REF 114  LAST  540   34,2402  3 4772 1           CA      ZERO             RETURN WITH PITCH(32REV)
 0388   REF   3  LAST  312   34,2403  54 163 1           TS      MODE             STORED IN MPAC, MPAC +1
 0389   REF  72  LAST  541   34,2404  0 6006 1           TC      INTPRET
 0390                        34,2405   54201 0           SETPD   SL               32(PITCH(32REV))=PITCH(REV)
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L       P11                                                                        USER'S PAGE NO.  11      E6 53

 0391                          34,2406   00001 0                       0
 0392                          34,2407   20206 1                       5
 0393                          34,2410   77606 1           PUSH                    LET P(RAD)=2.PI.PITCH(REV)
 0394                          34,2411   77650 1           GOTO
 0395   REF   1                34,2412   67672 0                  ATTDISP1         AROUND SETLOC
A0396                                                                  *
A0397                                               CONSTRUCT SM TO S/C MATRIX, TSMV

 0398   REF   1                33,2000                     SETLOC P11TWO
 0399                          33,3672                     BANK                    36 IN COL., 34 IN DISK

 0400   REF   1                                            COUNT* $$/P11
 0401                          33,3672   57546 1  ATTDISP1 COS    DCOMP
 0402                          33,3673   14017 1           STODL  14D              -.5*COS(P)
 0403                          33,3674   77756 0           SIN
 0404                          33,3675   14013 0           STODL  10D              .5*SIN(P)
 0405   REF  11  LAST  518     33,3676   15336 0                  ZEROVECS
 0406                          33,3677   00015 0           STORE  12D              0

A0407                                               EVALUATE ROLL = LAUNCHAZ-AZIMUTH-.5+SATRLRT*T
 0409                          33,3700   41335 1           SLOAD  DMP
 0410   REF   9  LAST  543     33,3701   03305 1                  SPOLYARG         TIME1 - RPSTART ,CSECS B-14.
 0411   REF   4  LAST  539     33,3702   03301 0                  SATRLRT
 0412                          33,3703   45261 0           SL     DSU
 0413                          33,3704   20217 1                  14D
 0414   REF  15  LAST  542     33,3705   15334 1                  DPHALF
 0415                          33,3706   45215 0           DAD    DSU              ASSUMING X(SM) ALONG LAUNCH AZIMUTH,
 0416   REF   8  LAST  539     33,3707   02634 1                  LAUNCHAZ         LAUNCHAZ = ANGLE FROM NORTH TO X(SM).
 0417   REF   4  LAST  539     33,3710   02401 0                  AZIMUTH          AZIMUTH = -ANGLE FROM NORTH TO Z(S/C)
 0418                          33,3711   77634 0           RTB                     DETERMINE IF ROLLOUT
 0419   REF   1                33,3712   70601 1                  RLTST            IS COMPLETED
 0421                          33,3713   71406 0  ATTDISPR PUSH   COS              CONTINUE COMPUTING TSMV
 0422                          33,3714   77606 1           PUSH                    LET  R(RAD) = 2*PI*ROLL(REV)
 0423                          33,3715   72405 0           DMP    SL1
 0424                          33,3716   00017 1                  14D
 0425                          33,3717   14027 1           STODL  22D              -.5*COS(R)*COS(P)
 0426                          33,3720   77676 0           DCOMP
 0427                          33,3721   00023 0           STORE  18D              -.5*COS(R)
 0428                          33,3722   72405 0           DMP    SL1
 0429                          33,3723   00013 0                  10D
 0430                          33,3724   14033 1           STODL  26D              -.5*COS(R)*SIN(P)
 0431                          33,3725   41556 1           SIN    PUSH
 0432                          33,3726   00031 0           STORE  24D              .5*SIN(R)
 0433                          33,3727   72405 0           DMP    SL1
 0434                          33,3730   00017 1                  14D
 0435                          33,3731   14021 1           STODL  16D              -.5*SIN(R)*COS(P)
 0436                          33,3732   77676 0           DCOMP
 0437                          33,3733   72405 0           DMP    SL1
 0438                          33,3734   00013 0                  10D
 0439                          33,3735   24025 0           STOVL  20D              -.5*SIN(R)*SIN(P)
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    0440                        33,3736   00013 0                  10D

    A0441                                          FROM TSMV FIND THE HALF UNIT VECTORS  XDC,YDC,ZDC = INPUT TO CALCGTA

    0442                        33,3737   77656 1           UNIT
    0443   REF   3  LAST   99   33,3740   26714 1           STOVL  XDC             XDC = .5*UNIT(SIN(P),0,-COS(P))
    0444                        33,3741   00021 1                  16D
    0445                        33,3742   77656 1           UNIT
    0446   REF   3  LAST   99   33,3743   26722 1           STOVL  YDC             YDC = .5*UNIT(-SIN(R)*COS(P),-COS(R),
    0447                        33,3744   00027 1                  22D                                      -SIN(R)*SIN(P))
    0448                        33,3745   77656 1           UNIT
    0449   REF   3  LAST   99   33,3746   36730 0           STCALL ZDC             ZDC = .5*UNIT(-COS(R)*COS(P),SIN(R),
    0450   REF   2  LAST  451   33,3747   47240 1                  CALCGTA                                  -COS(R)*SIN(P))

    A0451                                          CALL CALCGTA TO COMPUTE DESIRED SM ORIENTATION  OGC,IGC,AND MGC
    A0452                                                                   -          -   -
    A0453                                          FIND DIFFERENCE VECTOR   DELTACDU = OGC-CDUX

    A04531                                         ENTER HERE IF ATTITUDE HOLD

    0454                        33,3750   41575 0  NOPOLYM  VLOAD  PUSH                   OGC      IGC
    0455   REF  17  LAST  538   33,3751   02760 1                  OGC             CHANGE IGC  TO  MGC FOR COMPATIBILITY
    0456                        33,3752   45006 0           PUSH   CALL                   MGC      OGC
    0457   REF   2  LAST  508   33,3753   47530 1                  CDUTRIG         WITH Y,Z,X ORDER OF CDUSPOT
    0458                        33,3754   47175 1           VLOAD  RTB              -         DPHI     OGC-CDUX ,PD4
    0459                        33,3755   00003 1                  2               DELTACDU = DTHETA = IGC-CDUY ,   0
    0460   REF   3  LAST  418   33,3756   45644 0                  V1STO2S                    DPSI     MGC-CDUZ ,   2
    0461   REF   2  LAST  119   33,3757   27306 1           STOVL  BCOSTEMP
    0462   REF  12  LAST  544   33,3760   15336 0                  ZEROVECS
    0463                        33,3761   24001 0           STOVL  0
    0464   REF   4  LAST   81   33,3762   01172 1                  CDUSPOT
    0465                        33,3763   47034 0           RTB    RTB
    0466   REF   4  LAST  545   33,3764   45644 0                  V1STO2S
    0467   REF   1              33,3765   70561 1                  DELSTOR
    0468                        33,3766   14013 0           STODL  10D
    0469   REF   1              33,3767   01144 1                  SINCDUZ
    0470                        33,3770   72405 0           DMP    SL1
    0471                        33,3771   00001 0                  0
    0472                        33,3772   60415 1           DAD    SR2             CHANGE SCALE OF AK TO 2REVS
    0473                        33,3773   00005 1                  4
    0474                        33,3774   77650 1           GOTO
    0475   REF   1              33,3775   70413 0                  ATTDISP2

    0476   REF   2  LAST  536   34,2000                     SETLOC P11ONE
    0477                        34,2413                     BANK
    0478   REF   2 LAST   536 TO  544:   267    267*        COUNT* $$/P11
    0479                        34,2413   14021 1  ATTDISP2 STODL  16D             16D,  .5(DPHI + DTHETA*SIN(CDUZ))
    0480   REF   1              34,2414   01152 0                  COSCDUZ
    0481                        34,2415   41405 0           DMP    PUSH
    0482                        34,2416   00001 0                  0
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GAP: ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-111      11:40 FEB. 26,1971  MENELAUS.061  PAGE  546

L        P11                                                                                  USER'S PAGE NO.  13       E6 53

  0483                            34,2417   72405 0             DMP     SL1
  0484    REF   1                 34,2420   01154 0                     COSCDUX
  0485                            34,2421   41325 0             PDDL    DMP
  0486    REF   1                 34,2422   01146 0                     SINCDUX
  0487                            34,2423   00003 1                     2
  0488                            34,2424   72415 1             DAD     SL1
  0489                            34,2425   77626 0             STADR
  0490                            34,2426   63755 0             STODL   17D               17D,   .5(DTHETA*COS(CDUX)*COS(CDUZ)
  0491                            34,2427   72405 0             DMP     SL1                                        +DPSI*SIN(CDUX))
  0492    REF   2  LAST   546     34,2430   01146 0                     SINCDUX
  0493                            34,2431   41325 0             PDDL    DMP
  0494    REF   2  LAST   546     34,2432   01154 0                     COSCDUX
  0495                            34,2433   00003 1                     2
  0496                            34,2434   72425 1             DSU     SL1
  0497                            34,2435   77626 0             STADR
  0498                            34,2436   77754 1             STORE   18D               18D,   .5(-DTHETA*SIN(CDUX)*COS(CDUZ)
  0499                            34,2437   77751 1             TLOAD                                              +DPSI*COS(CDUX))
  0500                            34,2440   00021 1                     16D
  0501    REF   9  LAST   261     34,2441   03077 1             STORE   AK                STORE ATTITUDE ERRORS IN AK,AK1,AK2
  0502                            34,2442   77776 1             EXIT

  050201 REF   4  LAST   543     34,2443  3 1714 1             CA      SATSW
  050202 REF 142  LAST   540     34,2444  10 000 0             CCS     A                 CHK TAKEOVER STATUS
  050203 REF   1                 34,2445  0 2466 1             TC      SATOUT            POS - DISPLAY ONLY
  050204 REF   1                 34,2446  0 2474 1             TC      AKLOAD            0      STORE BIAS
  05021  REF  73  LAST   543     34,2447  0 6006 1   STEERSAT  TC      INTPRET           NEG    STEER L/V
  050211                         34,2450   76351 1             TLOAD   TAD
  050212 REF   2  LAST   119     34,2451   03316 0                     BIASAK
  050213 REF  10  LAST   546     34,2452   03077 1                     AK
  050214 REF  11  LAST   546     34,2453   03077 1             STORE   AK                AKS = AKS - STORED BIAS
  050215                         34,2454   77776 1             EXIT
  05022  REF  12  LAST   546     34,2455  3 1476 0             CA      AK
  050221 REF   1                 34,2456  0 2620 1             TC      RESCALES
  050222 REF  13  LAST   546     34,2457  55'476 1             TS      AK
  050223 REF   3  LAST   182     34,2460  3 1477 1             CA      AK1
  050224 REF   2  LAST   546     34,2461  0 2620 1             TC      RESCALES
  050225 REF   4  LAST   546     34,2462  55'477 0             TS      AK1
  050226 REF   3  LAST   182     34,2463  3 1500 0             CA      AK2
  050227 REF   3  LAST   546     34,2464  0 2620 1             TC      RESCALES
  050228 REF   4  LAST   546     34,2465  55'500 1             TS      AK2
 A0503                                                        DISPLAY ATTITUDE ERRORS ON FDAI VIA NEEDLER

  0504    REF 103  LAST   541     34,2466  0 4636 0   SATOUT    TC      BANKCALL
  0505    REF   2  LAST   541     34,2467   42425 1             CADR    NEEDLER
  0506    REF   3  LAST   437     34,2470  3 4125 0   ATERSET   CAF     OCT31             DELAY .25 SEC
  0507    REF 104  LAST   546     34,2471  0 4636 0             TC      BANKCALL          EXECUTION + DELAY =.56SEC APPROX
  0508    REF   3  LAST   390     34,2472   01731 0             CADR    DELAYJOB
  0509    REF   2  LAST   541     34,2473  0 2342 0             TC      ATERJOB           END OF ATT ERROR DISPLAY CYCLE

  0510    REF  14  LAST   546     34,2474  4 1476 1   AKLOAD    CS      AK                STORE AKS
 0511    REF   3  LAST  546   34,2475  55'715 1            TS      BIASAK        INTO BIAS
 0512    REF   5  LAST  546   34,2476  4 1477 0            CS      AK1           COMPLEMENTED
 0513    REF   4  LAST  547   34,2477  55'716 1            TS      BIASAK +1
 0514    REF   5  LAST  546   34,2500  4 1500 1            CS      AK2
 05141   REF   5  LAST  547   34,2501  55'717 0            TS      BIASAK +2
 05142   REF  29  LAST  541   34,2502  4 4770 1            CS      BIT1          SET SW
 05143   REF   5  LAST  546   34,2503  55'714 0            TS      SATSW         TO STEER
 05144   REF   1              34,2504  0 2447 1            TC      STEERSAT      GO STEER
 0515    REF   6  LAST  547   34,2505  3 1714 1  STRSAT    CA      SATSW         CHECK IF NEEDLER
 05151                        34,2506  0 0006 1            EXTEND                HAS BEEN INITIALIZED
 051511  REF   2  LAST  543   34,2507  6 2360 0            BZMF    ATTDISP       YES - CONTINUE
 051512  REF   9  LAST  541   34,2510  4 1501 0  ATRESET   CS      RCSFLAGS      NO - SET
 051513  REF  25  LAST  541   34,2511  7 4766 0            MASK    BIT3          INITIALIZATION SW
 05152   REF  10  LAST  547   34,2512  27'501 0            ADS     RCSFLAGS      FOR NEEDLER
 051521  REF 105  LAST  546   34,2513  0 4636 0            TC      BANKCALL      AND GO
 051522  REF   3  LAST  546   34,2514   42425 1            CADR    NEEDLER       DO IT
 051523  REF   1              34,2515  3 6211 0            CAF     REVCNT        OCT 6
 051524  REF 106  LAST  547   34,2516  0 4636 0            TC      BANKCALL      DELAY JOB
 051525  REF   4  LAST  546   34,2517   01731 0            CADR    DELAYJOB      60 MS -WAIT TILL IMUERRCNTR ZEROED
 051527  REF   7  LAST  547   34,2520  11'714 0            CCS     SATSW         CHECK SW STATUS
 051528  REF   1              34,2521  0 2531 1            TC      TAKEON        POS    STEER INIT.
 051529                       34,2522  0 2523 1            TC      +1            0      RETURN TO DISPLAY
 05153   REF  30  LAST  547   34,2523  3 4770 0            CA      BIT1          NEG    RETURN TO DISPLAY
 051531  REF   8  LAST  547   34,2524  55'714 0            TS      SATSW         SW = DISPLAY ONLY
 051532  REF  16  LAST  262   34,2525  4 4760 0            CS      BIT9          DISABLE
 051533                       34,2526  0 0006 1            EXTEND                SIVB
 051534  REF  31  LAST  531   34,2527  03 012 1            WAND    CHAN12        TAKEOVER
 051535  REF   2  LAST  546   34,2530  0 2466 1            TC      SATOUT        DISPLAY
 051536  REF  17  LAST  547   34,2531  3 4760 1  TAKEON    CAF     BIT9          ENABLE
 051537                       34,2532  0 0006 1            EXTEND                SIVB
 051538  REF  32  LAST  547   34,2533  05 012 1            WOR     CHAN12        TAKEOVER
 05154   REF 115  LAST  543   34,2534  3 4772 1            CA      ZERO          INDICATE NEEDLER
 051541  REF   9  LAST  547   34,2535  55'714 0            TS      SATSW         WAS INITIALIZED
 051542  REF   3  LAST  547   34,2536  0 2466 1            TC      SATOUT
 0516                         34,2537   51575 1  S11.1     VLOAD   ABVAL
 0517    REF   7  LAST  521   34,2540   01036 0                    VN
 0518    REF  10  LAST  293   34,2541   27723 1            STOVL   VMAGI         VI      SCALED  2(7)  IN METERS/CSEC
 0519    REF   7  LAST  521   34,2542   01030 0                    RN
 0524                         34,2543   50256 0            UNIT    DOT
 0525    REF   8  LAST  547   34,2544   01036 0                    VN
 0526                         34,2545   77752 1            SL1
 0527    REF   2  LAST  293   34,2546   17741 0            STODL   HDOT
 05271   REF   3  LAST  522   34,2547   05173 1                    RPAD
 05272                        34,2550   77214 0            BOF     VLOAD
 05273   REF   2  LAST  521   34,2551   00355 1                    AMOONFLG
 05274   REF   1              34,2552   70555 0                    EARTHALT
 05275   REF   5  LAST  522   34,2553   02026 1                    RLS
 05276                        34,2554   60446 1            ABVAL   SR2
 05277                        34,2555   77621 1  EARTHALT  BDSU
 05278                        34,2556   00045 0                    360
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 05279  REF   3  LAST  293   34,2557   03737 1            STORE  ALTI
 0528                        34,2560   77616 0            RVQ
 0529   REF   3  LAST  545   34,2561  3 1705 1  DELSTOR   CA     BOOSTEMP
 0530                        34,2562  0 0006 1            EXTEND                   STORE DELTACDU INTO PDL 0,2,4
 0531   REF 236  LAST  543   34,2563  20 154 0            MSU    MPAC
 0532   REF   5  LAST  512   34,2564  50 120 1            INDEX  FIXLOC
 0533                        34,2565  54 000 0            TS     0
 0534   REF   4  LAST  548   34,2566  3 1706 1            CA     BOOSTEMP +1
 0535                        34,2567  0 0006 1            EXTEND
 0536   REF 237  LAST  548   34,2570  20 155 1            MSU    MPAC +1
 0537   REF   6  LAST  548   34,2571  50 120 1            INDEX  FIXLOC
 0538                        34,2572  54 002 1            TS     2
 0539   REF   5  LAST  548   34,2573  3 1707 0            CA     BOOSTEMP +2
 0540                        34,2574  0 0006 1            EXTEND
 0541   REF 238  LAST  548   34,2575  20 156 1            MSU    MPAC +2
 0542   REF   7  LAST  548   34,2576  50 120 1            INDEX  FIXLOC
 0543                        34,2577  54 004 1            TS     4
 0544   REF   3  LAST  297   34,2600  1 6030 0            TCF    DANZIG
 0545   REF 239  LAST  548   34,2601  3 0154 1  RLTST     CA     MPAC              DETERMINE IF ROLLOUT
 05451                       34,2602  0 0006 1            EXTEND                   IS COMPLETED
 05452  REF   5  LAST  544   34,2603  7 1701 1            MP     SATRLRT +1
 05453                       34,2604  0 0006 1            EXTEND
 05454  REF   4  LAST  548   34,2605  6 6030 1            BZMF   DANZIG            UNLIKE SIGNS  STILL ROLLING
 0546                        34,2606  22 007 0            ZL                       ROLLOUT COMPLETED
 05461  REF 116  LAST  547   34,2607  3 4772 1            CAF    ZERO              ZERO OUT ROLL CONTRIBUTION
 05462  REF 240  LAST  548   34,2610  52 155 1            DXCH   MPAC
 05463  REF   5  LAST  548   34,2611  0 6030 1            TC     DANZIG
 05464  REF  74  LAST  546   34,2612  0 6006 1  NOPOLY    TC     INTPRET           COMES HERE IF
 05465                       34,2613   52001 1            SETPD  GOTO              ATTITUDE HOLD
 05466                       34,2614   00001 0                   0
 05467  REF   1              34,2615   67750 1                   NOPOLYM
 0547   REF   1              34,2616   01673 1  COEFPOLY  ADRES  POLYLOC
 0548                        34,2617   01476 0  V06N62    VN     0662
 0549                        34,2620  0 0006 1  RESCALES  EXTEND                   RESCALE AK S FOR
 05491  REF   1              34,2621  7 1720 1            MP     SATSCALE          NEW HARDWARE
 05492                       34,2622  20 001 1            DDOUBL                   SCALING FOR
 05493                       34,2623  20 001 1            DDOUBL                   STEERING
 05494  REF 128  LAST  448   34,2624  0 0002 0            TC     Q                 SATURN
R0552   SATURN TAKEOVER FUNCTION
R0553   ************************

R0554   PROGRAM DESCRIPTION

R0555       MOD NUMBER 1
R0556       MOD BY ELIASSEN

R0557   FUNCTIONAL DESCRIPTION

R0558       DURING THE COASTING PHASE OF SIVB ATTACHED, THE
R0559       ASTRONAUT MAY REQUEST SATURN TAKEOVER THROUGH
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R0560        EXTENDED VERB 46 (BITS 13,14 OF DAPDATR1 SET ).
R0561        THE CMC REGARDS RHC COMMANDS AS BODY-AXES RATE
R0562        COMMANDS AND IT TRANSMITS THESE TO SATURN AS DC
R0563        VOLTAGES. THE VALUE OF THE CONSTANT RATE COMMAND
R0564        IS 0.5 DEG/SEC. AN ABSENCE OF RHC ACTIVITY RE-
R0565        SULTS IN A ZERO RATE COMMAND.

R0566        THE FDAI ERROR NEEDLES WILL INDICATE THE VALUE
R0567        OF THE RATE COMMAND.

R0568    CALLING SEQUENCE

R0569        DAPFIG +9D  TC       POSTJUMP
R0570                    CADR     SATSTKON

R0571    SUBROUTINES CALLED

R0572        ENDEXT
R0573        IBNKCALL
R0574        STICKCHK
R0575        NEEDLER
R0576        T5RUPT
R0577        RESUME

R0578    ASTRONAUT REQUESTS

R0579        ENTRY -  VERB 46 ENTER
R0580                 (CONDITION - BITS 13, 14 OF DAPDATR1 SET)

R0581        EXIT  -  VERB 48 ENTER  (FLASH V06N46)
R0582                 VERB 21 ENTER  AXXXX ENTER WHERE  A=0 OR 1
R0583                 VERB 34 ENTER
R0584                 VERB 46 ENTER

R0585    NORMAL EXIT MODE

R0586                 VERB 46 ENTER  (SEE ASTRONAUT ABOVE)

R0587    ALARM OR ABORT EXIT MODES

R0588        NONE

R0589    OUTPUT

R0590        SATURN RATES IN  CDUXCMD, CDUYCMD, CDUZCMD

R0591    ERASABLE INITIALIZATION

R0592        DAPDATR1  (BITS 13,14 MUST BE SET)
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R0593   DEBRIS

R0594         CENTRALS
R0595         CDUXCMD, CDUYCMD, CDUZCMD

 060164 REF    1                 26,2000                      SETLOC P11FOUR
 060166                          26,2000                      BANK

 06018  REF    1                                              COUNT* $$/P11
 0602   REF    3  LAST  243      26,2000  22 016 0  REDOSAT   LXCH   BANKRUPT        ALSO COMES HERE FOR RESTARTS
 06021                           26,2001  0 0006 1            EXTEND
 06022  REF    3  LAST  243      26,2002  22 012 1            QXCH   QRUPT
 06023  REF   11  LAST  547      26,2003  4 1501 0            CS     RCSFLAGS        TURN ON BIT3 OF RCSFLAGS
 06024  REF   26  LAST  547      26,2004  7 4766 0            MASK   BIT3            FOR
 06025  REF   12  LAST  550      26,2005  27'501 0            ADS    RCSFLAGS        NEEDLER INITIALIZATION
 0603   REF   21  LAST  541      26,2006  0 4714 1            TC     IBNKCALL
 0604   REF    4  LAST  547      26,2007   42425 1            CADR   NEEDLER         DISABLE IMU ERR COUNTERS ETC.
 0605   REF   18  LAST  547      26,2010  3 4760 1            CAF    BIT9            SIVB
 0606                            26,2011  0 0006 1            EXTEND                 TAKEOVER
 0607   REF   33  LAST  547      26,2012  05 012 1            WOR    CHAN12          ENABLE
 0608                            26,2013  0 0006 1            EXTEND                 SET UP T5 CYCLE
 0609   REF    1                 26,2014  3 4541 0            DCA    2SATSTCK
 0610   REF    6  LAST  263      26,2015  52 113 0            DXCH   T5LOC
 0611   REF    1                 26,2016  3 7661 1            CAF    100MST5         IN 100 MSECS
 0612   REF    4  LAST  262      26,2017  54 030 0            TS     TIME5
 0613   REF   20  LAST  248      26,2020  1 5323 1            TCF    RESUME          END OF SATURN STICK INITIALIZATION

A0614                                                THIS SECTION IS EXECUTED EVERY 100 MSECS

 06145  REF    1                 21,2000                      SETLOC P11THREE
 06146                           21,2000                      BANK

 06148  REF    1                                              COUNT* $$/P11
 0615   REF    4  LAST  550      21,2000  22 016 0  SATSTICK  LXCH   BANKRUPT
 0616                            21,2001  0 0006 1            EXTEND
 0617   REF    4  LAST  550      21,2002  22 012 1            QXCH   QRUPT

 0618   REF    2  LAST  550      21,2003  3 4540 1            CAF    2SATSTCK        SET UP RUPT
 0619   REF    7  LAST  550      21,2004  54 112 1            TS     T5LOC           LO ORDER LOC SET
 0620   REF    2  LAST  550      21,2005  3 7661 1            CAF    100MST5         100 MSECS
 0621   REF    5  LAST  550      21,2006  54 030 0            TS     TIME5
 0622   REF    1                 21,2007  3 2031 1            CAF    STIKBITS
 0623                            21,2010  0 0006 1            EXTEND
 0624   REF    1                 21,2011  06 031 0            RXOR   CHAN31          CHECK IF MAN ROT BITS SAME
 0625   REF    2  LAST  550      21,2012  7 2031 0            MASK   STIKBITS
 0626   REF   22  LAST  550      21,2013  0 4714 1            TC     IBNKCALL        SET RATE INDICES
 0627   REF    1                 21,2014   43152 0            CADR   STICKCHK        FOR PITCH YAW AND ROLL

 0628   REF    2  LAST  114      21,2015  51'656 0            INDEX  RMANNDX         SET SATURN RATES
 0629   REF    2  LAST  119      21,2016  3 1710 0            CA     SATRATE
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  0630  REF  15  LAST  546   21,2017  55'476 1             TS      AK                               ROLL
  0631  REF   2  LAST  114   21,2020  51'657 1             INDEX   PMANNDX
  0632  REF   3  LAST  550   21,2021  3 1710 0             CA      SATRATE
  0633  REF   6  LAST  547   21,2022  55'477 0             TS      AK1                              PITCH
  0634  REF   2  LAST  118   21,2023  51'660 0             INDEX   YMANNDX
  0635  REF   4  LAST  551   21,2024  3 1710 0             CA      SATRATE
  0636  REF   6  LAST  547   21,2025  55'500 1             TS      AK2                              YAW

  0637  REF  23  LAST  550   21,2026  0 4714 1             TC      IBNKCALL        FOR SATURN INTERFACE AND FDAI DISPLAY
  0638  REF   5  LAST  550   21,2027   42425 1             CADR    NEEDLER
  0639  REF  21  LAST  550   21,2030  1 5323 1   STICKOUT  TCF     RESUME          END OF SATURN STICK CONTROL


  0644                       21,2031   00077 1   STIKBITS  OCT     00077
  0645  REF   1                 7661             100MST5   =       OCT37766
  06455 REF   1                 4000                       SETLOC  FFTAG2
  06456                         4540                       BANK

  06458 REF   1                                            COUNT*  $$/P11
  0646  REF  10  LAST  544   E6,1704                       EBANK=  SPOLYARG
  0647  REF   1                 4540   02000 0   2SATSTCK  2CADR   SATSTICK
  0647  REF   1                 4541   42066 1
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L         P20-P25                                                                             USER'S PAGE NO.   1      E0 S3

R0001     RENDEZVOUS NAVIGATION PROGRAM 20
R0002     PROGRAM DESCRIPTION
R0003     MOD NO -1
R0004     MOD BY - N.BRODEUR
R0005
R0006     FUNCTIONAL DESCRIPTION
R0007
R0008     TO INITIALIZE THE RENDEZVOUS NAVIGATION SUBROUTINES R22, R61CSM, AND
R0009     R52, WHICH IN TURN CONTROL THE CSM ATTITUDE AND OPTICS POSITIONING,
R0010     PROCESS BOTH OPTICS AND VHF TRACKING DATA, AND UPDATE EITHER THE LM
R0011     OR THE CSM STATE VECTORS.
R0012
R0013     CALLING SEQUENCE
R0014       V37E20E
R0015
R0016     SUBROUTINES CALLED
R0017       R22 (RENDEZVOUS TRACK DATA PROCESSING)
R0018       R52 (AUTO OPTICS POSITIONING)
R0019       R61CSM (PREFERRED TRACKING ATTITUDE)
R0020       R02BOTH             BANKCALL            UPFLAG
R0021       DOWNFLAG            2PHSCHNG            LOADTIME
R0022       PRIOCHNG            UPSTATE             INTPRET
R0023       ENDOFJOB            MKRLEES             FINDVAC
R0024
R0025     NORMAL EXIT MODES
R0026       RENDEZVOUS NAVIGATION MAY BE TERMINATED BY THE SELECTION OF
R0027       P00, P06, P22, P23, V34E FROM R60, AND V56E
R0028
R0029     ALARM OR ABORT EXIT MODES
R0030       NONE DIRECTLY FROM P20
R0031
R0032     OUTPUT
R0033       NONE DIRECTLY FROM P20
R0034
R0035     FLAGS SET + RESET
R0036       RNDVZFLG, VEHUPFLG, UPDATFLG, TRACKFLG, TARG1FLG
R0037       PRFTRKAT, V50N18FL
R0038
 0040     REF   1               36,2000                      SETLOC P20S7
 0041                           36,2016                      BANK

 0042     REF  10  LAST  422    E6,1774                      EBANK= R61CNTR
 0043     REF   1                                            COUNT* $$/P20

 0044     REF 107  LAST  547    36,2016  0 4636 0   PROG20   TC      BANKCALL
 0045     REF   1               36,2017   03731 1            CADR    R02BOTH            IMU STATUS CHECK
A0046                                                                                   BLOCKING OF UPLINK IS DONE BY UPLINK PRG
 00462    REF   2  LAST  114    36,2020  3 1655 0            CA      ADB
 00464    REF   3  LAST  294    36,2021  55'773 1            TS      DBPTC
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L        P20-P25                                                                                  USER'S PAGE NO.  2       06 53

 0047   REF  75  LAST  548   36,2022  0 6006 1              TC       INTPRET
 0048                        36,2023   43014 0              CLEAR    SET
 0049   REF   2  LAST  271   36,2024   00667 0                       VEHUPFLG          UPDATE LM
 0050   REF   3  LAST  261   36,2025   01460 1                       V50N18FL
 0051                        36,2026   66214 0              SET      SSP
 0052   REF   6  LAST  456   36,2027   00472 0                       TRACKFLG
 0056   REF   5  LAST  456   36,2030   00777 0                       OPTION2
 0057                        36,2031   00000 1
 0064                        36,2032   77414 0              BON      EXIT
 0065   REF  10  LAST  486   36,2033   05310 0                       AUTOSEQ
 0066   REF   1              36,2034   74050 1                       PRELOD78          MINKEY  (PRELOAD N78)
 0069   REF   6  LAST  253   36,2035  3 4124 1              CAF      OCT24
 0070   REF 108  LAST  552   36,2036  0 4636 0              TC       BANKCALL
 0071   REF   2  LAST  456   36,2037   21074 1              CADR     GOPERF4
 0072   REF  16  LAST  532   36,2040  0 4103 1              TC       GOTOPOOH
 0073                        36,2041  1 2043 0              TCF      +2
 0074                        36,2042  1 2035 1              TCF      -5

 0075   REF   6  LAST  553   36,2043  3 0776 1              CA       OPTION2
 0076   REF  20  LAST  541   36,2044  7 6214 1              MASK     THREE
 0077   REF 143  LAST  546   36,2045  10 000 0              CCS      A
 0078   REF   1              36,2046  0 2061 1              TC       DOV6N78           OPTIONS 1,2,5  (DO NOT PRELOAD N78)
 0079   REF  76  LAST  553   36,2047  0 6006 1              TC       INTPRET           OPTIONS 0,4            (PRELOAD N78)
 0080                        36,2050   77745 1   PRELOD78   DLOAD
 0081   REF   1              36,2051   34467 0                       35DEGANG
 0082   REF   4  LAST  294   36,2052   17740 1              STODL    UTPIT
 0083   REF  13  LAST  545   36,2053   15336 0                       ZEROVECS
 0084   REF   4  LAST  294   36,2054   03742 0              STORE    UTYAW
 0085   REF   3  LAST  294   36,2055   01353 0              STORE    AZIMANGL
 0086                        36,2056   77414 0              BON      EXIT
 0087   REF  11  LAST  553   36,2057   05310 0                       AUTOSEQ
 0088   REF   1              36,2060   74104 1                       P20OPT            MINKEY, BYPASS V04N06 AND V06N78
 0089   REF   1              36,2061  3 2470 0   DOV6N78    CAF      V06N78UT
 0090   REF  12  LAST  532   36,2062  0 5535 1              TC       VNFLASH
 0091   REF   1              36,2063  3 2472 1              CAF      V06N79UT
 0092   REF   2  LAST  458   36,2064  0 5540 0              TC       VNFLASHR

 0093   REF   1              36,2065  1 2075 0              TCF      ENDV6N79

 0094   REF   7  LAST  553   36,2066  3 0776 1              CA       OPTION2
 0095   REF  22  LAST  519   36,2067  7 4767 1              MASK     BIT2
 0096   REF 144  LAST  553   36,2070  10 000 0              CCS      A
 0097   REF  55  LAST  543   36,2071  0 5205 0              TC       ENDOFJOB          OPTION 2, BLANK ONLY R31
 0098   REF  10  LAST  458   36,2072  3 4773 0              CAF      FIVE              BLANK BOTH R1,R3
 0099   REF   2  LAST  458   36,2073  0 5516 0              TC       BLANKET
 0100   REF  56  LAST  553   36,2074  0 5205 0              TC       ENDOFJOB
 0101   REF   8  LAST  553   36,2075  3 0776 1   ENDV6N79   CA       OPTION2
 0102   REF  27  LAST  550   36,2076  7 4766 0              MASK     BIT3
 0103                        36,2077  0 0006 1              EXTEND
 0104   REF   1              36,2100  1 2105 0              BZF      NOAZIM
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 0105    REF  32  LAST  537   36,2101  0 5547 1             TC      UPFLAG
 0106    REF   2  LAST  216   36,2102   00254 1             ADRES   AZIMFLAG

 0107    REF   1              36,2103  1 2107 1             TCF     COMAZM

 0108                         36,2104   77776 1  P20OPT     EXIT
 0109    REF  27  LAST  509   36,2105  0 5561 0  NOAZIM     TC      DOWNFLAG
 0110    REF   3  LAST  554   36,2106   00254 1             ADRES   AZIMFLAG

 0111    REF   9  LAST  553   36,2107  3 0776 1  COMAZM     CA      OPTION2
 0112    REF  21  LAST  553   36,2110  7 6214 1             MASK    THREE
 0113    REF 145  LAST  553   36,2111  10 000 0             CCS     A
 0114    REF   1              36,2112  1 2220 1             TCF     OTKINPUT
 0115    REF  28  LAST  554   36,2113  0 5561 0             TC      DOWNFLAG
 0116    REF   5  LAST  270   36,2114   00176 1             ADRES   OTFLAG

 0117    REF  33  LAST  554   36,2115  0 5547 1             TC      UPFLAG
 0118    REF   4  LAST  486   36,2116   00027 1             ADRES   UPDATFLG

 0121    REF   9  LAST  540   36,2117  0 5362 0  NOOTINPT   TC      2PHSCHNG
 0122                         36,2120   00004 0             OCT     00004
 0123                         36,2121   05022 1             OCT     05022
 0124                         36,2122   26000 0             OCT     26000
 0125    REF   8  LAST  395   36,2123  3 4760 1             CAF     OTBIT
 0126    REF  18  LAST  421   36,2124  7 0104 0             MASK    FLAGWRD8
 0127    REF 146  LAST  554   36,2125  10 000 0             CCS     A
 0128    REF   1              36,2126  1 2150 0             TCF     INTSETUP

 0129    REF  77  LAST  553   36,2127  0 6006 1             TC      INTPRET
 0130                         36,2130   77634 0             RTB
 0131    REF  10  LAST  527   36,2131   51751 0                     LOADTIME
 0132    REF   3  LAST  137   36,2132   35062 0             STCALL  MARKTIME
 0133    REF   1              36,2133   60435 0                     UPSTATE
 0134                         36,2134   77776 1             EXIT

 01343   REF  34  LAST  554   36,2135  0 5547 1             TC      UPFLAG
 01346   REF   4  LAST  270   36,2136   00010 0             ADRES   RNDVZFLG

 0135    REF   3  LAST  421   36,2137  3 7650 0             CAF     PRIO26
 0136    REF  25  LAST  541   36,2140  0 5135 0             TC      FINDVAC
 0137    REF  26  LAST  515   E7,1722                       EBANK=  MRKBUF1
 0138    REF   2  LAST  231   36,2141   02625 1             2CADR   R22
 0138                         36,2142   70067 1
 0139    REF  10  LAST  554   36,2143  0 5362 0             TC      2PHSCHNG
 0140                         36,2144   00072 1             OCT     00072
 0141                         36,2145   00111 0             OCT     00111
 01412   REF   2  LAST  415   01,2025            1P11SPT3   =       1.11SPOT
 01414   REF   1              01,2041            2P7SPT1    =       2.7SPOT
 0142    REF   2  LAST  206   36,2146  0 4112 1             TC      AUTOCHK
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0143   REF   2  LAST  230    36,2147  1 2157 1            TCF      PIKUP20

0144   REF   6  LAST  276    36,2150  3 5047 1  INTSETUP CAF      PRIO5
0145   REF  26  LAST  554    36,2151  0 5135 0           TC       FINDVAC
0146   REF   5  LAST  231    E3,1554                     EBANK=   RRECTCSM
0147   REF   2  LAST  231    36,2152   02711 1           2CADR    STATINT1
0147                         36,2153   26063 0
0148   REF  11  LAST  554    36,2154  0 5362 0           TC       2PHSCHNG
0149                         36,2155   00052 0           OCT      00052
0150                         36,2156   00111 0           OCT      00111

01502  REF   3  LAST  554    01,2025                    1P11SPT4 =        1.11SPOT
01504  REF   3  LAST  213    01,2036                    2P5SPT3  =        2.5SPOT
0151   REF   3  LAST  422    36,2157  3 5053 1  PIKUP20  CAF      PRIO14            ALLOW HIGHER PRIO THAN LAMBERT
0152   REF   6  LAST  448    36,2160  0 5176 1           TC       PRIOCHNG
0153   REF   8  LAST  418    36,2161  3 4764 0           CAF      TRACKBIT
0154   REF  23  LAST  443    36,2162  7 0075 1           MASK     FLAGWRD1          IS TRACK FLAG SET
0155                         36,2163  0 0006 1           EXTEND
0156   REF   3  LAST  420    36,2164  1 2416 1           BZF      FIXDB
0157   REF   3  LAST  208    36,2165  3 4754 0           CAF      REFSMBIT
0158   REF   5  LAST  428    36,2166  7 0077 0           MASK     FLAGWRD3          IS REFSMFLAG SET
0159                         36,2167  0 0006 1           EXTEND
0160   REF   4  LAST  555    36,2170  1 2416 1           BZF      FIXDB

0161   REF 117  LAST  548    36,2171  3 4772 1           CAF      ZERO
0162   REF  11  LAST  552    36,2172  55'774 0           TS       R61CNTR           INITIALIZE R61 COUNTER
0163   REF  19  LAST  554    36,2173  3 0104 1           CA       FLAGWRD8
0164   REF   9  LAST  554    36,2174  7 4760 0           MASK     UTBIT
0165   REF 147  LAST  554    36,2175  10 000 0           CCS      A
0166   REF   1               36,2176  0 2263 1           TC       CALLR6X

0167   REF  35  LAST  554    36,2177  0 5547 1           TC       UPFLAG
0168   REF   4  LAST  396    36,2200   00037 0           ADRES    R21MARK
0169   REF 109  LAST  553    36,2201  0 4636 0           TC       BANKCALL
0170   REF   1               36,2202   76333 0           CADR     R61CSM
0171   REF  13  LAST  279    36,2203  4 0106 1           CS       FLGWRD10          CHECK IF PC MANEUVER TO TRACK
0172   REF   1               36,2204  7 4752 1           MASK     PCMANBIT                ATTITUDE
0173                         36,2205  0 0006 1           EXTEND
0174   REF   1               36,2206  1 4116 1           BZF      AUTOCHK1
0175   REF  36  LAST  555    36,2207  0 5547 1  P20TRACK TC       UPFLAG            SET TARG FLAG TO LEM FOR R52
0176   REF   2  LAST  396    36,2210   00024 1           ADRES    TARG1FLG          BIT 10  FLAG 1
0177   REF  78  LAST  554    36,2211  0 6006 1  P20R52JB TC       INTPRET
0178                         36,2212   77624 1           CALL
0179   REF   1               36,2213   31005 0                    R52               SET UP AUTO OPTICS JOB
0180                         36,2214   77776 1           EXIT
0181   REF 110  LAST  555    36,2215  0 4636 0           TC       BANKCALL
0182   REF   3  LAST  242    36,2216   16073 1           CADR     MKRLEES
0183   REF   5  LAST  555    36,2217  1 2416 1           TCF      FIXDB

0184   REF   1               36,2220  55'351 0  UTKINPUT TS       OPTNTYPE
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 0185    REF  37  LAST  555   36,2221   0 5547 1              TC      UPFLAG
 0186    REF   6  LAST  554   36,2222    00176 1              ADRES   UTFLAG

 0187    REF  29  LAST  554   36,2223   0 5561 0              TC      DOWNFLAG
 0188    REF   5  LAST  554   36,2224    00010 0              ADRES   RNDVZFLG

 0189    REF   2  LAST  555   36,2225  11'351 0               CCS     OPTNTYPE
 0190    REF   1              36,2226   0 2255 1              TC      TYPE2IN

 0191    REF   1              36,2227   3 2471 1   V1N70DSP   CAF     V01N70UT
 0192    REF  13  LAST  553   36,2230   0 5535 1              TC      VNFLASH
 0193    REF   5  LAST  450   36,2231  11'140 1               CCS     STARCODE
 0194    REF   1              36,2232   6 2475 0              AD      NEG47UT
 0195    REF 148  LAST  555   36,2233  10 000 0               CCS     A
 0196    REF   1              36,2234   1 2253 0              TCF     NOGOOD

 0197                         36,2235   1 2237 1              TCF     +2
 0198                         36,2236   1 2237 1              TCF     +1
 0199    REF   6  LAST  556   36,2237   3 1140 0              CA      STARCODE
 0200    REF   1              36,2240  55'355 1               TS      UTSTARNO

 0201    REF 149  LAST  556   36,2241  10 000 0               CCS     A
 0202    REF   1              36,2242   1 2117 0              TCF     NOUTINPT

 0203    REF   1              36,2243   3 5035 1              CAF     V06N88UT
 0204    REF  14  LAST  556   36,2244   0 5535 1              TC      VNFLASH
 0205    REF  79  LAST  555   36,2245   0 6006 1              TC      INTPRET
 0206                         36,2246    77775 1              VLOAD
 0207    REF   4  LAST  294   36,2247    03705 0                      STARSAV3
 0208    REF   2  LAST  130   36,2250    03732 1              STORE   PLANVCUT
 0209                         36,2251    77776 1              EXIT
 0210    REF   2  LAST  556   36,2252   0 2117 1              TC      NOUTINPT

 0211    REF   8  LAST  372   36,2253   0 4362 1   NOGOOD     TC      FALTON
 0212    REF   1              36,2254   0 2227 1              TC      V1N70DSP

 0213    REF   1              36,2255   3 5027 1   TYPE2IN    CAF     V06N34UT
 0214    REF  15  LAST  556   36,2256   0 5535 1              TC      VNFLASH
 0215                         36,2257   0 0006 1              EXTEND
 0216    REF  24  LAST  461   36,2260   3 1251 0              DCA     DSPTEM1
 0217    REF   3  LAST   87   36,2261  53'356 1               DXCH    R67TIME
 0218    REF   3  LAST  556   36,2262   1 2117 0              TCF     NOUTINPT

 0219    REF  30  LAST  556   36,2263   0 5561 0   CALLR6X    TC      DOWNFLAG
 0220    REF   5  LAST  555   36,2264    00037 0              ADRES   R21MARK

 0221    REF   3  LAST  556   36,2265  11'351 0               CCS     OPTNTYPE
 0222    REF   1              36,2266   1 2271 0              TCF     TYPE2

 0223    REF  39  LAST  540   36,2267   0 4655 0              TC      POSTJUMP
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 0224   REF   1                 36,2270   74454 1             CADR    R66CSM

 0225                           36,2271  0 0006 1  TYPE2      EXTEND
 0226   REF  21  LAST  543      36,2272  4 0025 1             DCS     TIME2
 0227   REF 241  LAST  548      36,2273  52 155 1             DXCH    MPAC
 0228                           36,2274  0 0006 1             EXTEND
 0229   REF   4  LAST  556      36,2275  3 1356 0             DCA     R67TIME
 0230   REF 242  LAST  557      36,2276  20 155 1             DAS     MPAC
 0231   REF   5  LAST  531      36,2277  0 7224 1             TC      DPAGREE
 0232   REF 243  LAST  557      36,2300  10 154 0             CCS     MPAC
 0233   REF   1                 36,2301  1 2314 1             TCF     DODELAY

 0234                           36,2302  1 2305 1             TCF     +3
 0235   REF 118  LAST  555      36,2303  3 4772 1             CAF     ZERO
 0236   REF 244  LAST  557      36,2304  54 155 1             TS      MPAC +1
 0237   REF 245  LAST  557      36,2305  10 155 1             CCS     MPAC +1
 0238                           36,2306  1 2307 0             TCF     +1
 0239   REF  58  LAST  540      36,2307  6 4770 0             AD      ONE
 0240   REF  16  LAST  540      36,2310  0 5233 0             TC      WAITLIST
 0241   REF  12  LAST  555      E6,1774                       EBANK=  R61CNTR
 0242   REF   2  LAST  415      36,2311   02320 1             2CADR   R67
 0242                           36,2312   74066 1
 0243   REF  57  LAST  553      36,2313  0 5205 0             TC      ENDOFJOB

 0244   REF  12  LAST  432      36,2314  3 4750 1  DODELAY    CAF     POSMAX
 0245   REF 111  LAST  555      36,2315  0 4636 0             TC      BANKCALL
 0246   REF   5  LAST  547      36,2316   01731 0             CADR    DELAYJOB
 0247   REF   2  LAST  556      36,2317  1 2271 0             TCF     TYPE2

 0248   REF   4  LAST  554      36,2320  3 7650 0  R67        CAF     PRIO26
 0249   REF  27  LAST  555      36,2321  0 5135 0             TC      FINDVAC
 0250   REF  13  LAST  557      E6,1774                       EBANK=  R61CNTR
 0251   REF   1                 36,2322   02327 0             2CADR   R67START
 0251   REF   1                 36,2323   74066 1
 0252   REF  38  LAST  556      36,2324  0 5547 1             TC      UPFLAG
 0253   REF   2  LAST  270      36,2325   00205 0             ADRES   R67FLAG

 0254   REF  26  LAST  541      36,2326  0 5314 1             TC      TASKOVER

 0255   REF  80  LAST  556      36,2327  0 6006 1  R67START   TC      INTPRET
 0256                           36,2330   47014 1             BON     RTB
 0257   REF   3  LAST  261      36,2331   00701 1                     STIKFLAG
 0258   REF   1                 36,2332   44717 0                     NOGOM3
 0259   REF   3  LAST  403      36,2333   44370 0                     READCDUK
 0260   REF  17  LAST  421      36,2334   37262 0             STCALL  BCDU
 0261   REF   1                 36,2335   74437 1                     UTPRFAX
 0262   REF  47  LAST  416      36,2336   03343 0             STORE   CDF
 0263                           36,2337   77776 1             EXIT

 02632                          36,2340  0 0004 0             INHINT
 02634  REF   1              36,2341  3 5007 0                CAF     MINDB
 02636  REF   3  LAST  552   36,2342  55'655 1                TS      ADB
 0264   REF   4  LAST  552   36,2343  11'773 1                CCS     DBPTC
 0265   REF  59  LAST  557   36,2344  6 4770 0                AD      ONE
 0266                        36,2345  0 2347 0                TC      +2
 0267   REF  60  LAST  558   36,2346  6 4770 0                AD      ONE
 026702                      36,2347  0 0006 1                EXTEND
 026704                      36,2350  1 2352 0                BZF     +2
 0268   REF   4  LAST  558   36,2351  55'655 1                TS      ADB

 0269   REF  81  LAST  557   36,2352  0 6006 1                TC      INTPRET
 0270                        36,2353   41335 1                SLOAD   DMP
 0271   REF   3  LAST  294   36,2354   03373 0                        RATEPTC
 0272   REF   1              36,2355   34474 1                        TOFITS          SCALING FACTOR(.4 DEC)
 0273                        36,2356   45002 1                SR4     CALL            COMPUTE THE INCREMENTAL ROTATION MATRIX
 0274   REF   4  LAST  416   36,2357   44522 1                        DELCOMP         DEL CORRESPONDING TO A  1 SEC ROTATION
 0275                        36,2360   41335 1                SLOAD   DMP             ABOUT COF
 0276   REF   4  LAST  558   36,2361   03373 0                        RATEPTC
 0277   REF   2  LAST  558   36,2362   34474 1                        TOFITS
 0278                        36,2363   64361 1                VXSC    MXV
 0279   REF  48  LAST  557   36,2364   03343 0                        COF
 0280   REF   3  LAST  419   36,2365   05014 1                        CDUDROT
 0281   REF   6  LAST  420   36,2366   27311 1                STOVL   BRATE
 0282   REF  14  LAST  553   36,2367   15336 0                        ZEROVECS
 0283   REF   5  LAST  420   36,2370   03275 1                STORE   BIASTEMP
 0284                        36,2371   77776 1                EXIT

 0285   REF  35  LAST  541   36,2372  0 5402 1                TC      PHASCHNG
 0286                        36,2373   00131 1                OCT     00131

 02865  REF   1              01,2030                 1P13SPT1 =       1.13SPOT
 0287   REF  24  LAST  555   36,2374  3 0075 0       R67RSTRT CA      FLAGWRD1
 0288   REF   9  LAST  555   36,2375  7 4764 1                MASK    TRACKBIT
 0289                        36,2376  0 0006 1                EXTEND
 0290   REF   6  LAST  555   36,2377  1 2416 1                BZF     FIXDB
 0291   REF  23  LAST  508   36,2400  3 4755 1                CAF     BIT12
 0292   REF  14  LAST  557   36,2401  55'774 0                TS      R61CNTR

 0293   REF   5  LAST  557   36,2402  3 7650 0                CAF     PRIO26
 0294   REF   7  LAST  555   36,2403  0 5176 1                TC      PRIOCHNG

 0295   REF  82  LAST  558   36,2404  0 6006 1                TC      INTPRET
 0296                        36,2405   72364 0                AXC,2   TLOAD
 0297   REF  18  LAST  418   36,2406   03320 0                        MIS
 0298   REF  18  LAST  557   36,2407   03262 1                        BCDU
 0299                        36,2410   45014 0                SET     CALL
 0300   REF   3  LAST  557   36,2411   04075 1                        R67FLAG
 0301   REF   4  LAST  403   36,2412   44377 1                        CDUTODCM
 0302                        36,2413   77614 1                SETGO
 0303   REF   3  LAST  418   36,2414   01035 0                        CALCMAN2        SET CALCMAN2 TO START MANEUVER
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0304   REF   3  LAST  418   36,2415   45053 0                       NEWANGL +1

0305   REF   7  LAST  507   36,2416  3 0105 0  FIXDB      CA       FLAGWRD9         RESTORE DAP DEADBAND
0306                        36,2417  0 0004 0             INHINT
0307   REF   2  LAST  222   36,2420  7 4755 0             MASK     MAXDBBIT
0308   REF 150  LAST  556   36,2421  10 000 0             CCS      A
0309                        36,2422  1 2426 1             TCF      +4

0310   REF 112  LAST  557   36,2423  0 4636 0             TC       BANKCALL
0311   REF   2  LAST  222   36,2424   51203 1             CADR      SETMINDB
0312                        36,2425  1 2430 0             TCF      +3

0313   REF 113  LAST  559   36,2426  0 4636 0             TC       BANKCALL
0314   REF   2  LAST  222   36,2427   51217 1             CADR     SETMAXDB

0315   REF  31  LAST  556   36,2430  0 5561 0             TC       DOWNFLAG
0316   REF   4  LAST  558   36,2431   00205 0             ADRES    R67FLAG
0317   REF  36  LAST  558   36,2432  0 5402 1             TC       PHASCHNG
0318                        36,2433   00111 0             OCT      00111
03185  REF   4  LAST  555   01,2025            1P11SPT5   =        1,11SPOT
0319                        36,2434  0 0004 0  STOPVEH    INHINT
0320   REF   5  LAST  422   36,2435  0 4463 1             TC       STOPRATE
0321   REF  58  LAST  557   36,2436  1 5205 1             TCF      ENDOFJOB

0322                        36,2437   73545 1  UTPRFAX    DLOAD    SIN              COMPUTE PREFERRED UNIT VECTOR
0323   REF   5  LAST  553   36,2440   03740 1                      UTPIT                                MPAC    =COS(P)COS(Y)
0324                        36,2441   65276 1             DCOMP    PDDL             PDX=-SIN(P)         MPAC +2=COS(P)SIN(Y)
0325   REF   6  LAST  559   36,2442   03740 1                      UTPIT                                MPAC +4=-SIN(P)
0326                        36,2443   41546 0             COS      PUSH             PDX+2=COS(P) USED WITH SECOND DMP BELOW
0327                        36,2444   73525 1             PDDL     SIN              PDX+4=COS(P) USED WITH FIRST  DMP BELOW
0328   REF   5  LAST  553   36,2445   03742 0                      UTYAW
0329                        36,2446   72405 0             DMP      SL1              MPAC=COS(P)SIN(Y)
0330                        36,2447   77725 1             PDDL                      REPLACE PDX+2 WITH COS"P)SIN(Y)
0331                        36,2450   71525 0             PDDL     COS              REPLACE PDX+4 WITH COS(P) IN ORDER TO
0332   REF   6  LAST  559   36,2451   03742 0                      UTYAW             POSITION PD COUNTER FOR DMP
0333                        36,2452   72405 0             DMP      SL1
0334                        36,2453   43466 1             VDEF     RVQ              PUSHUP FOR Y,Z COMPONENTS

0335   REF  25  LAST  558   36,2454  4 0075 1  R66CSM     CS       FLAGWRD1         R66 CONTROL
0336   REF  10  LAST  558   36,2455  7 4764 1             MASK     TRACKBIT
0337   REF 151  LAST  559   36,2456  10 000 0             CCS      A
0338   REF   7  LAST  558   36,2457  1 2416 1             TCF      FIXDB

0339   REF 114  LAST  559   36,2460  0 4636 0             TC       BANKCALL         TRACKFLG SET, CONTINUE R66
0340   REF   2  LAST  555   36,2461   76333 0             CADR     R61CSM           CALL R61

0341   REF   5  LAST  537   36,2462  3 5011 1             CAF      .5SEC
0342   REF 115  LAST  559   36,2463  0 4636 0             TC       BANKCALL         WAIT .5 SEC AND REPEAT
0343   REF   6  LAST  557   36,2464   01731 0             CADR     DELAYJOB
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 0344    REF   2  LAST  557   36,2465  0 2454 0            TC       R66CSM

 0345                         36,2466   74707 1  35DEGANG 2DEC     -.097222222222
 0345                         36,2467   43433 1
 0346                         36,2470   01516 1  V06N78UT VN       0678
 0347                         36,2471   00306 1  V01N70UT VN       0170
 0348    REF   1                 5035            V06N88UT =        V06N88
 0349                         36,2472   01517 0  V06N79UT VN       0679
 0350    REF   2  LAST  458      5027            V06N34UT =        V06N34
 0351                         36,2473   14631 0  TUFITS   2DEC     .4
 0351                         36,2474   23146 0
 0352                         36,2475   77730 0  NEG47UT  OCT      77730
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P0353   ORBITAL NAVIGATION PROGRAM 22
 0355   REF   1                 30,2000                        SETLOC P20S1
 0356                           30,2153                        BANK

 0357   REF  10  LAST  293      E7,1751                        EBANK=  LANDMARK
 0358   REF   1                                                COUNT*  $$/P22

 0359   REF 116  LAST  559      30,2153  0 4636 0   PROG22     TC      BANKCALL
 0360   REF   2  LAST  552      30,2154   03731 1              CADR    R02BOTH
 0361   REF  83  LAST  558      30,2155  0 6006 1              TC      INTPRET
 0362                           30,2156   43014 0              BOFF    SET
 0363   REF   7  LAST  556      30,2157   04346 1                      UTFLAG
 0364                           30,2160   60162 1                      +2
 0365   REF   7  LAST  553      30,2161   00472 0                      TRACKFLG
 0366                           30,2162   47014 1              CLEAR   RTB
 0367   REF   6  LAST  556      30,2163   00270 1                      RNDVZFLG
 0368   REF  11  LAST  554      30,2164   51751 0                      LOADTIME
 0369   REF  17  LAST  519      30,2165   34041 0              STCALL  TDEC1
 0370   REF   3  LAST  505      30,2166   27170 1                      CSMCONIC          INTEGRATE TO PRESENT TIME
 0371                           30,2167   47375 0              VLOAD   VXV               CROSS PRODUCT BETWEEN V AND R
 0372   REF  12  LAST  518      30,2170   00007 0                      VATT
 0373   REF  14  LAST  518      30,2171   00001 0                      RATT
 0374                           30,2172   50256 0              UNIT    DOT
 0375   REF  14  LAST  539      30,2173   01742 1                      REFSMMAT +6
 0376                           30,2174   77646 0              ABS
 0377                           30,2175   65552 0              SL1     ARCCOS
 0378   REF   6  LAST  495      30,2176   03626 0              STORE   +MGA
 0379                           30,2177   77776 1              EXIT
 0380   REF   1                 30,2200  3 2257 0              CAF     V06N45B
 0381   REF   3  LAST  553      30,2201  0 5540 0              TC      VNFLASHR
 0382   REF   1                 30,2202  0 2206 1              TC      PROG22A
 0383   REF  22  LAST  554      30,2203  3 6214 0              CAF     THREE
 0384   REF   3  LAST  553      30,2204  0 5516 0              TC      BLANKET           BLANK OUT R1 + R2
 0385   REF  59  LAST  559      30,2205  0 5205 0              TC      ENDOFJOB
 0386   REF   7  LAST  521      30,2206  4 5051 1   PROG22A    CS      PRIO7             RESULT=70777  SET OFFSET NO.=0
 0387   REF  11  LAST  561      30,2207  7 1751 1              MASK    LANDMARK
 0388   REF  12  LAST  561      30,2210  55'751 1              TS      LANDMARK
 0389   REF  12  LAST  555      30,2211  0 5362 0              TC      2PHSCHNG
 0390                           30,2212   00004 0              OCT     00004
 0391                           30,2213   05022 1              OCT     05022
 0392                           30,2214   13000 0              OCT     13000
 0393   REF  39  LAST  557      30,2215  0 5547 1              TC      UPFLAG
 0394   REF   1                 30,2216   00025 0              ADRES   TARG2FLG          SET =1 FOR SIGHTING LMK
 0395   REF  40  LAST  561      30,2217  0 5547 1              TC      UPFLAG
 0396   REF   3  LAST  553      30,2220   00026 0              ADRES   VEHUPFLG          VEH.=CSM
 0397   REF  84  LAST  561      30,2221  0 6006 1              TC      INTPRET
 0398                           30,2222   43014 0              CLEAR   CLEAR
 0399   REF   7  LAST  522      30,2223   01663 0                      LUNAFLAG
 0400   REF   2  LAST  245      30,2224   01664 1                      P22MKFLG
 0401                           30,2225   43014 0              SET     BOFF
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0402   REF   4  LAST  538   30,2226   00462 1                     ERADFLAG
0403   REF   9  LAST  496   30,2227   04343 1                     CMOONFLG
0404   REF   1              30,2230   60240 1                     PROG22B          EARTH
0405                        30,2231   77614 1            SET                       MOON
0406   REF   8  LAST  561   30,2232   01463 1                     LUNAFLAG
0407                        30,2233   45145 0            DLOAD    CALL             MPAC=V05N70,MPAC+1=NONZERO FOR N70
0408   REF   1              30,2234   23513 1                     V05N7022
0409   REF   1              30,2235   60332 0                     S22N7071
0410                        30,2236   77650 1            GOTO
0411   REF   1              30,2237   60242 0                     CALLR52
0412                        30,2240   77624 1  PROG22B   CALL                      GET LAT/LONG/ALT FROM ASTRO
0413   REF   1              30,2241   60304 0                     P22SUBRB
0414                        30,2242   77624 1  CALLR52   CALL
0415   REF   2  LAST  555   30,2243   31005 0                     R52
0416                        30,2244   45135 1  DOV5N71   SLOAD    CALL             MPAC=V05N71,MPAC+1=0 FOR N71
0417   REF   1              30,2245   23514 0                     V05N7122
0418   REF   2  LAST  562   30,2246   60332 0                     S22N7071
0419                        30,2247   66214 0  PROG22C   SET      SSP
0420   REF   3  LAST  561   30,2250   01464 0                     P22MKFLG         FOR DOWNLINK
0421   REF   2  LAST  134   30,2251   03746 1                     BKK
0422                        30,2252   00001 0            DEC      1
0423                        30,2253   77531 0            SSP      EXIT
0424   REF   2  LAST  134   30,2254   03751 1                     S22LOC
0425   REF  26  LAST  248   30,2255   03537 0            ECADR    SVMRKDAT
0426   REF   1              30,2256 0 2466 1            TC       S22.1

0427                        30,2257   01455 1  V06N45B   VN       0645
0428   REF   1              31,3512            V05N7022 =        V05N70
0429   REF   1              31,3513            V05N7122 =        V05N71
0434                        30,2260   77634 0  S22LSITE RTB                        CONVERT RLS FROM MOON-FIXED TO BASIC REF
0435   REF  12  LAST  561   30,2261   51751 0                     LOADTIME
0436                        30,2262   24007 0            STOVL    6D               6-7D= TIME
0437   REF   6  LAST  547   30,2263   02026 1                     RLS
0438                        30,2264   14001 0            STODL    0D               0-5D= LANDING SITE VECTOR
0439   REF   4  LAST  448   30,2265   15334 1                     HIDPHALF         MPAC= ANY NON-ZERO FOR MOON
0440                        30,2266   77624 1            CALL
0441   REF   2  LAST  459   30,2267   55345 0                     RP-TO-R          RLS IN BASIC REF B-27 IN MPAC
0442                        30,2270   77742 0            VSR2                      LUNAFLAG AND ERADFLAG SET ABOVE
0443   REF   4  LAST  459   30,2271   02152 0            STORE    ALPHAV           SCALE RLS B-29 FOR LAT-LONG
0444                        30,2272   77634 0            RTB
0445   REF  13  LAST  562   30,2273   51751 0                     LOADTIME         SET PRESENT TIME IN MPAC FOR LAT-LONG
0446                        30,2274   77624 1            CALL
0447   REF   3  LAST  459   30,2275   26453 1                     LAT-LONG
0448                        30,2276   77650 1            GOTO
0449   REF   2  LAST  129   30,2277   03667 0                     S22TOFF          EXIT
0450                        30,2300   77624 1  OBTAINLL CALL                       GET LAT/LONG/ALT FROM ASTRO
0451   REF   2  LAST  562   30,2301   60304 0                     P22SUBRB
0452                        30,2302   77650 1            GOTO
0453   REF   3  LAST  562   30,2303   03667 0                     S22TOFF          EXIT
0454                        30,2304   77420 1  P22SUBRB STQ      EXIT             GET LAT/LONG/ALT FROM ASTRO
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 0455   REF    4  LAST  562   30,2305    03670 0                     S22TOFF +1
 0456   REF    1              30,2306  3 5036 1    +2      CAF      V06N89B
 0457   REF   16  LAST  556   30,2307  0 5535 1            TC       VNFLASH
 0458   REF   85  LAST  561   30,2310  0 6006 1            TC       INTPRET
 0459                         30,2311    51545 1            DLOAD    ABS                TEST LAT/LONG GREATER THAN 90
 0460   REF    2  LAST  294   30,2312    00747 0                     LANDLAT
 0461                         30,2313    50021 1            BDSU     BMN                1/4 REV - LAT
 0462   REF    3  LAST  404   30,2314    15326 1                     DP1/4TH
 0463   REF    1              30,2315    60323 0                     N89ERRX
 0464                         30,2316    51545 1            DLOAD    ABS
 0465   REF    3  LAST  294   30,2317    02351 1                     LANDLONG
 0466                         30,2320    51021 0            BDSU     BPL
 0467   REF    4  LAST  563   30,2321    15326 1                     DP1/4TH
 0468   REF    2  LAST  563   30,2322    60326 0                     N89ERRX +3
 0469                         30,2323    77776 1  N89ERRX   EXIT
 0470   REF    9  LAST  556   30,2324  0 4362 1            TC       FALTON
 0471   REF    3  LAST  562   30,2325  0 2306 0            TC       P22SUBRE +2        LONG GR. THAN 90  REDISPLAY
 0472                         30,2326    77624 1    +3      CALL
 0473   REF    1              30,2327    62371 0                     LLASRDA
 0474                         30,2330    77650 1            GOTO
 0475   REF    5  LAST  563   30,2331    03670 0                     S22TOFF +1         EXIT
 0476   REF    3  LAST  562   30,2332    03746 1  S22N7071 STORE    8KK                8KK=V05N71,V05N70 8KK+1=0 N71,NOT 0 N70
 0477                         30,2333    77420 1            STQ      EXIT
 0478   REF    6  LAST  563   30,2334    03667 0                     S22TOFF
 0479   REF    4  LAST  563   30,2335  3 1745 0  S22DSPPA CA       8KK                V05N70 OR V05N71
 0480   REF    4  LAST  561   30,2336  0 5540 0            TC       VNFLASHR
 0481                         30,2337  0 2343 1            TC       +4
 0482   REF   11  LAST  553   30,2340  3 4773 0            CAF      FIVE               IMMEDIATE RETURN BLANK OUT R1,R3
 0483   REF    4  LAST  561   30,2341  0 5516 0            TC       BLANKET
 0484   REF   60  LAST  561   30,2342  0 5205 0            TC       ENDOFJOB
 0485   REF   13  LAST  561   30,2343  3 1751 0            CA       LANDMARK
 0486   REF    8  LAST  561   30,2344  7 5051 1            MASK     PRIO7              07000
 0487                         30,2345  0 0006 1            EXTEND
 0488   REF   25  LAST  386   30,2346  7 4763 0            MP       BIT6
 0489   REF    2  LAST  134   30,2347  55'744 0            TS       CXOFF              00000 = OFFSET INDICATOR
 0490   REF   12  LAST  563   30,2350  4 4773 1            CS       FIVE
 0491   REF    3  LAST  563   30,2351  6 1744 1            AD       CXOFF
 0492                         30,2352  0 0006 1            EXTEND
 0493                         30,2353  6 2355 0            BZMF     +2                 OFF=0 THRU 5 OK
 0494   REF    1              30,2354  0 2367 1            TC       S22DSPP            OFF=6,7 ILLEGAL REDISPLAY
 0495   REF   32  LAST  559   30,2355  0 5561 0            TC       DOWNFLAG
 0496   REF    1              30,2356    00141 0            ADRES    KNOWNFLG           CLEAR KNOWNFLG
 0497   REF   14  LAST  563   30,2357  3 1751 0            CA       LANDMARK           MASK A FROM ABCDE
 0498   REF    2  LAST  175   30,2360  7 7673 0            MASK     13,14,15
 0499                         30,2361  0 0006 1            EXTEND
 0500   REF    2  LAST  563   30,2362  6 2367 1            BZMF     S22DSPP            A=0,4,5,6,7  ILLEGAL REDISPLAY
 0501   REF    2  LAST  134   30,2363  55'743 1            TS       22SUBSCL           TEMP
 0502   REF   30  LAST  531   30,2364  4 4753 0            CS       BIT14
 0503   REF    3  LAST  563   30,2365  6 1743 0            AD       22SUBSCL
 0504   REF  152  LAST  559   30,2366  10 000 0            CCS      A
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0505   REF  10  LAST  563    30,2367  0 4362 1  S22DSPP   TC       FALTON             +  A=3 ILLEGAL REDISPLAY
0506   REF   1               30,2370  0 2335 0            TC       S22DSPPA           COMMON ERROR EXIT BACK TO DISPLAY
0507                         30,2371  0 2373 1            TC       +2                 -    A=1 KNCWN LMK  CHECK DE
0508   REF   1               30,2372  0 2417 1            TC       S22ABDE            -0   A=2 UNKNOWN LMK,DE MEANINGLESS
0509   REF  41  LAST  561    30,2373  0 5547 1            TC       UPFLAG
0510   REF   2  LAST  563    30,2374   00141 0            ADRES    KNOWNFLG           SET KNOWNFLG
0511   REF   2  LAST  487    30,2375  4 7677 1            CS       HIGH9              RESULT= 00077
0512   REF  15  LAST  563    30,2376  7 1751 1            MASK     LANDMARK
0513   REF   4  LAST  563    30,2377  55'743 1            TS       22SUBSCL           000DE
0514   REF  31  LAST  547    30,2400  4 4770 1            CS       BIT1
0515   REF   5  LAST  564    30,2401  6 1743 0            AD       22SUBSCL
0516                         30,2402  0 0006 1            EXTEND
0517   REF   2  LAST  564    30,2403  6 2417 1            BZMF     S22ABDE            DE=0,1 OK FOR BOTH N70,N71
0518   REF   5  LAST  563    30,2404  3 1746 0            CA       8KK +1             =0 FOR N71, NOT =0 FOR N70
0519                         30,2405  0 0006 1            EXTEND
0520   REF   3  LAST  563    30,2406  1 2367 0            BZF      S22DSPP            N71 REDISPLAY  DE MUST= 0 OR 1
0521   REF  23  LAST  521    30,2407  3 4764 0            CA       BIT5               N70 TEST DE= 50-57 OCTAL FOR ADV. ORBIT
0522   REF   6  LAST  393    30,2410  6 5004 0            AD       OCT50              SUM=00070
0523   REF   6  LAST  564    30,2411  7 1743 1            MASK     22SUBSCL           000D0
0524   REF 153  LAST  563    30,2412  4 0000 0            CS       A
0525   REF   7  LAST  564    30,2413  6 5004 0            AD       OCT50
0526                         30,2414  0 0006 1            EXTEND
0527   REF   1               30,2415  1 2427 0            BZF      DE-GR-50           D=5 OR DE=50-57,OK FOR N70
0528   REF   4  LAST  564    30,2416  0 2367 1            TC       S22DSPP            DE NOT 50-57  ILLEGAL,REDISPLAY
0529   REF  86  LAST  563    30,2417  0 6006 1  S22ABDE   TC       INTPRET
0530                         30,2420   67214 1            BOFF     SLOAD
0531   REF   3  LAST  564    30,2421   03347 1                     KNOWNFLG           UNKNOWN LMK, DE MEANINGLESS
0532   REF   7  LAST  563    30,2422   03667 0                     S22TOFF
0533   REF   7  LAST  564    30,2423   03744 0                     22SUBSCL           =0 GET LLA FROM ASTRO,NOT=0 USE RLS
0534                         30,2424   52030 0            BHIZ     GOTO
0535   REF   1               30,2425   60300 1                     OBTAINLL           GET LAT/LONG/ALT FROM ASTRO  N89
0536   REF   1               30,2426   60260 0                     S22LSITE           GET LAT/LONG/ALT FROM RLS
0537   REF  87  LAST  564    30,2427  0 6006 1  DE-GR-50  TC       INTPRET            ADVANCED ORBIT OPTION IN R52
0538                         30,2430   45014 0            SET      CALL               ADVANCED ORBIT ENTRANCE TO R52
0539   REF   1               30,2431   04065 0                     ADVTRK
0540   REF   1               30,2432   31007 1                     R52VRB
0541                         30,2433   77650 1            GOTO
0542   REF   1               30,2434   60244 0                     DUV5N71
0543   REF   1               13,2000                      SETLOC   P24PROG
0544                         13,2254                      BANK
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P0545   PROGRAM 24
 05455  REF   1                                            COUNT*  $$/P24
 0546   REF   1                  13,2254  3 0737 1  PROG24   CA      NO.PASS
 0547   REF   1                  13,2255  55'131 1           TS      PASSCNT
 0548   REF  13  LAST  561       13,2256  0 5362 0           TC      2PHSCHNG
 0549                            13,2257   00004 0           OCT     00004
 0550                            13,2260   05022 1           OCT     05022
 0551                            13,2261   13000 0           OCT     13000
 0552   REF 117  LAST  561       13,2262  0 4636 0           TC      BANKCALL
 0553   REF   3  LAST  561       13,2263   03731 1           CADR    R02BOTH             IMU STATUS CHECK
 0554   REF  88  LAST  564       13,2264  0 6006 1           TC      INTPRET
 0555                            13,2265   43014 0           BOFF    SET
 0556   REF   8  LAST  561       13,2266   04346 1                   UTFLAG
 0557                            13,2267   26271 1                   +2
 0558   REF   8  LAST  561       13,2270   00472 0                   TRACKFLG
 0559                            13,2271   43014 0           CLEAR   CLEAR
 0560   REF   3  LAST  247       13,2272   01274 1                   P24MKFLG
 0561   REF   1                  13,2273   04261 0                   NEWLMFLG
 0562                            13,2274   43014 0           CLEAR   CLEAR
 0563   REF   3  LAST  273       13,2275   01671 0                   ORBWFLAG
 0564   REF   3  LAST  272       13,2276   02676 1                   RENDWFLG
 0565                            13,2277   76131 0           SSP     AXT,1               ZERO P22 DOWNLIST MARK BUFFER
 0566   REF   6  LAST  439       13,2300   00051 0                   S1
 0567                            13,2301   00006 1           DEC     6
 0568                            13,2302   00044 1           DEC     36
 0569                            13,2303   77214 0           SET     VLOAD
 0570   REF   2  LAST  209       13,2304   04461 0                   P24FLAG
 0571   REF   3  LAST  491       13,2305   11762 1                   ZEROVEC
 0572   REF  27  LAST  562       13,2306   07604 1  ZERODNLK STORE   SVMRKDAT +36D,1
 0573                            13,2307   43100 1           TIX,1   CLEAR
 0574   REF   1                  13,2310   26306 0                   ZERODNLK
 0575   REF   4  LAST  562       13,2311   01664 1                   P22MKFLG
 0576                            13,2312   47014 1           CLEAR   RTB
 0577   REF   7  LAST  561       13,2313   00270 1                   RNDVZFLG
 0578   REF  14  LAST  562       13,2314   51751 0                   LOADTIME
 0579   REF   4  LAST  554       13,2315   35062 0           STCALL  MARKTIME
 0580   REF   1                  13,2316   56462 1                   SETINTG
 0581                            13,2317   77624 1           CALL
 0582   REF   4  LAST  456       13,2320   27236 0                   INTEGRV             UPDATE STATE VEC TO CURRENT TIME
 0583                            13,2321   43014 0           SET     CLEAR
 0584   REF   5  LAST  562       13,2322   00462 1                   ERADFLAG
 0585   REF   9  LAST  562       13,2323   01663 0                   LUNAFLAG
 0586                            13,2324   43014 0           BOFF    SET
 0587   REF  10  LAST  562       13,2325   04343 1                   CMOONFLG
 0588                            13,2326   26330 0                   +2
 0589   REF  10  LAST  565       13,2327   01463 1                   LUNAFLAG
 0590                            13,2330   77624 1           CALL
 0591   REF   4  LAST  563       13,2331   60304 0                   P22SUBRB
 0592                            13,2332   77776 1           EXIT
 0593   REF  14  LAST  565       13,2333  0 5362 0           TC      2PHSCHNG
 0594                            13,2334   00004 0          OCT     00004
 0595                            13,2335   05022 1          OCT     05022
 0596                            13,2336   13000 0          OCT     13000
 0597   REF  89  LAST  565       13,2337  0 6006 1          TC      INTPRET
 0598                            13,2340   45014 0          SET     CALL
 0599   REF   2  LAST  561       13,2341   00466 0                  TARG2FLG
 0600   REF   3  LAST  562       13,2342   31005 0                  R52
 0601                            13,2343   77776 1          EXIT
 0602   REF  17  LAST  553       13,2344  0 4103 1          TC      GOTOPOOH
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R0603   PROGRAM NAME- OPTICS CALIBRATION ROUTINE
R0604   MOD NO- 1
R0605   MOD BY- TOM KNATT
R0606
R0607   FUNCTIONAL DESCRIPTION- TO MEASURE THE EFFECT OF SOLAR RADIATION ON
R0608     THE SXT TRUNNION ANGLE AND TO STORE THE MEASURED TRUNNION BIAS FOR P23
R0609
R0610   CALLING SEQUENCE- CALL
R0611                           R57
R0612
R0613   SUBROUTINES CALLED- DISPLAY ROUTINES
R0614
R0615   NORMAL EXIT MODES-VIA EGRESS
R0616
R0617   ALARMS- NONE
R0618
R0619   ABORT MODES- P23ABORT IF MARKING SYSTEM OR EXTENDED VERB ACTIVE
R0620   INPUT- NONE REQUIRED, NORMALLY CALLED BY P23
R0621   OUTPUT- TRUNNION BIAS ANGLE- ANGLE DETERMINED WHEN SHAFT LINE OF SIGHT
R0622   (SLOS) AND LANDMARK LINE OF SIGHT (LLOS) ARE SUPERIMPOSED. THIS ANGLE
R0623   MAY NOT BE EXACTLY ZERO BECAUSE OF UNEVEN HEATING OF THE OPTICS,FOR
R0624   EXAMPLE.
R0625
R0626   ERASABLE INITIALIZATION REQUIRED- MRKBUF1, EXTVBACT
R0627
R0628   DEBRIS- RUPTREGS USED BY MARKRUPT AND ERASABLES USED BY DISPLAYS
 0630   REF   2  LAST  456   37,2000                          SETLOC P20S
 0631                        37,2167                          BANK
 0632   REF   1                                               COUNT* $$/R57
 0633   REF  27  LAST  554   E7,1722                          EBANK= MRKBUF1
 0634                        37,2167   77420 1  R57           STQ    EXIT
 0635   REF   2  LAST   94   37,2170   02310 1                       EGRESS
 0636   REF   6  LAST  555   37,2171 4 0077 0  R57A           CS     FLAGWRD3       IS THE IMU ALIGNED
 0637   REF   4  LAST  555   37,2172 7 4754 1                 MASK   REFSMBIT
 0638   REF 154  LAST  564   37,2173 10 000 0                 CCS    A
 0639   REF   1              37,2174 1 2213 1                 TCF    R57C           NO
 0640   REF   1              37,2175 3 4776 0                 CAF    ALRM15         YES SHOULD AUTO ACQUISITION OF STAR
 0641   REF 118  LAST  565   37,2176 0 4636 0                 TC     BANKCALL           BE PERFORMED
 0642   REF   2  LAST  215   37,2177   21067 0                CADR   GOPERF1
 0643   REF  18  LAST  566   37,2200 0 4103 1                 TC     GOTOPOOH       TERM
 0644                        37,2201 0 2203 1                 TC     +2             PRO YES
 0645   REF   2  LAST  567   37,2202 0 2213 0                 TC     R57C           ENTER NO
 0646   REF  90  LAST  566   37,2203 0 6006 1                 TC     INTPRET
 0647                        37,2204   77624 1                CALL
 0648   REF   1              37,2205   30761 1                       R51DSPA
 0649                        37,2206   77624 1                CALL
 0650   REF   1              37,2207   62756 1                       DOR60
 0651                        37,2210   77776 1                EXIT
 0652   REF  37  LAST  559   37,2211 0 5402 1                 TC     PHASCHNG
 0653                        37,2212   04022 0                OCT    04022
 0654    REF 119  LAST  567    37,2213  0 4636 0  R57C       TC      BANKCALL
 0655    REF   2  LAST  241    37,2214   16062 1             CADR    TESTMARK
 0656    REF  42  LAST  564    37,2215  0 5547 1             TC      UPFLAG                SET V59FLAG(BIT 12 FLAG 5) TO INDICATE
 0657    REF   1               37,2216   00116 1             ADRES   V59FLAG               CALIBRATION MARK
 0658    REF   1               37,2217  3 2260 1             CAF     V59NB
 0659    REF 120  LAST  568    37,2220  0 4636 0             TC      BANKCALL
 0660    REF   1               37,2221   20607 1             CADR    GOMARKFR
 0661    REF  19  LAST  567    37,2222  0 4103 1             TC      GCTOPOOH              TERMINATE
 0662    REF   1               37,2223  0 2247 1             TC      ENDR57
 0663    REF   2  LAST  568    37,2224  0 2247 1             TC      ENDR57
 0664    REF  11  LAST  447    37,2225  3 4774 1             CAF     SEVEN
 0665    REF   5  LAST  563    37,2226  0 5516 0             TC      BLANKET               BLANK OUT R1,R2,R3
 0666    REF  61  LAST  563    37,2227  0 5205 0             TC      ENDOFJOB
R0667    STORE TRUNNION ANGLE (OCDU)
 0668    REF   1               37,2230  3 2257 0  MARKDISP   CAF     V06N87NB
 0669    REF 121  LAST  568    37,2231  0 4636 0             TC      BANKCALL
 0670    REF   2  LAST  568    37,2232   20607 1             CADR    GOMARKFR
 0671    REF  20  LAST  568    37,2233  0 4103 1             TC      GCTOPOOH              TERMINATE
 0672    REF   1               37,2234  0 2241 1             TC      R57B                  PROCEED
 0673    REF   1               37,2235  0 2255 1             TC      R57D                  RECYCLE
 0674    REF  13  LAST  563    37,2236  3 4773 0             CAF     FIVE
 0675    REF   6  LAST  568    37,2237  0 5516 0             TC      BLANKET               BLANK OUT R1,R3
 0676    REF  62  LAST  568    37,2240  0 5205 0             TC      ENDOFJOB
 0677    REF   1               37,2241  3 2262 0  R57B       CA      19.77DEG              PUT FIXED INTO ERASABLE FOR MSU
 0678    REF  65  LAST  543    37,2242  54 001 1             TS      L                     INSTRUCTION COMING UP
 0679    REF  28  LAST  567    37,2243  3 1727 1             CA      MRKBUF1 +5            CONTAINS TRUNNION
 0680                          37,2244  0 0006 1             EXTEND
 0681    REF  66  LAST  568    37,2245  20 001 1             MSU     L                     CORRECTS TRUNBIAS FROM 2'S TO 1'S
 0682    REF   1               37,2246  55 024 1             TS      TRUNBIAS
 0683    REF  33  LAST  563    37,2247  0 5561 0  ENDR57     TC      DOWNFLAG              RESET V59FLAG
 0684    REF   2  LAST  568    37,2250   00116 1             ADRES   V59FLAG               BIT 12  FLAG 5
 0685    REF   5  LAST  509    37,2251  0 5527 1             TC      CLEARMRK              ALLOW R53 IN

 0686    REF  91  LAST  567    37,2252  0 6006 1             TC      INTPRET
 0687                          37,2253   77650 1             GOTO
 0688    REF   3  LAST  567    37,2254   02310 1                     EGRESS
 0689    REF   6  LAST  568    37,2255  0 5527 1  R57D       TC      CLEARMRK
 0690    REF   1               37,2256  1 2171 0             TCF     R57A
 0691                          37,2257   01527 0  V06N87NB   VN      0687
 0692                          37,2260   16600 0  V59NB      VN      5900
 0693                          37,2261   14655 1  V51N45     VN      5145
 0694                          37,2262   61740 0  19.77DEG   OCT     61740
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L         P20-P25                                                                            USER'S PAGE NO. 18      E7 S3

R0695     RENDEZVOUS TRACKING SIGHTING MARK ROUTINE (R21)
R0696     AND BACKUP SIGHTING MARK ROUTINE (R23)

R0697     PROGRAM DESCRIPTION
R0698     MOD NO - 1
R0699     MOD BY - N.BRODEUR
R0700     FUNCTIONAL DESCRIPTION
R0701
R0702       TO PERFORM SIGHTING MARKS IN CONJUNCTION WITH THE RENDEZVOUS NAVIG-
R0703     ATION PROGRAM. CALLED BY ASTRONAUT VIA EXTENDED VERB
R0704     CALLING SEQUENCE -
R0705             R21 VIA V 57
R0706             R23 VIA V 54
R0707     SUBROUTINES CALLED -
R0708       FLAGUP         FLAGDOWN        BANKCALL
R0709       ENDOFJOB       GOMARK2         GOMARKF
R0710       INTPRET        GENTRAN         KLEENEX
R0711       ENDMARK
R0712     NORMAL EXIT MODES-
R0713       MARKRUPT USED BY SXTMARK HAS BEEN MODIFIED TO STORE MARK IN MRKBUF2
R0714     FOR USE BY R22. WHEN ASTRONAUT IS FINISHED TAKING MARKS, HE HITS AN
R0715     PROCEED ,   R21 IS TERMINATED THUS CAUSING THE FINAL MARK TO BE TRANSFRD
R0716     TO MRKBUF2 FOR PROCESSING BY R22
R0717     ALARM OR ABORT EXIT MODES -
R0718       NONE
R0719     OUTPUT -
R0720       7 REGISTER MRKBUF2 CONTAINING TIME2,TIME1,CDUY,OPTICS X,CDUZ,OPTICS Y,
R0721     CDUX.
R0722     ERASABLE INITIALIZATION REQUIRED
R0723     FLAGS SET AND RESET
R0724       R21MARK   (COMMUNICATION TO MARKRUPT TC STORE MARKS IN MRKBUF1 + 2)
R0725       R23FLG  INDICATES COAS MARKING
R0726     DEBRIS
  0727    REF  29  LAST  568    E7,1722                            EBANK= MRKBUF1
  0728    REF   1               37,2000                            SETLOC RENDEZ
  0729                          37,2263                            BANK

  0730    REF   1                                                  COUNT* $$/R23
  07301   REF  34  LAST  568    37,2263  0 5561 0   R23CSM         TC     DOWNFLAG
  07302   REF   6  LAST  556    37,2264   00037 0                  ADRES  R21MARK
  0731    REF  12  LAST  515    37,2265  3 7702 0                  CAF    NEGONE
  0732    REF  30  LAST  569    37,2266  55'722 0                  TS     MRKBUF1
  0733    REF   1               37,2267  3 7651 1                  CAF    PRIO27
  0734    REF   8  LAST  558    37,2270  0 5176 1                  TC     PRIOCHNG         HIGHER THAN R22

  0735    REF   1               37,2271  3 2332 1                  CAF    V0694            R23 BACKUP MARKING
  0736    REF 122  LAST  568    37,2272  0 4636 0                  TC     BANKCALL         DISPLAY SHAFT + TRUNNION
  0737    REF   4  LAST  507    37,2273   20576 1                  CADR   GOMARKF
  0738    REF   1               37,2274  0 2320 1                  TC     R21END           TERM
  0739                          37,2275  0 2277 1                  TC     +2               PROC
```

```
0740                      37,2276  0 2271 1            TC      -5              ENTER
0741  REF   1             37,2277  3 2331 1  R23CSM1   CAF     V53N45          PERFORM ALT LOS SIGHT MARK
0742  REF 123  LAST  569  37,2300  0 4636 0            TC      BANKCALL
0743  REF   1             37,2301   20612 0            CADR    MARKMONR
0744  REF   2  LAST  569  37,2302  0 2320 1            TC      R21END          V34-TERMINATE R23
0745  REF   3  LAST  570  37,2303  1 2320 0            TCF     R21END          PRO END BACK-UP MARKING (R23)
0746                      37,2304  0 0004 0            INHINT
0747                      37,2305  0 0006 1            EXTEND
0748  REF  22  LAST  557  37,2306  3 0025 0            DCA     TIME2
0749  REF  31  LAST  569  37,2307  53'723 1            DXCH    MRKBUF1         READ TIME
0750  REF   5  LAST  538  37,2310  3 0033 1            CA      CDUY            READ CDU ANGLES
0751  REF  32  LAST  570  37,2311  55'724 0            TS      MRKBUF1 +2
0752  REF   9  LAST  538  37,2312  3 0034 0            CA      CDUZ
0753  REF  33  LAST  570  37,2313  55'726 1            TS      MRKBUF1 +4
0754  REF  11  LAST  538  37,2314  3 0032 0            CA      CDUX
0755  REF  34  LAST  570  37,2315  55'730 0            TS      MRKBUF1 +6
0756                      37,2316  0 0003 1            RELINT
0757  REF   1             37,2317  0 2277 1            TC      R23CSM1
0758  REF 124  LAST  570  37,2320  0 4636 0  R21END    TC      BANKCALL
0759  REF   2  LAST  241  37,2321   20575 1            CADR    KLEENEX
0760  REF  13  LAST  569  37,2322  3 7702 0            CA      NEGONE
0761  REF  35  LAST  570  37,2323  55'722 0            TS      MRKBUF1         CLEAR BUFFERS FOR REGULAR MARKING
0762  REF   7  LAST  392  37,2324  3 5055 1            CAF     PRIO16
0763  REF   9  LAST  569  37,2325  0 5176 1            TC      PRIOCHNG        LOWER THAN R22

0764  REF  43  LAST  568  37,2326  0 5547 1            TC      UPFLAG          SET R21MARK TO ALLOW REG OPTICS MARKING
0765  REF   7  LAST  569  37,2327   00037 0            ADRES   R21MARK         BIT 14  FLAG 2
0766  REF   1             37,2330  0 5524 1            TC      ENDMARK         END MARKING AND ENDJOB
0767                      37,2331   15255 1  V53N45    VN      5345
0768                      37,2332   01536 0  V0694     VN      0694
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R0769   PREFERRED TRACKING ATTITUDE ROUTINE R61CSM
R0770   PROGRAM DESCRIPTION
R0771   MOD NO - 2
R0772   MOD BY - N.BRODEUR
R0773   FUNCTIONAL DESCRIPTION-
R0774     TO COMPUTE THE PREFERRED TRACKING ATTITUDE OF THE CSM TO ENABLE OPTICS
R0775   TRACKING OF THE LM AND TO PERFORM THE MANEUVER TO THE PREFERRED
R0776   OR X-AXIS TRACKING ATTITUDE.
R0777   CALLING SEQUENCE-
R0778             TC      BANKCALL
R0779             CADR    R61CSM
R0780   SUBROUTINES CALLED
R0781     MAKECADR           BANKCALL
R0782     INTPRET         FLAGUP           FLAGDOWN
R0783     BANKJUMP        CRS61.1          R60CSM
R0784     PHASCHNG
R0785   NORMAL EXIT MODES-
R0786     NORMAL RETURN IS TO CALLER + 1
R0787   OUTPUT -
R0788     SEE OUTPUT FOR CRS61.1 & ATTITUDE MANEUVER ROUTINE (R60CSM)
R0789   ERASABLE INITIALIZATION REQUIRED
R0790     GENRET USED TO SAVE Q FOR RETURN
R0791     R61CNTR MUST BE PRESET TO ZERO
R0792   FLAGS SET + RESET
R0793     3-AXIS FLAG
R0794   DEBRIS
R0795     SEE SUBROUTINES
 0796   REF   3  LAST  119   E6,1770                               EBANK=  GENRET
 0797   REF   1                                                    COUNT*  $$/R61            ROUTINES - NAVIGATION - PREF. TR. ATT=

 0798   REF   7  LAST  539   37,2333  0 4611 0   R61CSM     TC      E6SETTER          SWITCH TO E6 - RETURNS WITH OLD SETTING
 0799   REF   2  LAST  119   37,2334  55'771 0              TS      SAVBNK            SAVE EBANK
 0800   REF   3  LAST  394   37,2335  0 4665 0              TC      MAKECADR
 0801   REF   4  LAST  571   37,2336  55'770 1              TS      GENRET
 0802   REF  15  LAST  558   37,2337  11'774 0              CCS     R61CNTR           TEST R61CNTR
 0803   REF   1              37,2340  0 2416 0              TC      DECRM61           NOT READY TO DO R61.
 0804                        37,2341  0 2343 1              TC      +2                DO R61
 0805   REF   2  LAST  571   37,2342  0 2417 1              TC      DECRM61 +1
 08052                       37,2343  0 0004 0              INHINT
 08054  REF   2  LAST  558   37,2344  3 5007 0              CAF     MINDB
 08056  REF   5  LAST  558   37,2345  55'655 1              TS      ADB
 0806   REF   5  LAST  558   37,2346  11'773 1              CCS     DBPTC
✓0807   REF  61  LAST  558   37,2347  6 4770 0              AD      ONE
 0808                        37,2350  1 2352 0              TCF     +2
 0809   REF  62  LAST  571   37,2351  6 4770 0              AD      ONE
 0810                        37,2352  0 0006 1              EXTEND
 0811                        37,2353  1 2355 1              BZF     +2                IGNOR ZERO DEADBAND
 0812   REF   6  LAST  571   37,2354  55'655 1              TS      ADB

 0813   REF  92  LAST  568   37,2355  0 6006 1              TC      INTPRET
 0814                            37,2356   77624 1              CALL
 0815     REF   1                37,2357   71432 1                        CRS61.1        LOS DETERMINATION + VEH ATTITUDE
 0816                            37,2360   77776 1  R61DMPTG EXIT                        DEFINE TAG FOR P20 EDIT DUMP
 0817     REF  35  LAST  569     37,2361  0 5561 0              TC        DOWNFLAG       RESET FLAG TO INHIBIT FURTHER R6
 0818     REF   4  LAST  553     37,2362   00055 1              ADRES     V50N18FL          ATTITUDE MANEUVERS
 0819     REF 246  LAST  557     37,2363  50 154 1              INDEX     MPAC
 0820                            37,2364  0 2365 0              TC        +1
 0821     REF   1                37,2365  0 2415 0              TC        R61END         SUBROUTINE DRIVING DAP (EXIT R61)
A0822                                                                                    OR AUTO MODE NOT SET (EXIT R61)
A0823                                                                                    OR STIKFLAG SET       (EXIT R61)
 0824     REF  36  LAST  572     37,2366  0 5561 0  R61C1       TC        DOWNFLAG       RESET 3-AXIS FLAG
 0825     REF   4  LAST  402     37,2367   00124 0              ADRES     3AXISFLG       BIT 6  FLAG 5
 0826     REF   3  LAST  215     37,2370  4 0107 0              CS        FLGWRD11
 0827     REF   2  LAST  215     37,2371  7 4761 1              MASK      AZIMBIT
 0828     REF 155  LAST  567     37,2372  10 000 0              CCS       A
 0829                            37,2373  0 2376 1              TC        +3             AZIMFLAG NOT SET,CLEAR 3AXISFLAG

 0830     REF  44  LAST  570     37,2374  0 5547 1              TC        UPFLAG         AZIMFLAG SET     ,SET   3AXISFLAG
 0831     REF   5  LAST  572     37,2375   00124 0              ADRES     3AXISFLG

 0832     REF  63  LAST  571     37,2376  4 4770 1              CS        ONE            SET R61CNTR NEG. TO INDICATE KALCMANU
 0833     REF  16  LAST  571     37,2377  55'774 0              TS        R61CNTR

 0834     REF  45  LAST  572     37,2400  0 5547 1              TC        UPFLAG         SET FLAG FOR PROIRITY DISPLAYS FOR R60
 0835     REF   2  LAST  395     37,2401   00077 1              ADRES     PDSPFLAG       BIT 12  FLAG 4
 0836     REF 125  LAST  570     37,2402  0 4636 0              TC        BANKCALL
 0837     REF   2  LAST  402     37,2403   56074 1              CADR      R60CSM
 0838     REF  37  LAST  572     37,2404  0 5561 0              TC        DOWNFLAG       RESET FLAG FOR PRIORITY DISPLAYS IN R60
 0839     REF   3  LAST  572     37,2405   00077 1              ADRES     PDSPFLAG       BIT 12  FLAG 4
 0840     REF 119  LAST  557     37,2406  3 4772 1              CAF       ZERO
 0841     REF 126  LAST  572     37,2407  0 4636 0              TC        BANKCALL
 0842     REF   1                37,2410   20753 1              CADR      PRIODSP        RELEASE DISPLAY
 0843     REF  38  LAST  567     37,2411  0 5402 1              TC        PHASCHNG
 0844                            37,2412   00111 0              OCT       00111
 08445    REF   5  LAST  559     01,2025            1P11SPT6 =            1.11SPOT
 0845     REF 120  LAST  572     37,2413  3 4772 1              CAF       ZERO
 0846     REF   3  LAST  571     37,2414  0 2416 0              TC        DECRM61
 0847     REF  23  LAST  561     37,2415  3 6214 0  R61END      CAF       THREE

 0848     REF  17  LAST  572     37,2416  55'774 0  DECRM61     TS        R61CNTR

 0849     REF   5  LAST  571     37,2417  31'770 0     +1       CAE       GENRET
 0850     REF 156  LAST  572     37,2420  22 000 1              LXCH      A              RETURN IS IN L
 0851     REF   3  LAST  571     37,2421  3 1771 1              CA        SAVBNK         RESTORE EBANK
 0852     REF  17  LAST  538     37,2422  56 003 1              XCH       EBANK
 0853     REF 157  LAST  572     37,2423  22 000 1              LXCH      A              RETURN IS NOW BACK IN A
 0854     REF   6  LAST  395     37,2424  0 4660 0              TC        BANKJUMP       EXIT R61
 0856     REF   1                23,2000                        SETLOC    P20S2
 0857                            23,2756                        BANK
 0858  REF  36  LAST  570   E7,1722                          EBANK= MRKBUF1
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R0859      BVECTOR PERFORMS COMPUTATIONS FOR
R0860     DELTAQ,THE MEASURED DEVIATION BASED ON THE DIFFERENCE BETWEEN THE CSM-LE
R0861     M STATE VECTOR ESTIMATES AND THE ACTUAL TRACKING MEASUREMENT.
R0862     US,THE MODIFIED FICTITIOUS STAR DIRECTION VECTOR
R0863     GEOMETRY VECTOR B ASSOCIATED WITH EACH TRACKING MEASUREMENT.
R0864     INPUT
R0865        UM,1/2 UNIT VECTOR ALONG THE CSM-LM LINE OF SIGHT (BASIC REF.SYSTEM)
R0866        USTAR,FICTITIOUS STAR DIRECTION (1/2 UNIT VECTOR)
R0867        RCLP,RELATIVE CSM TO LM POSITION VECTOR
R0868     OUTPUT
R0869        USTAR,MODIFIED FICTITOUS STAR DIRECTION (1/2 UNIT VECTOR)
R0870        BVECTOR = 9 DIMENSIONAL BVECTOR (1/2 UNIT VEC.)
R0871        DELTAQ = MEASURED DEVIATION
R0872     CALLING SEQUENCE
R0873        L  CALL BVECTORS
R0874     NORMAL EXIT
R0875        L+1 OF CALLING SEQUENCE

 0876     REF    1                                          COUNT* $$/INCOR
 0877                           23,2756    77620 0  BVECTORS STQ
 0878     REF    4  LAST  568   23,2757    02310 1                     EGRESS
 0879                           23,2760    53575 0           VLOAD     UNIT
 0880     REF    2  LAST  125   23,2761    03531 0                     RCLP                RELATIVE POSITION VECTOR
 0881                           23,2762    14033 1           STODL     26D                 RCLP UNIT VEC
 0882                           23,2763    00045 0                     36D                 RCLP ABS VALUE
 0883     REF    1              23,2764    25136 1           STOVL     TEMPOR1             MOVE TO SAFE LOCATION
 0884     REF    2  LAST   79   23,2765    01102 0                     USTAR
 0885                           23,2766    53435 0           VXV       UNIT
 0886                           23,2767    00033 1                     26D                 USTAR = UNIT(US X UCL)
 0887     REF    4  LAST  125   23,2770    37502 1           STCALL    BVECTOR
 0888     REF    1              23,2771    22327 1                     GRP2PC              PHASE CHANGE
 0889                           23,2772    77775 1           VLOAD
 0890     REF    5  LAST  574   23,2773    03502 0                     BVECTOR
 0891     REF    3  LAST  574   23,2774    01102 0           STORE     USTAR
 0892                           23,2775    72441 0           DOT       SL1
 0893     REF    2  LAST   79   23,2776    01072 0                     UM                  USTAR DOT UM
 0894                           23,2777    45326 1           ACOS      DSU
 0895     REF    5  LAST  563   23,3000    15326 1                     DPI/4TH
 0896                           23,3001    41301 0           NORM      DMP
 0897     REF    7  LAST  512   23,3002    00047 1                     X1
 0898     REF    1              23,3003    07016 1                     PI/4.0
 0899                           23,3004    53605 1           DMP       SRR*
 0900     REF    2  LAST  574   23,3005    01136 1                     TEMPOR1             RCLP ABS VALUE
 0901                           23,3006    21576 0                     0  -3,1             ADJUST SCALING
 0902     REF    2  LAST  125   23,3007    27524 1           STOVL     DELTAQ
 0903     REF   15  LAST  558   23,3010    15336 0                     ZEROVECS
 0904     REF    6  LAST  574   23,3011    03510 0           STORE     BVECTOR +6
 0905     REF    7  LAST  574   23,3012    03516 0           STORE     BVECTOR +12D
 0906                           23,3013    77650 1           GOTO
 0907     REF    5  LAST  574   23,3014    02310 1                     EGRESS
 0908                      23,3015   31103 1  PI/4.0   2DEC   .785398164
 0908                      23,3016   36652 0
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R0909    GETUM-DETERMINES THE LINE OF SIGHT UNIT VECTOR UM IN THE BASIC REFERENC
R0910   E COORDINATE SYSTEM FROM THE OPTICS SHAFT AND TRUNNION ANGLES AND THE IM
R0911   U GIMBAL ANGLES.
R0912   INPUT
R0913      MARKDATA,BASE ADDRESS OF MARK DATA
R0914      REFSMMAT,ROTATION MATRIX FROM STABLE MEMBER TO BASIC REF.COORD.SYSTEM

R0915   SUBROUTINES CALLED-
R0916      SXTNB - SEXT. ANGULAR READINGS TO NAV. BASE COOR.
R0917      NBSM  - TRANSFORM FROM NAV. BASE TO STABLE MEMBER
R0918   OUTPUT
R0919      MPAC = LINE OF SIGHT 1/2 UNIT VECTOR IN BASIC REFERENCE SYSTEM
R0920   CALLING SEQUENCE
R0921      L  CALL GETUM

R0922   NORMAL EXIT
R0923      L+1 OF CALLING SEQUENCE

 0924                         23,3017   40220 0  GETUM    STQ     SETPD
 0925   REF   6  LAST  574    23,3020   02310 1                   EGRESS
 0926                         23,3021   00001 0                   0
 0927                         23,3022   77624 1           CALL
 0928   REF   1               23,3023   36057 0                   SXTSM1
 0929                         23,3024   76505 0           VXM     VSL1
 0930   REF  15  LAST  561    23,3025   01734 0                   REFSMMAT
 0931                         23,3026   77650 1           GOTO                        MPAC =(UM)LINE OF SIGHT VECTOR
 0932   REF   7  LAST  576    23,3027   02310 1                   EGRESS              EXIT
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R0933    RENDEZVOUS TRACKING DATA PROCESSING ROUTINE (R22)

R0934    FUNCTIONAL DESCRIPTION

R0935    TO PROCESS RENDEZVOUS SIGHTING MARK AND VHF RANGING DATA TO UPDATE
R0936    THE STATE VECTOR OF EITHER THE CSM OR LM AS DEFINED BY VEHUPFLG.
R0937    (VEHUPFLG IS SET TO LM BY P20, CSM BY V81E, AND LM BY V80E.)

R0938    CALLING SEQUENCE
R0939      AUTOMATICALLY SELECTED BY P20

R0940    SUBROUTINES CALLED
R0941      PRIOCHNG            INTPRET             GRP2PC
R0942      GETUM               BVECTORS            INCORP1
R0943      INCORP2             INTEGRV             PHASCHNG
R0944      NOVAC               BANKCALL            GOTOV56
R0945      ENDOFJOB            INSTALL             DOWNFLAG
R0946      TRFAILOF            TRFAILON            TASKOVER
R0947      POSTJUMP

R0948    NORMAL EXIT MODES
R0949      RENDEZVOUS NAVIGATION MAY BE TERMINATED BY THE SELECTION OF
R0950      P00, P06, P22, P23, V34E FROM R60, AND V56E

R0951    ALARMS OR ABORT EXIT MODES
R0952      NONE

R0953    INPUT
R0954      MARK DATA, SEE R21 AND R23
R0955      VHF RANGING DATA

R0956    OUTPUT
R0957      TRKMKCNT, NO OF RENDEZVOUS TRACKING MARKS INCORPORATED (COUNTER)
R0958      VHFCNT, NO OF VHF RANGING MARKS INCORPORATED (COUNTER)
R0959      V06N49, EXCESSIVE UPDATE PARAMETERS-DELTA R AND DELTA V

R0960    FLAGS SET + RESET
R0961      SOURCFLG, VINTFLAG, DIMOFLAG, INCORFLG, ORBWFLAG, RENDWFLG
R0962      STATEFLG, D6OR9FLG, SKIPVHF, DMENFLG                                       AT THE INTERRUPTED DISPLAY.

 0965    REF   1                  34,2000                           SETLOC  P20S3
 0966                             34,2625                           BANK

 0967    REF   1                                                    COUNT*  $$/R22
 0968    REF   6  LAST  558       34,2625  3 7650 0   R22           CAF     PRIO26
 0969    REF   2  LAST  211       34,2626  55'262 1                 TS      PHSPRDT2
 0970    REF  10  LAST  570       34,2627  0 5176 1                 TC      PRIOCHNG
 0971    REF   2  LAST  333       34,2630  3 7700 1                 CA      NEG3
 0972    REF  37  LAST  573       34,2631  55'722 0                 TS      MRKBUF1
 0973    REF  93  LAST  571       34,2632  0 6006 1                 TC      INTPRET
 0974                         34,2633   77634 0                RTB
 0975   REF  15  LAST  565    34,2634   51751 0                         LOADTIME
 0976   REF   2  LAST  185    34,2635   01010 1                STORE    VHFTIME               PRESENT TIME
 0977                         34,2636   77624 1   REND1        CALL
 0978   REF   2  LAST  574    34,2637   22327 1                         GRP2PC
 0979                         34,2640   77624 1                CALL
 0980   REF   1               34,2641   56523 0                         WAITONE
 0981                         34,2642   77776 1   REND1A       EXIT
 0982   REF  38  LAST  577    34,2643  3 1722 1                CA       MRKBUF1
 0983                         34,2644  0 0006 1                EXTEND
 0984   REF   1               34,2645  1 2650 1                BZF      REND2
 0985                         34,2646  0 0006 1                EXTEND
 0986   REF   1               34,2647  6 2666 0                BZMF     REND3A
 0987   REF  17  LAST  512    34,2650  3 6211 0   REND2        CAF      SIX
 0988   REF   6  LAST  275    34,2651  0 5607 0                TC       GENTRAN
 0989   REF  39  LAST  578    34,2652   01722 1                ADRES    MRKBUF1
 0990   REF   5  LAST  565    34,2653   01061 1                ADRES    MARKTIME              MARKTIME MUST BE CONTIGUOUS WITH VTEMP
 0991   REF   3  LAST  577    34,2654  3 7700 1                CAF      NEG3                  NEG VALUE TO INDICATE VALUES USED
 0992   REF  40  LAST  578    34,2655  55'722 0                TS       MRKBUF1
 0993   REF  46  LAST  572    34,2656  0 5547 1                TC       UPFLAG                SET FLAG TO INDICATE THAT OPTICS MARK IS
 0994   REF   1               34,2657   00217 0                ADRES    R22CAFLG                BEING PROCESSED (TESTED IN MARK REJCT)
 0995   REF  94  LAST  577    34,2660  0 6006 1                TC       INTPRET
 0996                         34,2661   45014 0                CLEAR    CALL
 0997   REF   1               34,2662   04667 1                         SOURCFLG              0 = OPTICS DATA
 0998   REF   3  LAST  578    34,2663   22327 1                         GRP2PC                PHASE CHANGE
 0999                         34,2664   77650 1                GOTO
 1000   REF   1               34,2665   70761 0                         REND4
 1001   REF  95  LAST  578    34,2666  0 6006 1   REND3A       TC       INTPRET
 1002                         34,2667   77624 1   REND3        CALL
 1003   REF   4  LAST  578    34,2670   22327 1                         GRP2PC
 1004                         34,2671   77624 1                CALL
 1005   REF   2  LAST  578    34,2672   56523 0                         WAITONE
 1006                         34,2673   43014 0                BOFF     BOFF
 1007   REF   4  LAST  273    34,2674   04746 0                         VHFRFLAG
 1008   REF   1               34,2675   70642 0                         REND1A
 1009   REF   1               34,2676   05346 0                         RANGFLAG              RANGE > 200 N.M. DONT READ
 1010   REF   2  LAST  578    34,2677   70642 0                         REND1A
 1011                         34,2700   77634 0                RTB
 1012   REF  16  LAST  578    34,2701   51751 0                         LOADTIME              PRESENT TIME
 1013                         34,2702   45225 0                DSU      DSU
 1014   REF   1               34,2703   14651 0                         60SECDP               1 MIN
 1015   REF   3  LAST  578    34,2704   01010 1                         VHFTIME               LAST READING OF RADAR
 1016                         34,2705   77440 1                BMN      EXIT
 1017   REF   3  LAST  578    34,2706   70642 0                         REND1A
 1018                         34,2707  0 0004 0   RANGERD      INHINT                         READ RADAR RANGE
 1019   REF   1               34,2710  4 4777 0                CS       OCT17
 1020                         34,2711  0 0006 1                EXTEND
 1021   REF   6  LAST  392    34,2712  03 013 0                WAND     CHAN13                ZERO OUT BITS 1-4 OF CHANNEL 13
 1022                         34,2713  0 0006 1   RADSTART     EXTEND
 1023   REF   4  LAST  432    34,2714  00 004 0                READ     LOSCALAR              READ PRESENT TIME
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1024    REF 67  LAST 568   34,2715  54 001 1             TS      L

1025    REF  6  LAST 386   34,2716  7 4342 1             MASK    LOW5         ONLY THE 5 BITS MATTER
1026                       34,2717  4 0000 0             COM
1027    REF 26  LAST 563   34,2720  6 4763 1             AD      BIT6         COMPUTE DELTA TIME TO NEXT T5 TICK
1028    REF  7  LAST 579   34,2721  7 4342 1             MASK    LOW5

1029    REF  1             34,2722  55'064 0             TS      RADDEL
1030    REF  6  LAST 278   34,2723  6 7701 0             AD      NEG2         IF A TICK OF T5 IS NEAR, WAIT TILL IT
1031                       34,2724  0 0006 1             EXTEND               HAS TICKED.  MAX DELAY HERE IS
1032    REF  1             34,2725  6 2713 0             BZMF    RADSTART     937.5 MICROSEC.

1033    REF  1             34,2726  3 4322 0             CA      OCT11        SET RADAD BITS NOW
1034                       34,2727  0 0006 1             EXTEND
1035    REF  7  LAST 578   34,2730  05 013 0             WOR     CHAN13
1036    REF 68  LAST 579   34,2731  4 0001 1             CS      L
1037    REF  2  LAST  80   34,2732  55'063 1             TS      RADTIME      SAVE NEG TIME OF READ

1038                       34,2733  0 0003 1             RELINT
1039                       34,2734  0 0006 1             EXTEND
1040    REF 23  LAST 570   34,2735  3 0025 0             DCA     TIME2
1041    REF  6  LAST 578   34,2736  53'062 0             DXCH    MARKTIME     READ PRESENT TIME
1042    REF 38  LAST 572   34,2737  0 5561 0             TC      DOWNFLAG
1043    REF  1             34,2740   00043 0             ADRES   SKIPVHF      CLEAR VHF RESTART FLAG
1044    REF 63  LAST 568   34,2741  0 5205 0             TC      ENDOFJOB     WAIT FOR RADAR READ
1045    REF  2  LAST 273   34,2742  0 5632 0  RANGERD1   TC      TRFAILOF     TURN TRACKER LIGHT OFF
1046    REF  4  LAST 186   34,2743  11'703 0             CCS     RM           15 BIT UNSIGNED RANGE
1047    REF  1             34,2744  0 2750 1             TC      RANGERD4     GR + 0
1048    REF  1             34,2745  0 3424 0             TC      LIGHTON +4   =  + 0
1049    REF  1             34,2746  0 3406 0             TC      RANGERD3     L  - 0
1050    REF  2  LAST 579   34,2747  0 3406 0             TC      RANGERD3     =  - 0
1051    REF 96  LAST 578   34,2750  0 6006 1  RANGERD4   TC      INTPRET
1052                       34,2751   41335 1             SLOAD   DMP
1053    REF  5  LAST 579   34,2752   03704 1                     RM
1054    REF  1             34,2753   16535 0                     CONVRNGE     CONVERT RANGE TO METERS B-27
1055    REF  1             34,2754   01114 1  RANGERD2   STORE   VHFRANGE
1056                       34,2755   71214 0             SET     DLOAD
1057    REF  2  LAST 578   34,2756   04467 0                     SOURCFLG     SOURCE OF DATA TO VHF RADAR
1058    REF  7  LAST 579   34,2757   01062 1                     MARKTIME
1059    REF  4  LAST 578   34,2760   01010 1             STORE   VHFTIME      FOR DOWNLINK
1060                       34,2761   77624 1  REND4      CALL
1061    REF  2  LAST 554   34,2762   60435 0                     UPSTATE      INTEGRATE CSM,LM,W MATRIX
1062                       34,2763   77624 1             CALL
1063    REF  1             34,2764   56603 1                     SHIFTNDX     SET EARTH MOON SCALING INDEX
1064                       34,2765   45014 0             CLEAR   CALL
1065    REF  4  LAST 565   34,2766   01671 0                     ORBWFLAG     CLEAR FOR P22 AND P23
1066    REF  1             34,2767   71327 1                     CMPOS        SET CSM POSITION
1067                       34,2770   45014 0             SET     CALL
1068    REF  1             34,2771   02464 0                     INCORFLG     SET FOR FIRST PASS
1069    REF  1             34,2772   71336 1                     LMPOS        SET LM POSITION
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 1070                       34,2773   77614 1             BON
 1071  REF  12  LAST  553   34,2774   05310 0                     AUTOSEQ
 1072  REF   1              34,2775   47030 1                     AUTOW         AUTOMATIC W MATRIX REINITIALIZATION
 1073                       34,2776   77614 1  REND5B     BON
 1074  REF   4  LAST  565   34,2777   72713 1                     RENDWFLG
 1076                       34,3001   77745 1  REND5C     DLOAD
 1077  REF  16  LAST  574   34,3002   15336 0                     ZEROVECS
 1078  REF   6  LAST  292   34,3003   14772 0             STODL   VHFCNT        ZERO OUT VHFCNT AND TRKMKCNT
 1079  REF   2  LAST  486   34,3004   02001 1                     WRENDPOS
 1080                       34,3005   34001 1             STCALL  0             0=WRENDPOS  1=WRENDVEL
 1081  REF   1              34,3006   56612 1                     INITIALW      INITIALIZE W MATRIX
 1082                       34,3007   71214 0             CLEAR   DLOAD
 1083  REF   2  LAST  472   34,3010   05267 1                     P35FLAG
 1084  REF   8  LAST  579   34,3011   01062 1                     MARKTIME
 1085  REF   2  LAST  284   34,3012   03736 0             STORE   AGEOFW
 1086                       34,3013   66214 0             CLEAR   SSP
 1087  REF   2  LAST  216   34,3014   05273 1                     PTV93FLG
 1088  REF   2  LAST  105   34,3015   02551 1                     COUNT3MK
 1089                       34,3016   00001 0                     1
 1090                       34,3017   77614 1  REND6      SET
 1091  REF   5  LAST  580   34,3020   02476 0                     RENDWFLG
 1092                       34,3021   52375 1  REND7      VLOAD   VSU
 1093  REF   4  LAST   79   34,3022   01054 1                     LEMPOS
 1094  REF   2  LAST   79   34,3023   01046 1                     CSMPOS
 1095  REF   3  LAST  574   34,3024   03531 0             STORE   RCLP          LM - CSM
 1096                       34,3025   43056 0             UNIT    BON
 1097  REF   3  LAST  579   34,3026   04707 0                     SOURCFLG
 1098  REF   1              34,3027   71251 1                     REND14        BRANCH IF DATA IS RADAR
 1099  REF   2  LAST   80   34,3030   01130 1             STORE   UCL
 1100                       34,3031   74014 1             BOFF    AXC,1
 1101  REF   2  LAST  579   34,3032   02744 1                     INCORFLG
 1102  REF   1              34,3033   71047 1                     REND9
 1103  REF   9  LAST  580   34,3034   01061 1                     MARKTIME
 1104                       34,3035   77624 1             CALL
 1105  REF   1              34,3036   47017 1                     GETUM         CALCULATE UM LINE OF SIGHT
 1106  REF   3  LAST  574   34,3037   25072 0             STOVL   UM
 1107  REF   3  LAST  580   34,3040   01130 1                     UCL
 1108                       34,3041   40035 0             VXV     BOV
 1109  REF   4  LAST  580   34,3042   01072 0                     UM            UCL X UM
 1110  REF   1              34,3043   71044 1                     REND3
 1111                       34,3044   40056 0  REND8      UNIT    BOV
 1112  REF   1              34,3045   71375 0                     RENDISP3      IGNORE MARK RESET FLAGS FOR REJECT
 1113  REF   4  LAST  574   34,3046   01102 0             STORE   USTAR
 1114                       34,3047   77624 1  REND9      CALL
 1115  REF   1              34,3050   46756 1                     BVECTORS
 1116                       34,3051   77214 0             BON     VLOAD
 1117  REF   4  LAST  561   34,3052   00707 1                     VEHUPFLG
 1118  REF   1              34,3053   71057 0                     REND9A
 1119  REF   8  LAST  574   34,3054   03502 0                     BVECTOR
 1120                        34,3055   77676 0                VCOMP
 1121   REF    9  LAST  580  34,3056   03502 0                STORE  BVECTOR
 1122                        34,3057   77624 1   REND9A       CALL
 1123   REF    5  LAST  578  34,3060   22327 1                       GRP2PC
 1124                        34,3061   77614 1                BOFF
 1125   REF    6  LAST  570  34,3062   01341 0                       R21MARK
 1126   REF    1             34,3063   71302 0                       REND15           BRANCH IF BACKUP OPTICS (R23 WORKING)
 1127                        34,3064   43345 1                DLOAD  CAD
 1128   REF    1             34,3065   16457 0                       SXTVAR
 1129   REF    1             34,3066   16461 0                       IMUVAR
 1130   REF    2  LAST  125  34,3067   27526 0   REND10       STOVL  VARIANCE         TEMP STORAGE FOR VARIANCE CALC.
 1131   REF    4  LAST  580  34,3070   03531 0                       RCLP
 1132                        34,3071   60246 1                ABVAL  NORM
 1133   REF    8  LAST  574  34,3072   00047 1                       X1
 1134                        34,3073   41316 0                DSQ    DMP
 1135   REF    3  LAST  581  34,3074   03526 0                       VARIANCE
 1136                        34,3075   45070 1                XAD,1  CALL
 1137   REF    9  LAST  581  34,3076   00046 0                       X1
 1138   REF    2  LAST  579  34,3077   56603 1                       SHIFTNDX         GET EARTH MOON SCALING INDEX
 1139                        34,3100   56070 0                XAD,1  XAD,1
 1140   REF    7  LAST  518  34,3101   00047 1                       X2
 1141   REF    8  LAST  581  34,3102   00047 1                       X2
 1142                        34,3103   72257 1                SR*    TLOAD
 1143                        34,3104   20577 0                       0 -2,1           ADJUST SCALING TO B-40
 1144   REF  247  LAST  572  34,3105   00155 0                       MPAC
 1145   REF    4  LAST  581  34,3106   03526 0                STORE  VARIANCE
 1146                        34,3107   54335 0                SLOAD  SR
 1147   REF    1             34,3110   02400 1                       INTVAR           INTEGRATION VARIANCE SCALED B-15
 1148                        34,3111   20632 1                       25D              SCALE IT B-40
 1149                        34,3112   47171 0                TAD    RTB
 1150   REF    5  LAST  581  34,3113   03526 0                       VARIANCE
 1151   REF    1             34,3114   45657 1                       TPMODE
 1152   REF    6  LAST  581  34,3115   03526 0                STORE  VARIANCE
 1153                        34,3116   76214 1                BOFF   TAD
 1154   REF    4  LAST  580  34,3117   04747 1                       SOURCFLG         BRANCH IF NOT VHF RADAR
 1155   REF    1             34,3120   71127 0                       REND10A
 1156   REF    1             34,3121   03005 1                       RVARMIN          VHF RADAR MIN. VARIANCE
 1157                        34,3122   72244 0                BPL    TLOAD
 1158   REF    2  LAST  581  34,3123   71127 0                       REND10A
 1159   REF    2  LAST  581  34,3124   03005 1                       RVARMIN
 1160                        34,3125   77646 0                ABS                     MIN. VALUE WAS STORED AS NEG.
 1161   REF    7  LAST  581  34,3126   03526 0                STORE  VARIANCE         STORE MIN. VALUE
 1162                        34,3127   45014 0   REND10A      CLEAR  CALL
 1163   REF    1             34,3130   02666 0                       DMENFLG          CLEAR FOR 6 X 6 W MATRIX
 1164   REF    1             34,3131   75260 1                       INCORP1          CALCULATE UPDATE
 1165                        34,3132   77624 1                CALL
 1166   REF    6  LAST  581  34,3133   22327 1                       GRP2PC
 1167                        34,3134   45014 0                BOFF   CALL
 1168   REF    3  LAST  580  34,3135   02744 1                       INCORFLG
 1169   REF    1             34,3136   71176 1                       REND12
 1170   REF   3  LAST  581   34,3137   56603 1                    SHIFTNDX         GET EARTH MOON SCALING INDEX
 1171                        34,3140   51575 1             VLOAD  ABVAL
 1172   REF   7  LAST   80   34,3141   01122 1                    DELTAX +6
 1173                        34,3142   77657 0             SR*
 1174                        34,3143   57176 0                    0,2
 1175   REF   4  LAST  292   34,3144   27504 0             STOVL  N49DISP +2
 1176   REF   6  LAST  582   34,3145   01114 1                    DELTAX
 1177                        34,3146   53646 0             ABVAL  SR*
 1178                        34,3147   57176 0                    0,2
 1179   REF   5  LAST  582   34,3150   03502 0             STORE  N49DISP
 1180                        34,3151   43131 0             SSP    BON
 1181   REF   6  LAST  582   34,3152   03506 1                    N49DISP +4
 1182                        34,3153   00002 0             OCT    2
 1183   REF   5  LAST  581   34,3154   04707 0                    SOURCFLG
 1184   REF   1              34,3155   71163 0                    REND10B          VHF MARK CODE
 1185                        34,3156   66214 0             BON    SSP
 1186   REF   3  LAST  269   34,3157   05303 1                    REJCTFLG
 1187   REF   2  LAST  580   34,3160   71375 0                    RENDISP3
 1188   REF   7  LAST  582   34,3161   03506 1                    N49DISP +4       OPTICS MARK CODE
 1189                        34,3162   00001 0             OCT    1
 1190                        34,3163   77735 0   REND10B   SLOAD
 1191   REF   1              34,3164   02003 0                    RMAX
 1192                        34,3165   45261 0             SR     DSU
 1193                        34,3166   20613 1                    100
 1194   REF   8  LAST  582   34,3167   03502 0                    N49DISP
 1195                        34,3170   67240 0             BMN    SLOAD
 1196   REF   1              34,3171   71345 0                    RENDISP          BRANCH IF POS UP.GREATER THAN MAX.
 1197   REF   1              34,3172   02004 1                    VMAX
 1198                        34,3173   50025 0             DSU    BMN
 1199   REF   9  LAST  582   34,3174   03504 0                    N49DISP +2
 1200   REF   2  LAST  582   34,3175   71345 0                    RENDISP          BRANCH IF VEL.UPDATE GREATER THAN MAX.
 1201                        34,3176   77624 1   REND12    CALL
 1202   REF   1              34,3177   75472 1                    INCORP2          INCORPORATE UPDATE VALUES INTO STATE VEC
 1203                        34,3200   71214 0             BOFF   DLOAD
 1204   REF   4  LAST  581   34,3201   02744 1                    INCORFLG
 1205   REF   1              34,3202   71217 0                    REND12A          BRANCH IF 1ST PASS OPTICS
 1206   REF  10  LAST  580   34,3203   01062 1                    MARKTIME
 1207   REF   2  LAST  130   34,3204   03734 1             STORE  OLDMKTME         SAVE OLD MARK TIME
 1208                        34,3205   67214 1             CLEAR  SLOAD
 1209   REF   3  LAST  486   34,3206   05272 0                    MANEUFLG         CLEAR MANEUVER FLAG
 1210   REF   3  LAST  580   34,3207   02551 1                    COUNT3MK
 1211                        34,3210   45254 0             BZE    DSU
 1212   REF   2  LAST  582   34,3211   71217 0                    REND12A
 1213   REF   1              34,3212   07142 1                    HIGH3            CHECK IF 3 MARKS TAKEN
 1214                        34,3213   66240 1             BMN    SSP
 1215   REF   1              34,3214   71237 1                    REND13A          BRANCH IF NOT 3 YET
 1216   REF   4  LAST  582   34,3215   02551 1                    COUNT3MK         SET COUNT EQUAL TO 0
 1217                        34,3216   00000 1             DEC    0
 1218                        34,3217   43014 0   REND12A   BON    BOFF
 1219   REF   6  LAST  582   34,3220   04707 0                    SOURCFLG
 1220    REF   1               34,3221   71307 0                    REND16      BRANCH IF DATA IS RADAR
 1221    REF   5  LAST  582    34,3222   02744 1                    INCORFLG
 1222    REF   1               34,3223   71315 0                    REND17
 1223                          34,3224   77624 1             CALL
 1224    REF   4  LAST  582    34,3225   56603 1                    SHIFTNDX    GET EARTH MOON SCALING INDEX
 1225                          34,3226   45014 0             BON    CALL
 1226    REF   5  LAST  580    34,3227   00707 1                    VEHUPFLG
 1227    REF   1               34,3230   71323 0                    REND18      BRANCH IF CSM UPDATE
 1228    REF   2  LAST  579    34,3231   71336 1                    LMPOS       GET LM POSITION
 1229                          34,3232   77624 1  REND13     CALL
 1230    REF   7  LAST  581    34,3233   22327 1                    GRP2PC      PHASE CHANGE
 1231                          34,3234   77614 1             CLRGO
 1232    REF   6  LAST  583    34,3235   02624 0                    INCORFLG
 1233    REF   1               34,3236   71021 1                    REND7       BRANCH FOR 2ND PASS THIS OPTICS MARK
 1236                          34,3237   77735 0  REND13A    SLOAD
 1237    REF   5  LAST  582    34,3240   02551 1                    COUNT3MK
 1238    REF   3  LAST  130    34,3241   37732 0             STCALL CNT3TEMP
 1239    REF   8  LAST  583    34,3242   22327 1                    GRP2PC
 1240                          34,3243   62150 1             LXA,1  INCR,1
 1241    REF   4  LAST  583    34,3244   03731 1                    CNT3TEMP
 1242                          34,3245   00001 0             DEC    1           ADD ONE TO MARK COUNT
 1243                          34,3246   52130 1             SXA,1  GOTO
 1244    REF   6  LAST  583    34,3247   02550 0                    COUNT3MK
 1245    REF   3  LAST  582    34,3250   71217 0                    REND12A
 1246    REF   2  LAST  561    30,2000                       SETLOC P20S1
 1247                          30,2435                       BANK

 12475   REF   1                                             COUNT* $$/R22
 1248                          30,2435   45020 1  UPSTATE    STQ    CALL        INTEGRATE NON-UPDATED VEHICLE STATE
 1249    REF   2  LAST   77    30,2436   01006 0                    POINTEX       VECTOR
 1250    REF   2  LAST  565    30,2437   56462 1                    SETINTG     SET INTEGRV FLAGS   VINTFLAG=1 FOR CSM
 1251                          30,2440   43014 0             BOFF   CLEAR
 1252    REF   6  LAST  583    30,2441   00747 0                    VEHUPFLG    0=LM 1=CSM FOR UPDATE VEHICLE
 1253    REF   1               30,2442   60444 0                    REND4A      INTEGRATE CSM
 1254    REF   6  LAST  456    30,2443   01674 0                    VINTFLAG    INTEGRATE LM
 1255                          30,2444   77624 1  REND4A     CALL
 1256    REF   5  LAST  565    30,2445   27236 0                    INTEGRV
 1257                          30,2446   77624 1             CALL
 1258    REF   9  LAST  583    30,2447   22327 1                    GRP2PC      PHASE CHANGE
 1259                          30,2450   77624 1             CALL               INTEGRATE UPDATED VEHICLE
 1260    REF   3  LAST  583    30,2451   56462 1                    SETINTG     SET INTEGRV FLAGS   VINTFLAG=1 FOR CSM
 1261                          30,2452   43014 0             BOFF   SET
 1262    REF   6  LAST  580    30,2453   02756 1                    RENDWFLG
 1263    REF   1               30,2454   60456 0                    REND5       IF FLAG=0 DO NOT INTEGRATE W MATRIX
 1264    REF   5  LAST  457    30,2455   01476 0                    DIM0FLAG    INTEGRATE VALID W MATRIX
 1265                          30,2456   43014 0  REND5      BON    CLEAR
 1266    REF   7  LAST  583    30,2457   00707 1                    VEHUPFLG
 1267    REF   1               30,2460   60462 1                    REND5A      INTEGRATE CSM
 1268    REF   7  LAST  583    30,2461   01674 0                    VINTFLAG    INTEGRATE LM
 1269                          30,2462   77624 1  REND5A     CALL
 1270   REF   6  LAST  583   30,2463   27236 0                        INTEGRV
 1271                        30,2464   77650 1              GOTO
 1272   REF   3  LAST  583   30,2465   01006 0                        POINTEX
 1273   REF   2  LAST  577   34,2000                        SETLOC  P20S3
 1274                        34,3251                        BANK

 12745  REF   2 LAST  577 TO  583:   276    276*            COUNT*  $$/R22
 1275   REF  10  LAST  581   34,3251   27502 0  REND14      STOVL   BVECTOR         VHF RADAR BVECTOR
 1276   REF  17  LAST  580   34,3252   15336 0                      ZEROVECS
 1277   REF  11  LAST  584   34,3253   03510 0              STORE   BVECTOR +6
 1278   REF  12  LAST  584   34,3254   27516 0              STOVL   BVECTOR +12D
 1279   REF   5  LAST  581   34,3255   03531 0                      RCLP
 1280                        34,3256   71256 0              UNIT    DLOAD
 1281   REF   2  LAST  579   34,3257   01114 1                      VHFRANGE        VHFRANGE SCALED B-27
 1282                        34,3260   60414 0              BON     SR2
 1283   REF   6  LAST  511   34,3261   04303 0                      MOONTHIS
 1284                        34,3262   71263 0                      +1
 1285                        34,3263   43025 1              DSU     SET
 1286                        34,3264   00045 0                      36D             ABVAL (RCLP)
 1287   REF   7  LAST  583   34,3265   02464 0                      INCORFLG
 1288   REF   3  LAST  574   34,3266   03524 1              STORE   DELTAQ
 1289                        34,3267   77214 0              BOFF    VLOAD
 1290   REF   8  LAST  583   34,3270   00747 0                      VEHUPFLG
 1291   REF   1              34,3271   71275 1                      REND14A
 1292   REF  13  LAST  584   34,3272   03502 0                      BVECTOR
 1293                        34,3273   77676 0              VCOMP
 1294   REF  14  LAST  584   34,3274   03502 0              STORE   BVECTOR
 1295                        34,3275   77624 1  REND14A     CALL
 1296   REF  10  LAST  583   34,3276   22327 1                      GRP2PC
 1297                        34,3277   52145 0              DLOAD   GOTO
 1298   REF   1              34,3300   03003 1                      RVAR
 1299   REF   1              34,3301   71067 0                      REND10
 1300                        34,3302   43335 0  REND15      SLOAD   CAD             GET ALT LOS VARIANCE
 1301   REF   1              34,3303   01350 0                      ALTVAR          BACKUP OPTICS
 1302   REF   2  LAST  581   34,3304   16461 0                      IMUVAR          IMU VARIANCE
 1303                        34,3305   77650 1              GOTO
 1304   REF   2  LAST  584   34,3306   71067 0                      REND10
 1305                        34,3307   62150 1  REND16      LXA,1   INCR,1
 1306   REF   7  LAST  580   34,3310   00771 0                      VHFCNT          VHF RADAR UPDATE COUNT
 1307                        34,3311   00001 0              DEC     1
 1308                        34,3312   52130 1              SXA,1   GOTO
 1309   REF   8  LAST  584   34,3313   00771 0                      VHFCNT          UPDATE COUNT
 1310   REF   3  LAST  582   34,3314   71375 0                      RENDISP3
 1311                        34,3315   62150 1  REND17      LXA,1   INCR,1
 1312   REF   3  LAST  195   34,3316   00772 0                      TRKMKCNT        OPTICS MARK COUNT
 1313                        34,3317   00001 0              DEC     1
 1314                        34,3320   52130 1              SXA,1   GOTO
 1315   REF   4  LAST  584   34,3321   00772 0                      TRKMKCNT        UPDATE COUNT
 1316   REF   4  LAST  584   34,3322   71375 0                      RENDISP3
 1317                        34,3323   77624 1  REND18      CALL
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1318     REF   2  LAST  579  34,3324   71327 1                       CMPOS          GET CSM POSITION
1319                         34,3325   77650 1               GOTO
1320     REF   1             34,3326   71232 1                       REND13
1321     REF   3  LAST  584  34,2000                         SETLOC  P20S3
1322                         34,3327                         BANK

13225    REF   3 LAST  584 TO  585:     46   322*            COUNT*  $$/R22
1323                         34,3327   53775 1   CMPOS       VLOAD   VSR*
1324     REF   1             34,3330   01573 1                       DELTACSM
1325                         34,3331   57167 0                       7,2
1326                         34,3332   77655 1               VAD
1327     REF   1             34,3333   01607 1                       RCVCSM
1328     REF   3  LAST  580  34,3334   01046 1               STORE   CSMPOS         CSM POSITION SCALED B-27 OR B-29
1329                         34,3335   77616 0               RVQ
1330                         34,3336   53775 1   LMPOS       VLOAD   VSR*
1331     REF   1             34,3337   01645 1                       DELTALEM
1332                         34,3340   57167 0                       7,2
1333                         34,3341   77655 1               VAD
1334     REF   1             34,3342   01661 1                       RCVLEM
1335     REF   5  LAST  580  34,3343   01054 1               STORE   LEMPOS         LM POSITION SCALED B-27 OR B-29
1336                         34,3344   77616 0               RVQ
1337     REF   4  LAST  585  34,2000                         SETLOC  P20S3
1338                         34,3345                         BANK

13385    REF   4 LAST  585 TO  585:     14   336*            COUNT*  $$/R22
1339                         34,3345   77776 1   RENDISP     EXIT
1340     REF 121  LAST  572  34,3346   3 4772 1              CAF     ZERO           SET TEMPOR1 > ZERO TO INDICATE
1341     REF   3  LAST  574  34,3347   55'135 0              TS      TEMPOR1        V06 N49 DISPLAY HASNT BEEN ANSWERED
1342     REF  39  LAST  572  34,3350   0 5402 1              TC      PHASCHNG
1343                         34,3351   04022 0               OCT     04022
1344     REF   2  LAST  569  34,3352   3 7651 1              CAF     PRIO27         SET UP DISPLAY JOB WITH HIGHER PRIORITY
1345     REF  10  LAST  531  34,3353   0 5121 0              TC      NOVAC
1346     REF  41  LAST  578  E7,1722                         EBANK=  MRKBUF1        THAN PRESENT JOB
1347     REF   1             34,3354   03366 1               2CADR   RENDISP2
1347     REF   1             34,3355   70067 1
1348     REF  97  LAST  579  34,3356   0 6006 1  RENDISP7    TC      INTPRET
1349     REF 248  LAST  581  34,3357   00155 0               STORE   MPAC
1350                         34,3360   53135 0               SLOAD   BZE
1351     REF   4  LAST  585  34,3361   01136 1                       TEMPOR1
1352     REF   1             34,3362   71357 0                       RENDISP7 +1    DISPLAY HAS NOT BEEN ANSWERED YET
1353                         34,3363   52040 1               BMN     GOTO
1354     REF   2  LAST  581  34,3364   71176 1                       REND12         NEG INDICATES PROCEED
1355     REF   5  LAST  584  34,3365   71375 0                       RENDISP3       POS INDICATES RECYCLE
1356     REF   1             34,3366   3 5030 1  RENDISP2    CAF     V06N49
1357     REF 127  LAST  572  34,3367   0 4636 0              TC      BANKCALL
1358     REF   2  LAST  572  34,3370   20753 1               CADR    PRIODSP
1359     REF   2  LAST  396  34,3371   0 4546 1              TC      GOTOV56        TERM EXIT P20 VIA V56
1360     REF  64  LAST  572  34,3372   4 4770 1              CS      ONE            NEG INDICATES PROCEED RENDISP7 JOB
1361     REF   5  LAST  585  34,3373   55'135 0              TS      TEMPOR1        POS INDICATES RECYCLE RENDISP7 JOB
1362     REF  64  LAST  579  34,3374   0 5205 0              TC      ENDOFJOB       GO COMPLETE ABOVE JOB
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  1363                            34,3375   77624 1  REND1SP3 CALL
  1364    REF  11  LAST  584      34,3376   22327 1                   GRP2PC
  1365                            34,3377   43014 0           CLEAR   CLEAR           RESET FLAGS
  1366    REF   2  LAST  578      34,3400   04670 1                   R22CAFLG
  1367    REF   4  LAST  582      34,3401   05263 0                   REJCTFLG
  1368                            34,3402   52014 0           BON     GOTO
  1369    REF   7  LAST  582      34,3403   04707 0                   SOURCFLG
  1370    REF   1                 34,3404   70636 0                   REND1           DATA WAS RADAR GO LOOK FOR OPTICS NEXT
  1371    REF   1                 34,3405   70667 1                   REND3
  1372    REF   2  LAST  572      23,2000                     SETLOC  P20S2
  1373                            23,3030                     BANK

  13735   REF   1                                             COUNT*  $$/R22
  1374                            23,3030   67214 1  AUTOW    BON     SLOAD
  1375    REF   4  LAST  582      23,3031   05312 1                   MANEUFLG        MANEUVER DONE IF SET
  1376    REF   1                 23,3032   50104 1                   AUTOW3
  1377    REF   7  LAST  583      23,3033   02551 1                   COUNT3MK        COUNT OF MARKS SINCE W REINITIALIZED
  1378                            23,3034   52054 1           BZE     GOTO
  1379    REF   1                 23,3035   47037 0                   AUTOW1A
  1380    REF   1                 23,3036   47133 0                   AUTOW2
  1381                            23,3037   77614 1  AUTOW1A  BOFF
  1382    REF   4  LAST  484      23,3040   05354 0                   TPIMNFLG        NOT AFTER TPI
  1383    REF   1                 23,3041   47046 0                   AUTOW1          NOT AFTER TPI
  1384                            23,3042   52014 0           BOFF    GOTO
  1385    REF   3  LAST  580      23,3043   05347 1                   P35FLAG
  1386    REF   2  LAST  586      23,3044   47133 0                   AUTOW2
  1387    REF   1                 23,3045   71001 0                   REND5C
  1388                            23,3046   71201 1  AUTOW1   SETPD   DLOAD           PUT TIG
  1389                            23,3047   00001 0                   0                        OR
  1390    REF  41  LAST  531      23,3050   03413 1                   TIG                         TCDH IF P. C.
  1391                            23,3051   71214 0           BOFF    DLOAD
  1392    REF   4  LAST  496      23,3052   05356 1                   PCFLAG                                PUSH LIST 0
  1393    REF   1                 23,3053   47055 1                   AUTOW11
  1394    REF   5  LAST  283      23,3054   02461 0                   TCDH
  1395                            23,3055   67206 1  AUTOW11  PUSH    SLOAD           PD 0,1 = TIG OR TCDH IF P C
  1396    REF   2  LAST   96      23,3056   02372 0                   WRDTIME
  1397                            23,3057   67206 1           PUSH    SLOAD           PD 2,3 = WRDTIME
  1398    REF   2  LAST   96      23,3060   02373 1                   MINBLKTM
  1399                            23,3061   67206 1           PUSH    SLOAD           PD 4,5 = MINBLKTM
  1400    REF   2  LAST   96      23,3062   02374 0                   TBEFCOMP
  1401                            23,3063   67206 1           PUSH    SLOAD           PD 6,7 = TBEFCOMP
  1402    REF   2  LAST   96      23,3064   02375 1                   BRNBLKTM
  1403                            23,3065   67206 1           PUSH    SLOAD           PD 8,9 = BRNBLKTM
  1404    REF   2  LAST   96      23,3066   02376 1                   MAXWTIME
  1405                            23,3067   67206 1           PUSH    SLOAD           PD 10,11 == MAXWTIME
  1406    REF   2  LAST   96      23,3070   02377 0                   FINCMPTM
  1407                            23,3071   71206 0           PUSH    DLOAD           PD 12,13 = FINCMPTM
  1408    REF  11  LAST  582      23,3072   01062 1                   MARKTIME
  1409                            23,3073   45225 0           DSU     DSU
  1410                            23,3074   00003 1                   2               WRDTIME
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 1411    REF   3  LAST  580  23,3075  03736 0                    AGEOFW
 1412                        23,3076  71240 1            BMN     DLOAD
 1413    REF   3  LAST  586  23,3077  47133 0                    AUTOW2       AGEOFW GR WRDTIME
 1414    REF   3  LAST  582  23,3100  03734 1                    OLDMKTME
 1415                        23,3101  43225 0            DSU     DAD
 1416    REF  12  LAST  586  23,3102  01062 1                    MARKTIME     MARK TIME
 1417                        23,3103  00005 1                    4            MINBLKTM
 1418                        23,3104  71240 1            BMN     DLOAD
 1419    REF   1             23,3105  50114 0                    AUTOW4       (TIME - OLDMKTME) GR MIN
 1420    REF  13  LAST  587  23,3106  01062 1                    MARKTIME
 1421                        23,3107  51025 1            DSU     BPL
 1422                        23,3110  00001 0                    0D           TIG
 14222   REF   1             23,3111  50120 1                    AUTOW5       REINITIALIZE - TIG IS IN THE PAST
 14224                       23,3112  77615 0            DAD
 1423                        23,3113  00015 0                    12D          FINCMPTM
 1424                        23,3114  50015 0            DAD     BMN
 1425                        23,3115  00007 0                    6D           TBEFCOMP
 1426    REF   2  LAST  587  23,3116  50120 1                    AUTOW5       (FINCMPTM - TIME) GR TBEFCOMP
 1427                        23,3117  43345 1            DLOAD   DAD
 1428                        23,3120  00001 0                    0
 1429    REF   1             23,3121  07137 0                    3MINCON      3 MIN CONSTANT (APPROX)
 1430                        23,3122  43225 0            DSU     DAD
 1431                        23,3123  00015 0                    12D          FINCMPTM
 1432                        23,3124  00011 1                    8D           BRNBLKTM
 1433                        23,3125  45225 0            DSU     DSU
 1434    REF   4  LAST  587  23,3126  03736 0                    AGEOFW
 1435                        23,3127  00013 0                    10D          MAXWTIME
 1436                        23,3130  43040 1            BMN     SET
 1437    REF   4  LAST  587  23,3131  47133 0                    AUTOW2       FINCOM + BRNBLK+3MIN+AGE GR MAXWTIME
 1438    REF   3  LAST  580  23,3132  05073 0                    PTV93FLG     POST BURN V93 REQUEST FLAG
 1439                        23,3133  52014 0  AUTOW2    CLEAR   GOTO
 1440    REF   5  LAST  579  23,3134  01671 0                    CRBWFLAG     P22 W MATRIX FLAG
 1441    REF   1             23,3135  70776 0                    REND5B
 1447                        23,3136  00001 0  3MINCON   DEC     1.0   B-14   2.74 MIN
 1449                        23,3137  00002 0  HIGH2     2DEC    2.0   B-14
 1449                        23,3140  00000 1
 1450                        23,3141  00003 1  HIGH3     2DEC    3.0 B-14
 1450                        23,3142  00000 1
 1451    REF   1             24,2000                     SETLOC  P20S5
 1452                        24,2104                     BANK

 14525   REF   1                                         COUNT*  $$/R22
 1453                        24,2104  43014 0  AUTOW3    BON     BOFF
 1454    REF   4  LAST  587  24,2105  05313 0                    PTV93FLG
 1455    REF   2  LAST  586  24,2106  71001 0                    REND5C
 1456    REF   5  LAST  586  24,2107  05354 0                    TPIMNFLG
 1457    REF   2  LAST  587  24,2110  50114 0                    AUTOW4
 1458                        24,2111  77614 1            BOFF
 1459    REF   3  LAST  279  24,2112  05355 1                    FULTKFLG
 1460    REF   3  LAST  587  24,2113  71001 0                    REND5C       BRANCH IF VHF AND OPTICS MARKING
 1461                          24,2114   52131 0  AUTOW4    SSP     GOTO
 1462   REF   8  LAST  586     24,2115   02551 1                    COUNT3MK          SET 3 MARK COUNTER EQ 1
 1463                          24,2116   00001 0            DEC     1
 1464   REF   5  LAST  587     24,2117   47133 0                    AUTOW2            BYPASS REINITIALIZING W MATRIX
 1465                          24,2120   52014 0  AUTOW5    CLEAR   GOTO
 1466   REF   5  LAST  587     24,2121   05273 1                    PTV93FLG
 1467   REF   4  LAST  587     24,2122   71001 0                    REND5C

 1468   REF   1                27,2000                      SETLOC  R22S1
 1469                          27,2456                      BANK

 14695  REF   1                                             COUNT*  $$/R22
 1470                          27,2456   00052 0  SXTVAR    2DEC    0.04 E-6 B+16     SXT ERROR VARIANCE = .04 (MR)SQ
 1470                          27,2457   36307 0
 1471                          27,2460   00052 0  IMUVAR    2DEC    0.04 E-6 B+16     IMU ERROR VARIANCE = .04 (MR)SQ
 1471                          27,2461   36307 0
 1472                          27,2462   45020 1  SETINTG   STQ     CALL
 1473   REF   8  LAST  576     27,2463   02310 1                    EGRESS
 1474   REF  15  LAST  521     27,2464   27516 0                    INTSTALL          RESERVE INTEGRATION
 1475                          27,2465   43145 0            DLOAD   SET
 1476   REF  14  LAST  587     27,2466   01062 1                    MARKTIME
 1477   REF   1                27,2467   01472 1                    STATEFLG
 1478   REF  18  LAST  561     27,2470   00041 1            STORE   TDEC1             MARKTIME
 1479                          27,2471   43014 0            CLEAR   CLEAR
 1480   REF  10  LAST  514     27,2472   01673 1                    INTYPFLG          PRECISION INTEGRATION
 1481   REF   6  LAST  583     27,2473   01676 1                    DIM0FLAG
 1482                          27,2474   43014 0            SET     CLRGO
 1483   REF   8  LAST  583     27,2475   01474 1                    VINTFLAG          SET VEHICLE EQ. CSM
 1484   REF   1                27,2476   01635 0                    D6OR9FLG          SET W MATRIX DIM. EQ 6
 1485   REF   9  LAST  588     27,2477   02310 1                    EGRESS            EXIT
 1486                          27,2500   43014 0  CONTCHK   BOFF    BOFF
 1487   REF   8  LAST  565     27,2501   00350 1                    RNDVZFLG
 1488   REF   1                27,2502   31263 1                    ENDPLAC

 1489   REF   3  LAST  539     27,2503   01742 1                    REFSMFLG          BRANCH TO END OF JOB IF REFSMMAT NO GOOD
 1490   REF   2  LAST  588     27,2504   31263 1                    ENDPLAC
 1491                          27,2505   50135 0            SLOAD   BMN
 1492   REF  18  LAST  572     27,2506   03375 0                    R61CNTR
 1493   REF   1                27,2507   56525 0                    WAITONE1
 1494                          27,2510   43014 0            BON     BOFF              IS TRACK FLAG SET
 1495   REF   5  LAST  554     27,2511   00710 1                    UPDATFLG
 1496   REF   4  LAST  584     27,2512   01006 0                    POINTEX
 1497   REF   9  LAST  565     27,2513   00752 1                    TRACKFLG
 1498   REF   3  LAST  588     27,2514   31263 1                    ENDPLAC
 1499                          27,2515   77776 1            EXIT
 1500   REF  40  LAST  585     27,2516 0 5402 1  REDOR22    TC      PHASCHNG
 1501                          27,2517   00132 1            OCT     00132
 15015  REF   1                01,2047            2P13SPT1  =       2.13SPOT
 1502   REF   7  LAST  577     27,2520 3 7650 0             CAF     PRIO26
 1503   REF  11  LAST  577     27,2521 0 5176 1             TC      PRIOCHNG
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1504   REF   2  LAST  588   27,2522  1 2526 0            TCF     WAITONE1 +1

1505                        27,2523   77620 0  WAITONE   STQ
1506   REF   5  LAST  588   27,2524   01006 0                    POINTEX
1507                        27,2525   77776 1  WAITONE1  EXIT
1508   REF   2  LAST  151   27,2526  3 5020 0    +1      CAF     4SECS           WAIT 4 SECS.
1509   REF 128  LAST  585   27,2527  0 4636 0            TC      BANKCALL
1510   REF   7  LAST  559   27,2530   01731 0            CADR    DELAYJOB
1511   REF  98  LAST  585   27,2531  0 6006 1            TC      INTPRET
1512                        27,2532   77650 1            GOTO
1513   REF   1              27,2533   56500 1                    CONTCHK         CHECK AGAIN NOW
1514   REF   5  LAST  585   34,2000                      SETLOC  P20S3
1515                        34,3406                      BANK

15155  REF   5 LAST  585 TO  586:     33    369*         COUNT*  $$/R22
1516   REF   6  LAST  579   34,3406  3 1703 1  RANGERD3  CA      RM
1517   REF  13  LAST  557   34,3407  7 4750 0            MASK    POSMAX
1518   REF 249  LAST  585   34,3410  54 154 0            TS      MPAC            MASK OUT NEG. SIGN BIT
1519   REF  99  LAST  589   34,3411  0 6006 1            TC      INTPRET
1520                        34,3412   41335 1            SLOAD   DMP
1521   REF 250  LAST  589   34,3413   00155 0                    MPAC            CLEAR MPAC +1
1522   REF   2  LAST  579   34,3414   16535 0                    CONVRNGE        CONVERT FROM NM TO METERS AND SCALE B-27
1523                        34,3415   52015 1            DAD     GOTO
1524   REF   3  LAST  589   34,3416   16535 0                    CONVRNGE        VALUE IN METERS OF SIGN BIT SCALED B-27
1525   REF   1              34,3417   70754 0                    RANGERD2
1526   REF   3  LAST  584   34,3420  3 1113 0  LIGHTON   CA      VHFRANGE
1527                        34,3421  0 0006 1            EXTEND
1528                        34,3422  1 3424 1            BZF     +2
1529   REF   1              34,3423  0 5644 1            TC      TRFAILON
1530   REF 100  LAST  589   34,3424  0 6006 1    +4      TC      INTPRET
1531                        34,3425   77745 1            DLOAD
1532   REF  15  LAST  588   34,3426   01062 1                    MARKTIME
1533   REF   5  LAST  579   34,3427   01010 1            STORE   VHFTIME
1534                        34,3430   77650 1            GOTO
1535   REF   2  LAST  586   34,3431   70636 0                    REND1
1536   REF   2  LAST  215      4777            OCT17     EQUALS  LOW4
1537   REF   2  LAST  588   27,2000                      SETLOC  R22S1
1538                        27,2534                      BANK

15385  REF   2 LAST  588 TO  589:     46     46*         COUNT*  $$/R22
1539                        27,2534   00045 0  CONVRNGE  2DEC    18.52 B-13      VHF INPUT RANGE CONV.FROM.01 NM TO M
1539                        27,2535   01217 1
R1540                                  AND 16384 X 18.52 = METERS FOR SIGN BIT
1541                        27,2536  0 0006 1  VHFREAD   EXTEND
1542   REF   8  LAST  382   27,2537  04 007 1            ROR     SUPERBNK        MUST SAVE SBANK BECAUSE OF RUPT
1543   REF   5  LAST  550   27,2540  54 016 1            TS      BANKRUPT        EXITS VIA RESUME, LIGHTON, RANGERD1
1544                        27,2541  0 0006 1            EXTEND
1545   REF   5  LAST  550   27,2542  22 012 1            QXCH    QRUPT
1546   REF  11  LAST  485   27,2543  4 0076 1            CS      FLAGWRD2
1547   REF   3  LAST  202   27,2544  7 4757 1            MASK    SKIPVBIT        SKIPVHF FLAG
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 1548                                   27,2545  0 0006 1               EXTEND
 1549   REF  22  LAST  551              27,2546  1 5323 1               BZF      RESUME               BRANCH IF VHF RESTART BIT SET
 1550   REF   3  LAST  214              27,2547  3 4762 0               CAF      UPDATBIT
 1551   REF  26  LAST  559              27,2550  7 0075 1               MASK     FLAGWRD1             UPDATFLG
 1552                                   27,2551  0 0006 1               EXTEND
 1553   REF   1                         27,2552  1 2574 1               BZF      BYPASS1
 1554   REF   5  LAST  396              27,2553  4 0100 1               CS       FLAGWRD4
 1555   REF   3  LAST  396              27,2554  7 4755 0               MASK     PDSPFBIT             PDSPFLAG
 1556                                   27,2555  0 0006 1               EXTEND
 1557   REF   2  LAST  590              27,2556  1 2574 1               BZF      BYPASS1
 1558   REF   1                         27,2557  3 0046 0               CA       RNRAD
 1559   REF   7  LAST  589              27,2560  55'703 0               TS       RM                   SAVE RANGE
 1560   REF  23  LAST  553              27,2561  3 4767 0               CAF      BIT2
 1561                                   27,2562  0 0006 1               EXTEND
 1562   REF   5  LAST  198              27,2563  02 033 0               RAND     CHAN33               READ DATA GOOD BIT
 1563                                   27,2564  0 0006 1               EXTEND
 1564   REF   1                         27,2565  1 2576 0               BZF      VHFGOOD              BRANCH IF DATA GOOD BIT EQUALS GOOD
 1565   REF   4  LAST  589              27,2566  55'113 1  BYPASS       TS       VHFRANGE             STORE NON ZERO VALUE
 1566   REF   8  LAST  588              27,2567  3 7650 0               CAF      PRIO26
 1567   REF  28  LAST  557              27,2570  0 5135 0               TC       FINDVAC
 1568   REF  42  LAST  585              E7,1722                         EBANK=   MRKBUF1
 1569   REF   2  LAST  579              27,2571   03420 1               2CADR    LIGHTON
 1569                                   27,2572   70067 1
 1570   REF  23  LAST  590              27,2573  0 5323 0               TC       RESUME

 1571   REF 122  LAST  585              27,2574  3 4772 1  BYPASS1      CAF      ZERO
 1572   REF   1                         27,2575  0 2566 0               TC       BYPASS
 1573   REF   9  LAST  590              27,2576  3 7650 0  VHFGOOD      CAF      PRIO26
 1574   REF  29  LAST  590              27,2577  0 5135 0               TC       FINDVAC
 1575   REF  43  LAST  590              E7,1722                         EBANK=   MRKBUF1
 1576   REF   1                         27,2600   02742 1               2CADR    RANGERD1
 1576   REF   1                         27,2601   70067 1
 1577   REF  24  LAST  590              27,2602  0 5323 0               TC       RESUME

 1578                                   27,2603   77774 0  SHIFTNDX     AXT,2
 1579                                   27,2604   00000 1                        0
 1580                                   27,2605   43414 1               BON      RVQ
 1581   REF  11  LAST  565              27,2606   04303 0                        CMOONFLG
 1582                                   27,2607   56610 0                        +1                   MOON ORB.
 1583                                   27,2610   43514 0               INCR,2   RVQ
 1584                                   27,2611   77775 1               DEC      -2
 1585                                   27,2612   66370 0  INITIALW     AXT,1    SSP
 1586                                   27,2613   00044 1                        36D
 1587   REF   7  LAST  565              27,2614   00051 0                        S1
 1588                                   27,2615   00006 1                        6
 1589                                   27,2616   77775 1               VLOAD
 1590   REF  18  LAST  584              27,2617   15336 0                        ZEROVECS
 1591   REF   6  LAST  277              27,2620   06445 1  INITA        STORE    W +36D,1             CLEAR 0 - 35
 1592   REF   7  LAST  590              27,2621   06533 1               STORE    W +90D,1             CLEAR 54-89
 1593                                   27,2622   67300 0               TIX,1    SLOAD
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  1594   REF  1                 27,2623   56620 0                     INITA
  1595                          27,2624   00001 0                     0                POSITION VALUE
  1596   REF   8  LAST  590     27,2625   02401 0           STORE     W                INITIALIZE DIAGONAL W  POSITION
  1597   REF   9  LAST  591     27,2626   02411 1           STORE     W +8D
  1598   REF  10  LAST  591     27,2627   02421 1           STORE     W +16D
  1599                          27,2630   77735 0           SLOAD
  1600                          27,2631   00002 0                     1                VELOCITY VALUE
  1601   REF  11  LAST  591     27,2632   02511 0           STORE     W +72D           INITIALIZE DIAGONAL W VELOCITY
  1602   REF  12  LAST  591     27,2633   02521 0           STORE     W +80D
  1603   REF  13  LAST  591     27,2634   02531 1           STORE     W +88D
  1604                          27,2635   77616 0           RVQ
R1605
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P1606              STALL ROUTINE FOR USERS OF CHANNEL 13.

  1607    REF   2  LAST  141        4000                         SETLOC FFTAG12
  1608                              4542                         BANK

  16085   REF   1                                                COUNT* $$/CHN13
  1609    REF   6  LAST  274        4542  3 4754 0  C13STALL CAF    PRIO10            = BANK 04
  1610    REF   2  LAST  206        4543  56 004 0           XCH    FBANK
  1611    REF   6  LAST  157        4544  54 071 0           TS     RUPTREG2
  1612    REF   1                   4545  1 3251 0           TCF    C13STAL1
  1613    REF   1                04,2000                         SETLOC C13BANK
  1614                           04,3251                         BANK

  16145   REF   1                                                COUNT* $$/CHN13
  1615    REF  24  LAST  517     04,3251  3 4765 1  C13STAL1 CAF    BIT4
  1616                           04,3252  0 0006 1           EXTEND
  1617    REF   8  LAST  579     04,3253  02 013 1           RAND   CHAN13
  1618                           04,3254  0 0006 1           EXTEND
  1619    REF   1                04,3255  1 3276 0           BZF    TCQSTAL           NO RADAR ACTIVITY. OK TO WRITE.

  1620                           04,3256  13 257 0  C13SLOOP NOOP                     TO PREVENT TC TRAP
  1621                           04,3257  0 0006 1           EXTEND
  1622    REF   5  LAST  578     04,3260  00 004 0           READ   LOSCALAR
  1623    REF   3  LAST  579     04,3261  6 1063 0           AD     RADTIME           COMPUTE DELTA T SINCE LAST RADAR READ
  1624    REF   3  LAST  444     04,3262  6 4753 1           AD     HALF
  1625    REF   4  LAST  592     04,3263  6 4753 1           AD     HALF              FOR OVERFLOW
  1626    REF  69  LAST  579     04,3264  56 001 0           XCH    L

  1627    REF   1                04,3265  3 3301 0           CA     90MSCALR
  1628    REF   2  LAST  579     04,3266  6 1064 1           AD     RADDEL
  1629                           04,3267  0 0006 1           EXTEND
  1630    REF  70  LAST  592     04,3270  60 001 0           SU     L

  1631                           04,3271  0 0006 1           EXTEND
  1632    REF   2  LAST  592     04,3272  6 3276 1           BZMF   TCQSTAL           GR THAN 90 MS.  OK

  1633    REF   1                04,3273  6 3302 0           AD     -DTSCALR
  1634                           04,3274  0 0006 1           EXTEND
  1635    REF   1                04,3275  6 3256 0           BZMF   C13SLOOP          IN FORBIDDEN PERIOD.  LOOP UNTIL OK

  1636    REF   7  LAST  592     04,3276  3 0071 1  TCQSTAL  CA     RUPTREG2
  1637    REF 129  LAST  548     04,3277  22 002 0           LXCH   Q
  1638                           04,3300  52 005 0           DTCF

  1639                           04,3301   00440 1  90MSCALR OCT    440               90 MILLISEC IN SCALAR
  1640                           04,3302   77754 1  -DTSCALR OCT    77754             -5.9375 MS IN SCALAR

 R1641    CRS61.1  4/10/68
 R1642      TO COMPUTE THE PREFERRED TRACKING ATTITUDE OF THE CSM WHICH ENABLES
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R1643     OPTICS  TRACKING OF THE LM AND LM TRACKING OF THE CSM RADAR TRANSPONDER
R1644     AND TO COMPUTE THE &X-AXIS TRACKING ATTITUDE OF THE CSM WHICH ENABLES
R1645     COAS TRACKING OF THE LM.
R1646       TO PERFORM THE MANEUVER TO THE SELECTED TRACKING ATTITUDE IF THE
R1647     MANEUVER IS LESS THAN 10 DEGREES BUT TO CALL R60 IF THE MANEUVER IS
R1648     GREATER THAN 10 DEGREES OR IF THE R60FLAG IS SET.
R1649               (1) EXTRAPOLATE LM AND CSM STATE VECTORS TO PRESENT TIME USING
R1650                   CONIC EQUATIONS.

R1651               (2) CALCULATE LOS FROM CSM TO LM = RL - RC.

R1652               (3) THE PREFERRED TRACKING ATTITUDE IS DEFINED AS FOLLOWS:
R1653                   THE TRACK AXIS (I) IS ALIGNED ALONG THE LOS TO THE LM. THE
R1654                   TRACK AXIS (I) IS DEFINED AS:
R1655
R1656                   UNIT(I)=UNIT(Z   )COS55 &UNIT(X   )SIN55
R1657                        -        -SC              -SC
R1658               (4) COMPUTE DESIRED CDU ANGLES, USING VECPOINT.
R1659               (7) FORM DIFFERENCE BETWEEN DESIRED AND ACTUAL CDUS.
R1660                   IF ANY OF THE THREE ANGLE DIFFERENCES EXCEEDS 10 DEGREES,
R1661                   GROSS MANEUVER IS REQUIRED. SIGNAL R61 (SET MPAC=1) TO
R1662                   OPERATE KALCMANU AND EXIT CRS61.1.
R1663                   IF ALL DIFFERENCES ARE LESS THAN 10 DEGREES, CONTINUE.

R1664               (8) CALCULATE ORTHOGONAL LOS RATE IN REF COORDS AS

R1665                   OMEGATH = (UNITLOS(B1) X UNITDV(B1))(ABSDV(B7)/ABSLOS(B29))
R1666                   CONVERSION FACTOR OF 100/2PI (B4) REV CSEC PER RAD SEC IS
R1667                   APPLIED TO YIELD UNITS OF REVS/SEC. SCALE IS CARRIED AS
R1668                   B+1+1+7-29+4+1 PLUS RESULTS OF NORMALIZING ABSDV, ABSLOS.
R1669                   THE EXTRA B+1 RESULTS FROM RESCALING ABSDV B8 AFTER NORM
R1670                   TO AVOID OVFLOW ON DIVIDE.

R1671                   UNITLOS = UNIT( RL - RC) B1.
R1672                   UNITDV  = UNIT( VL - VC) B1.
R1673                   ABSLOS  = LENGTH OF LOS, METERS B29.
R1674                   ABSDV   = LENGTH OF DV , METERS/CSEC B7.

R1675               (9) OBTAIN RATE IN SM COORDS.

R1676                   OMEGATHSM = (REFSMMAT)(OMEGATH).

R1677               (10)OBTAIN GIMBAL ANGLE INCREMENTS FOR 0.1 SECOND.

R1678                   DTHETASM = (0.1)(OMEGATHSM)

R1679               (11)OBTAIN CELCDUX,Y,Z USING SUBR SMCDURES.
R1680                   INPUT CONSISTS OF

R1681                   (A) VECTOR OF ANGULAR INCREMENTS, DTHETASM, STORED
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R1682                        IN V(DTHETASM).

R1683                    (8) SIN,COS CDUX,Y,Z FROM  SUBR CDUTRIG.

R1684                    TRANSFER OUTPUT OF SMCDURES FROM V(DCDU) TO VAC14D.

R1685                (12)CALCULATE ANG LOS RATE IN BODY(NB) COORDS USING SUBR SMNB.

R1686                    OMEGANB = (SMNB)(OMEGATHSM)

R1687                    SUBR SMNB REQUIRES  OMEGATHSM IN V(VAC32D) AND ACTUAL CDUS
R1688                    (Y,X,Z ORDER) IN V(VAC20D) WITH S1 OF VAC = BASE ADDRESS
R1689                    OF CDUS (FIXLOC + 20D).

R1690                (13)CALCULATE ANG LOS RATE IN CONTROL COORDS AS FOLLOWS

R1691                    WBODY = (MBDYTCTL)(OMEGANB)    UNITS=REVS/SEC(B0).

R1692                                    ( 0.5        0               0          ) BODY TO
R1693                    MBDYTCTL(B1) = (  0    COS(7.25)B1  -SIN(7.25)B1 )=CONTROL
R1694                                    (  0    SIN(7.25)B1   COS(7.25)B1 ) AXES
R1695                                                                         CONVERSION
R1696                                                                          MATRIX

R1697                (14)RESCALE WBODY TO UNITS OF 450 DEG/SEC BY APPLYING FACTOR
R1698                    OF 0.8 TO REVS/SEC.

R1699                (15)ADDRESS LIVE AUTOPILOT REGISTERS IN BASIC (UNDER INHINT).

R1700                    TRANSFER DESIRED CDUS, SCALED 180 DEGREES,FROM T(SAVEDCDU)
R1701                    TO V(CDUXD).
R1702                    TRANSFER DELCDUS, SCALED 180 DEG, FROM V(VAC14D)
R1703                    TO V(DELCDUX).
R1704                    TRANSFER OMEGA CONTROL, SCALED 450 DEG/SEC,FROM V(MPAC)
R1705                    TO V(WBODY).
R1706                    RELINT, SET MPAC=0, EXIT CRS61.1

R1707   CALL         L  CALL CRS61.1

R1708   RETURNS      ALL TO L+1.

R1709                (1) S(MPAC)=0. NORMAL EXIT. 3 SETS OF INPUTS FED TO DAP.
R1710                (2) S(MPAC)=1. CALCULATED DESIRED CDUS,SP, SET IN T(CPHI)
R1711                    FOR KALCMANU. ABS(ACDU - DCDU) EXCEEDS 10 DEGREES.
R1712                (3) S(MPAC)=2. GNCS AUTO MODE NOT SELECTED (BIT10=1).
R1713                (4) S(MPAC)=3. DAP HOLD FLAG (HOLDFLAG) NOT EQUAL -1.

R1714   INPUT        (1) TIME2,TIME1. COMPUTER CLOCK TIME,DP, CENTISEC B28.
R1715                (2) CDUX,Y,Z. PRESENT CDU ANGLES,SP,2S COMPL HALF-REVS B0.
R1716                (3) M(REFSMMAT),STABLE MEMBER COORDS B1.
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R1717   OUTPUT   NORMAL. EXIT WITH S(MPAC) = 0.

R1718            (1) CDUXD,CDUYD,CDUZD, DESIRED OUTER, INNER, MIDDLE CDU ANGLES,
R1719                DP, 1S COMPL, SCALED 180 DEGREES (HALF-REVS B0).
R1720            (2) DELCDUX,DELCDUY,DELCDUZ. 0.1 SEC DCU ANGULAR INCREMENTS,
R1721                DP, 1S COMPL, SCALED 180 DEG.
R1722            (3) WBODY,WBODY1,WBODY2. LOS ANGULAR RATE IN CONTROL COORDS,
R1723                DP, 1S COMPL, SCALED 450 DEG/SEC.

R1724            SPECIAL. EXIT WITH S(MPAC) = 1.

R1725            (1) CPHI,CTHETA,CPSI. DESIRED OUTER, INNER, MIDDLE CDU ANGLES,
R1726                SP, 2S COMPL, SCALED 180 DEGREES.

R1727   EXTERNAL SUBROUTINES USED   (8)=BASIC

R1728            (1) CALCGA    (5) LOADTIME(B)  (9) SMNB
R1729            (2) CDUTRIG   (6) MATMOVE
R1730            (3) CSMCONIC  (7) RDCDUS(B)
R1731            (4) LEMCONIC  (8) SMCDURES

R1732   ERASABLE (1) S(Q611),EBANK7  CRS61.1 EXIT .
R1733            (2) S(Q6111)EBANK7  CALCDCDU EXIT.
R1734            (3) T(SAVEDCDU) E6  SP VECTOR OF CDUDS.
R1735            (4) V(SAVEPOS)  E7  CSM POS VEC AND  D(SAVEPOS)= LENGTH OF LOS.
R1736            (5) V(SAVEVEL) E7  CSM VEL VEC.

R1737   FLAGWDS  HOLDFLAG. USED, NOT SET.

R1738   MISC     (1) ERASABLE ITEMP1 USED TO TEMP STORE EBANK UNDER INHINT.
R1739            (2) ERASABLE P21TIME USED AS TEMP STORE DURING CRS61.1
R1740            (3) ERAS DTHETASM USED AS TEMP STORE DURING EARLY CRS61.1

R1741   DEBRIS - CURRENT VAC AREA, CRS61.1 ERASABLES, ITEMP1, P21TIME

 1743   REF   1                34,2000                              SETLOC P20S4
 1744                          34,3432                              BANK

 1745   REF   6  LAST  423     E6,1646                              EBANK= CDUXD
 1746   REF   1                                                     COUNT* $$/CRS61
A1747
 1748                          34,3432   40220 0  CRS61.1           STQ    SETPD
 1749   REF   2  LAST  129     34,3433   03704 1                           Q611
 1750                          34,3434   00001 0                           0
 1751                          34,3435   77634 0                    RTB
 1752   REF  17  LAST  578     34,3436   51751 0                           LOADTIME       LOAD CLOCK TIME2,1 INTO MPAC.
A1753
 1754   REF   2  LAST   94     34,3437   36307 0  STORT             STCALL R63TIME        STORE CLOCK TIME FOR SUBR R63
 1755   REF   1                34,3440   73171 1                           R63            SUBR TO CALC DCDU(T=PRESENT,PASS1)
 1756                          34,3441   71214 0                    CLEAR  CLOAD
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  1757   REF   2  LAST  578   34,3442    05266 0                    RANGFLAG
  1758   REF   3  LAST  595   34,3443    02307 1                    R63TIME
  1759                        34,3444    51025 1             DSU    BPL
  1760   REF   1              34,3445    33161 1                    328NM
  1761                        34,3446    71451 1                    +3
  1762                        34,3447    77614 1             SET
  1763   REF   3  LAST  596   34,3450    05066 1                    RANGFLAG
  1764                        34,3451    77776 1    +3       EXIT
  1765   REF  16  LAST  521   34,3452  0 5354 0  STEP2CK     TC     CHECKMM         CHECK MAJOR MODE = 27 (UPDATE PROG)
  1766                        34,3453    00033 1             MM     27
  1767   REF   2  LAST  211   34,3454  0 4415 0              TC     UPACTOFF        NO TURN OFF UPLINK LITE
A 1768                                                                              YES  LEAVE UPLINK AS IS
  1769   REF   7  LAST  420   34,3455  11'340 0              CCS    HOLDFLAG
  1770   REF   1              34,3456  0 3560 1              TC     ASET            EXIT IF HOLDFLAG IS + NONZERO
  1771                        34,3457  0 3461 1              TC     +2
  1772                        34,3460  0 3461 1              TC     +1
  1773   REF   4  LAST  572   34,3461  4 0107 0              CS     FLGWRD11
  1774   REF   3  LAST  572   34,3462  7 4761 1              MASK   AZIMBIT
  1775   REF 158  LAST  572   34,3463  10 000 0              CCS    A
  1776   REF   1              34,3464  0 3505 1              TC     NOAZFLG1        AZIMFLAG NOT SET

  1777   REF  27  LAST  506   34,3465  3 4767 0              CAF    TWO             AZIMFLAG SET
  1778   REF   2  LAST  113   34,3466  55'611 1  CDULOOP     TS     DTHETASM
  1779   REF   3  LAST  596   34,3467  51'611 0              INDEX  DTHETASM
  1780   REF  12  LAST  570   34,3470  3 0032 0              CA     CDUX
  1781                        34,3471  0 0006 1              EXTEND
  1782   REF   4  LAST  596   34,3472  5 1611 0              INDEX  DTHETASM
  1783   REF  15  LAST  283   34,3473  21'307 0              MSU    THETAD
  1784   REF 251  LAST  589   34,3474  54 154 0              TS     MPAC

  1785   REF 101  LAST  589   34,3475  0 6006 1              TC     INTPRET
  1786                        34,3476    45246 0             ABS    DSU
  1787   REF   1              34,3477    16645 1                    DEGREE10
  1788                        34,3500    77444 0             BPL    EXIT
  1789   REF   1              34,3501    71566 1                    STKTEST

  1790   REF   5  LAST  596   34,3502  11'611 1              CCS    DTHETASM
  1791   REF   1              34,3503  0 3466 0              TC     CDULOOP

  1792   REF   1              34,3504  0 3545 0              TC     AUTOCK

  1793   REF   8  LAST  188   34,3505  3 1572 0  NOAZFLG1    CA     THETADX
  1794   REF   5  LAST  545   34,3506  55'175 1              TS     CDUSPOT +4
  1795   REF   7  LAST  188   34,3507  3 1573 1              CA     THETADY
  1796   REF   6  LAST  596   34,3510  55'171 0              TS     CDUSPOT
  1797   REF   7  LAST  188   34,3511  3 1574 0              CA     THETADZ
  1798   REF   7  LAST  596   34,3512  55'173 1              TS     CDUSPOT +2      STORE IN CDUSPOT FOR TRG*NBSM
  1799   REF 102  LAST  596   34,3513  0 6006 1              TC     INTPRET
  1800                        34,3514    45175 0             VLOAD  CALL
  1801   REF  12  LAST  400   34,3515    03351 0                    SCAXIS
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 1802   REF   1                34,3516   47642 1                     TRG*NBSM
 1803                          34,3517   50206 0           PUSH      DOT                PD 0-5
 1804   REF   4  LAST  398     34,3520   03357 0                     POINTVSM
 1805                          34,3521   50025 0           DSU       BMN                BRANCH IF GR. 10 DEG.
 1806   REF   1                34,3522   16641 0                     COSTEN
 1807   REF   2  LAST  596     34,3523   71566 1                     STKTEST
 1808                          34,3524   47375 0           VLOAD     VXV
 1809                          34,3525   00001 0                     0                  SCAXIS IN S.M.
 1810   REF   5  LAST  597     34,3526   03357 0                     POINTVSM
 1811                          34,3527   41561 0           VXSC      PUSH               PD 6-11 B2
 1812   REF   1                34,3530   16644 0                     DELTYME            1/(DELTA TIME) B-2
 1813                          34,3531   45246 0           ABVAL     DSU
 1814   REF   1                34,3532   16642 0                     MAXRATE            .1 DEG. / SEC. B0
 1815                          34,3533   77240 1           BMN       VLOAD              PUSH UP 6-11
 1816   REF   1                34,3534   71540 0                     STEP2CKB           BRANCH IF LESS .1 DEG./SEC.
 1817                          34,3535   74256 0           UNIT      VXSC
 1818   REF   2  LAST  597     34,3536   16642 0                     MAXRATE
 1819                          34,3537   41572 1           VSL1      PUSH               PD 6-11 .1 DEG./SEC DISTRIBUTED
 1820                          34,3540   74375 0  STEP2CKB VLOAD     VXSC
 1821                          34,3541   00007 0                     6
 1822   REF   1                34,3542   16637 1                     RADTOREV           RAD. TO REV. B0
 1823   REF   6  LAST  596     34,3543   03212 0           STORE     CTHETASM           B0
 1824                          34,3544   77776 1           EXIT
 1825   REF   2  LAST  394     34,3545 3 7673 1  AUTOCK    CAF       FORST3             BITS 15,14,13 OF CHAN31 = 011
 1826   REF   2  LAST  394     34,3546 0 5654 0            TC        C31BTCHK           FOR AUTO AND G&N CONTROL
 1827                          34,3547 1 3550 0            TCF       +1
 1828   REF   2  LAST  394     34,3550 6 7671 0            AD        NEG30000
 1829                          34,3551 0 0006 1            EXTEND                       AUTO MODE SELECTED (BITS 15-13=011)
 1830   REF   1                34,3552 1 3554 1            BZF       DAPCK                 YES-CONTINUE.
 1831   REF   2  LAST  596     34,3553 0 3560 1            TC        ASET
 1832   REF  27  LAST  590     34,3554 4 0075 1  DAPCK     CS        FLAGWRD1           IS STIKFLAG SET (I.E. IS SOMEONE ON RHC)
 1833   REF   1                34,3555 7 4753 0            MASK      STIKBIT
 1834   REF 159  LAST  596     34,3556 10 000 0            CCS       A
 1835   REF   1                34,3557 0 3600 1            TC        STEP3CK
 1836   REF 103  LAST  596     34,3560 0 6006 1  ASET      TC        INTPRET
 18362                         34,3561   77614 1           CLEAR
 18364  REF   2  LAST  416     34,3562   00273 1                     CYC61FLG
 1837                          34,3563   52135 1           SLOAD     GOTO
 1838   REF  19  LAST  590     34,3564   15336 0                     ZEROVECS
 1839   REF   3  LAST  595     34,3565   03704 1                     Q611
 18391                         34,3566   77614 1  STKTEST  BOFINV
 18392  REF   3  LAST  597     34,3567   00153 0                     CYC61FLG
 18393  REF   2  LAST  395     34,3570   44001 0                     KALCMAN3 +1
 1840                          34,3571   77414 0           BON       EXIT
 1841   REF   5  LAST  572     34,3572   01700 1                     V50N18FL
 1842   REF   1                34,3573   73166 1                     MANUEXIT
 1843   REF  28  LAST  553     34,3574 3 4766 1            CAF       BIT3
 1844                          34,3575 0 0006 1            EXTEND                       STIKFLG IS SET
 1845   REF  19  LAST  529     34,3576 05 011 1            WOR       DSALMOUT           TURN ON OPACTY LIGHT
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  1846    REF   3  LAST  597   34,3577  0 3560 1             TC      ASET              EXIT AND SET R61CNTR
  1847    REF 104  LAST  597   34,3600  0 6006 1  STEP3CK    TC      INTPRET
  1848                         34,3601   43001 1             SETPD   8OFF
  1849                         34,3602   00001 0                     0D
  1850    REF   9  LAST  565   34,3603   04346 1                     UTFLAG
  1851    REF   1              34,3604   71610 0                     CRS61.2           NORMAL P-20 (OPTION 0) IF UTFLAG NOT SET

  1852                         34,3605   53145 1             DLOAD   BZE               OPTION 1,TEST FOR STAR OR PLANET
  1853    REF   4  LAST  596   34,3606   02307 1                     R63TIME           =0 IF STAR
  1854    REF   1              34,3607   73162 0                     UTSTART1
 A1855                                                                                 USE NORMAL P20 PATH FOR PLANET
 A1856                                                                                 WITH VL AND RL = 0
 A1857                                                                                 NOW HAVE DCDUS STORED IN T(SAVEDCDU).
 A1858                                                                                 GO CALC OTHER DAP INPUTS (DELCDU,WBODY)
  1859                         34,3610   52375 1  CRS61.2    VLOAD   VSU
  1860    REF   3  LAST  116   34,3611   03204 1                     DCDU
  1861    REF   2  LAST  129   34,3612   03715 1                     SAVEVEL           DV = VL - VC
  1862                         34,3613   57456 1             UNIT    VCOMP             V(MPAC)=-UNITDV.VAC36D=ABSDV.
  1863                         34,3614   74235 0             VXV     VXSC              (-UNITDV)CROSS(UNITLOS).
  1864    REF   2  LAST  129   34,3615   03707 1                     SAVEPOS
  1865    REF   1              34,3616   16646 1                     RVCS/RDS          (UNITLOS B1)(UNITDV B1)(CONST B4)=CROSS.
  1866                         34,3617   60325 0             PDDL    NORM
  1867    REF   5  LAST  598   34,3620   02307 1                     R63TIME           R63TIME IS TEMP STORE FOR ABS(LOS)
  1868    REF  10  LAST  581   34,3621   00047 1                     X1
  1869                         34,3622   60325 0             PDDL    NORM
  1870                         34,3623   00045 0                     36D               NORM ABS VALUE OF DV(NUM).
  1871    REF   8  LAST  590   34,3624   00051 0                     S1
 A1872
  1873                         34,3625   70460 1             XSU,1   SR1               X1 = X1(N DENOM)-S1(N NUM).
  1874    REF   9  LAST  598   34,3626   00050 1                     S1                SR1 TO AVOID OFLOW ON DDV.
  1875                         34,3627   74271 0             DDV     VXSC              ABSDV(MPAC)/ABSLOS(PUSH1) = QUOT.
  1876                         34,3630   55721 0             MXV     VSL*
  1877    REF  16  LAST  576   34,3631   01734 0                     REFSMMAT
  1878                         34,3632   20163 1                       -14D,1          UNNORMALIZE,ADJUST FOR REF. AND SCALE B0
  1879                         34,3633   53214 0             BON     VAD
  1880    REF   4  LAST  554   34,3634   05707 1                     AZIMFLAG
  1881                         34,3635   71637 0                     +2
  1882    REF   7  LAST  597   34,3636   03212 0                     DTHETASM          SCALED B0
  1883                         34,3637   00025 0             STORE   20D
  1884                         34,3640   77761 1             VXSC
  1885    REF   1              34,3641   16650 0                     TENTH
  1886    REF   8  LAST  598   34,3642   37212 1             STCALL  DTHETASM          STORE SM INCREM. ANGLES FOR SMCDURES
  1887    REF   3  LAST  545   34,3643   47530 1                     CDUTRIG           OBTAIN SIN,COSCDUS FOR SMCDURES.
  1888                         34,3644   45001 1             SETPD   CALL              SMCDURES USES PUSH
  1889                         34,3645   00001 0                     0
  1890    REF   1              34,3646   47743 1                     SMCDURES          OBTAIN DELCDU IN V(DCDU).
  1891                         34,3647   70575 1             VLOAD   VSR2
  1892    REF   4  LAST  598   34,3650   03204 1                     DCDU
  1893                         34,3651   34017 0             STCALL  14D
  1894    REF   4  LAST  598   34,3652   47530 1                     CDUTRIG
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L          P20-P25                                                                            USER'S PAGE NO.  48        E6 S3

  1895                               34,3653   45175 0             VLOAD  CALL           LOAD VECTOR AND CALL TRANSFORMATION
  1896                               34,3654   00025 0                    20D            VECTOR FOR TRG*SMNB INTO MPAC
  1897     REF   2  LAST  298        34,3655   47633 1                    *SMNB*         OBTAIN ANG. RATE REFERRED TO NB (BODY)
  1898                               34,3656   77721 0             MXV
  1899     REF   1                   34,3657   16652 1                    MBDYTCTL       CONVERT RATE(OMEGA) TO CONTROL COORDS.
  1900                               34,3660   76561 1             VXSC   VSL1           MULT. BY 0.8 TO RESCALE REVS TO 450 DEG.
  1901     REF   1                   34,3661   15272 1                    POINT8
A 1902
  1903                               34,3662   77776 1  CRS61.2A   EXIT
  1904                               34,3663   0 0004 0            INHINT
  1905     REF   5  LAST  596        34,3664   4 0107 0            CS     FLGWRD11
  1906     REF   4  LAST  596        34,3665   7 4761 1            MASK   AZIMBIT
  1907     REF 160  LAST  597        34,3666   10 000 0            CCS    A
  1908     REF   1                   34,3667   0 3710 1            TC     THTDXYZ        AZIMFLAG NOT SET,USE THETADX,Y,Z

  19085    REF  28  LAST  596        34,3670   3 4767 0            CAF    TWO            AZIMFLAG SET, MODIFY DELCDUS
  1909     REF   9  LAST  598        34,3671   55'611 1  DCDULOOP  TS     DTHETASM
  19095                              34,3672   6 0000 1            DOUBLE
  1910     REF   8  LAST  548        34,3673   6 0120 1            AD     FIXLOC
  19105    REF  10  LAST  599        34,3674   55'612 1            TS     DTHETASM +1
  1911     REF  11  LAST  599        34,3675   51'611 0            INDEX  DTHETASM
  19115    REF  16  LAST  596        34,3676   3 1307 1            CA     THETAD
  1912                               34,3677   0 0006 1            EXTEND
  19125    REF  12  LAST  599        34,3700   5 1611 0            INDEX  DTHETASM
  1913     REF   9  LAST  596        34,3701   21'572 1            MSU    THETADX
  19135                              34,3702   0 0006 1            EXTEND
  1914     REF   1                   34,3703   7 3755 1            MP     1/200
  19145    REF  13  LAST  599        34,3704   51'612 0            INDEX  DTHETASM +1
  1915                               34,3705   20 017 0            DAS    14D
  19155    REF  14  LAST  599        34,3706   11'611 1            CCS    DTHETASM
  19158    REF   1                   34,3707   1 3671 0            TCF    DCDULOOP
  1916     REF  10  LAST  599        34,3710   3 1572 0  THTDXYZ   CA     THETADX
  1917     REF   7  LAST  595        34,3711   55'646 0            TS     CDUXD
  1918     REF   8  LAST  596        34,3712   3 1573 1            CA     THETADY
  1919     REF   4  LAST  423        34,3713   55'650 1            TS     CDUYD
  1920     REF   8  LAST  596        34,3714   3 1574 0            CA     THETADZ
  1921     REF   4  LAST  423        34,3715   55'652 0            TS     CDUZD
A 1922
  1923                               34,3716   0 0006 1  THTD123   EXTEND                TRANSFER OMEGA CONTROL (ANG LOS RATE)
  1924     REF 252  LAST  596        34,3717   3 0155 0            DCA    MPAC           FROM V(MPAC) TO V(WBODY ).
  1925     REF  11  LAST  422        34,3720   53'526 0            DXCH   WBODY
  1926                               34,3721   0 0006 1            EXTEND
  1927     REF 253  LAST  599        34,3722   3 0160 0            DCA    MPAC +3
  1928     REF   5  LAST  422        34,3723   53'530 1            DXCH   WBODY1
  1929                               34,3724   0 0006 1            EXTEND
  1930     REF 254  LAST  599        34,3725   3 0162 1            DCA    MPAC +5
  1931     REF   5  LAST  422        34,3726   53'532 0            DXCH   WBODY2
A 1932
  1933                               34,3727   0 0006 1            EXTEND                TRANSFER CDU INCREMENTS
  1934     REF   9  LAST  599        34,3730   5 0120 1            INDEX  FIXLOC         FROM V(VAC14D) TO V(DELCDUX).
  1935                          34,3731   3 0017 1            DCA     14D
  1936   REF   5  LAST  422     34,3732  53'576 0            DXCH    DELCDUX
  1937                          34,3733   0 0006 1            EXTEND
  1938   REF  10  LAST  599     34,3734   5 0120 1            INDEX   FIXLOC
  1939                          34,3735   3 0021 1            DCA     16D
  1940   REF   4  LAST  422     34,3736  53'600 1            DXCH    DELCDUY
  1941                          34,3737   0 0006 1            EXTEND
  1942   REF  11  LAST  600     34,3740   5 0120 1            INDEX   FIXLOC
  1943                          34,3741   3 0023 0            DCA     18D
  1944   REF   4  LAST  422     34,3742  53'602 0            DXCH    DELCDUZ
  1945   REF  65  LAST  585     34,3743   4 4770 1            CS      ONE              NOW DAP VARIABLES LOADED. SET HOLDFLAG.
  1946   REF   8  LAST  596     34,3744  55'340 0            TS      HOLDFLAG         TO -1.
  1947                          34,3745   0 0003 1            RELINT
  1948   REF   4  LAST  598     34,3746   0 3560 1            TC      ASET
A 1949
  19491                         34,3747   43234 0  RCYCLR61 RTB     DAD
  19492  REF  18  LAST  595     34,3750   51751 0                    LOADTIME
  19493  REF   1                34,3751   33574 1                    20.48SEC
  19494                         34,3752   52015 1           DAD     GOTO
  19495  REF   6  LAST  420     34,3753   03317 1                    TM
  19496  REF   1                34,3754   71437 1                    STORT
  19497  REF   1                35,3573             20.48SEC EQUALS  IRTEBIT
  19498                         34,3755   00122 0  1/200    DEC     .005
  1950   REF   1                35,2000                     SETLOC  P20S3
  1951                          35,3160                     BANK

  19515  REF   1                                            COUNT*  $$/CRS61
  1952                          35,3160   00022 1  328NM    2DEC    606844.84 B-29   327.67 N.M.
  1952                          35,3161   20476 0
  1953                          35,3162   77775 1  UTSTAR1  VLOAD                    STAR, N88 PATH SET WCA, DELTA GA = 0
  1954   REF  20  LAST  597     35,3163   15336 0                   ZEROVECS
  1955                          35,3164   34017 0           STCALL  14D              DELTA GA AT PDIJ  (INCR GIMB CHANGES)
  1956   REF   1                35,3165   71662 0                   CRS61.2A         WCA IS IN MPAC (LOS RATE). SET RCS DAP

  1957                          35,3166   52135 1  MANUEXIT SLOAD   GOTO
  1958   REF   1                35,3167   16674 0                   LCONE            OCTAL 00001
  1959   REF   4  LAST  597     35,3170   03704 1                   Q611
A 1960
  1961                          35,3171   71220 1  R63      STQ     DLOAD            SUBR TO CALL DESIRED CDUS(T)
  1962   REF   2  LAST  129     35,3172   03705 0                   Q6111
  1963   REF   6  LAST  598     35,3173   02307 1                   R63TIME
  1964   REF  19  LAST  588     35,3174   34041 0           STCALL  TDEC1
  1965   REF   4  LAST  561     35,3175   27170 1                   CSMCONIC
  1966                          35,3176   77775 1           VLOAD                    SAVE CSM POSITION AND VEL
  1967   REF  15  LAST  561     35,3177   00001 0                   RATT             RC B-29
  1968   REF   3  LAST  598     35,3200   27707 1           STOVL   SAVEPOS
  1969   REF  13  LAST  561     35,3201   00007 0                   VATT             VC B-7
  1970   REF   3  LAST  598     35,3202   03715 1           STORE   SAVEVEL
  1971                          35,3203   77635 1           VXV
  1972   REF   4  LAST  600     35,3204   03707 1                   SAVEPOS
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 1973   REF  6  LAST  597   35,3205   03357 0              STORE   POINTVSM        SAVE VXR
 1974                       35,3206   71214 0              BON     DLOAD
 1975   REF 10  LAST  598   35,3207   04306 0                      UTFLAG
 1976   REF  1              35,3210   76425 0                      UTAREA1         UT OPTION 1 PROCESSING
 1977   REF  7  LAST  600   35,3211   02307 1                      R63TIME         NORMAL P-20 PATH
 1978   REF 20  LAST  600   35,3212   34041 0              STCALL  TDEC1
 1979   REF  3  LAST  505   35,3213   27202 1                      LEMCONIC
 1980                       35,3214   77775 1              VLOAD                   SAVE LM VEL
 1981   REF 14  LAST  600   35,3215   00007 0                      VATT            VL B-7
 1982   REF  5  LAST  598   35,3216   27204 1              STOVL   CCDU
 1983   REF 16  LAST  600   35,3217   00001 0                      RATT            RL B-29
 1984                       35,3220   53451 1              VSU     UNIT
 1985   REF  5  LAST  600   35,3221   03707 1                      SAVEPOS
 1986   REF  6  LAST  601   35,3222   17707 1              STODL   SAVEPOS         SAVE UNITLOS FOR CRS61.2 RATE CALC.
 1987                       35,3223   00045 0                      36D
 1988   REF  8  LAST  601   35,3224   26307 1              STOVL   R63TIME         SAVE ABS VAL OF LOS FOR CRS61.2
 1989   REF  7  LAST  601   35,3225   03707 1                      SAVEPOS
 1990                       35,3226   77614 1  R63COM1     BON
 1991   REF  5  LAST  598   35,3227   05707 1                      AZIMFLAG
 1992   REF  1              35,3230   76462 0                      UTOPT45         OPTIONS 4,5
 1993                       35,3231   76521 0              MXV     VSL1            COMMON PATH NORMAL P20,OPTION 1
 1994   REF 17  LAST  598   35,3232   01734 0                      REFSMMAT
 1995   REF  7  LAST  601   35,3233   37357 1              STCALL  POINTVSM        ULOS IN STABLE MEM
 1996   REF  2  LAST  557   35,3234   74437 1                      UTPRFAX         COMPUTE UNIT PREFERRED VECTOR
 1997   REF 13  LAST  596   35,3235   37351 1              STCALL  SCAXIS
 1998   REF  3  LAST  394   35,3236   56225 1                      VECPOINT
 1999   REF 17  LAST  599   35,3237   01310 1              STORE   THETAD          DESIRED GIMBALS
 2000                       35,3240   77650 1              GOTO
 2001   REF  3  LAST  600   35,3241   03705 0                      Q6111

 2002   REF  3  LAST  567   37,2000                        SETLOC  P20S
 2003                       37,2425                        BANK

 20035  REF  1                                             COUNT*  $$/CRS61
 2004                       37,2425   45145 0  UTAREA1     DLOAD   CALL            UT OPTION 1 PATH
 2005   REF  9  LAST  601   37,2426   02307 1                      R63TIME
 2006   REF  1              37,2427   54136 1                      LSPOS
 2007                       37,2430   00017 1              STORE   14D             RM B-29
 2008                       37,2431   52214 1              BON     VSU
 2009   REF 12  LAST  590   37,2432   04303 0                      CMOONFLG
 2010   REF  1              37,2433   76445 0                      UTMNCNTR
 2011   REF  8  LAST  601   37,2434   03707 1                      SAVEPOS         RC B-29
 2012                       37,2435   77656 1              UNIT
 2013   REF 14  LAST  601   37,2436   27351 0              STOVL   SCAXIS          VMOON = UNIT(RM-RC)
 2014   REF  9  LAST  601   37,2437   03707 1                      SAVEPOS
 2015                       37,2440   57456 1              UNIT    VCOMP
 2016                       37,2441   24011 1              STOVL   8D              VEARTH=-UNIT(RC)
 2017                       37,2442   00003 1                      2D              RS B-38
 2018                       37,2443   52056 0              UNIT    GOTO
 2019   REF  1              37,2444   76460 1                      SAVEVSUN        VSUN = UNIT(RS)
 2020                         37,2445  53455 0  LTMNCNTR VAD    UNIT          MOON PATH
 2021   REF  10  LAST  601    37,2446  03707 1                  SAVEPOS
 2022                         37,2447  77676 0           VCOMP
 2023                         37,2450  24011 1           STOVL  8D            VEARTH = -UNIT(RM+RC)
 2024   REF  11  LAST  602    37,2451  03707 1                  SAVEPOS
 2025                         37,2452  57456 1           UNIT   VCOMP
 2026   REF  15  LAST  601    37,2453  27351 0           STOVL  SCAXIS        VMOON = -UNIT(RC)
 2027                         37,2454  00017 1                  14D           RM B-29
 2028                         37,2455  74402 1           VSR8   VSR1          SCALE RM B-38
 2029                         37,2456  53445 1           BVSU   UNIT          VSUN = UNIT(RS-RM)
 2030                         37,2457  00003 1                  20D
 2031                         37,2460  34003 0  SAVEVSUN STCALL 20D
 2032   REF   1               37,2461  32000 0                  SAVESTAR

 2033   REF   1               15,2000                    SETLOC STARTAB
 2034                         15,2000                    BANK

 20345  REF   1                                          COUNT* $$/CRS61
 2035                         15,2000  47201 1  SAVESTAR SETPD  VXV
 2036                         15,2001  00001 0                  0D
 2037   REF   1               15,2002  34644 0                  ECLIPOL
 2038   REF   2  LAST  121    15,2003  27452 1           STOVL  VEL/C
 2039   REF   4  LAST  600    15,2004  03715 1                  SAVEVEL
 2040                         15,2005  53361 0           VXSC   VAD
 2041   REF   1               15,2006  34642 0                  1/C
 2042   REF   3  LAST  602    15,2007  03452 1                  VEL/C
 2043   REF   4  LAST  602    15,2010  27452 1           STOVL  VEL/C
 2044   REF   4  LAST  565    15,2011  11762 1                  ZEROVEC
 2045   REF   6  LAST  601    15,2012  27204 1           STOVL  DCDU          VL=0  FOR STAR AND PLANET
 2046   REF  12  LAST  602    15,2013  03707 1                  SAVEPOS
 2047                         15,2014  53476 1           VCOMP  UNIT
 2048   REF  13  LAST  602    15,2015  17707 1           STODL  SAVEPOS       UNIT(0-RC)  FOR PLANET
 2049                         15,2016  00045 0                  36D
 2050   REF  10  LAST  601    15,2017  02307 1           STORE  R63TIME       ABS(0-RC) FOR PLANET
 2051                         15,2020  41535 1           SLOAD  PUSH          PD0 = STARCODE
 2052   REF   2  LAST  556    15,2021  01356 0                  UTSTARNO      STARCODE
 2053                         15,2022  67254 0           BZE    SLOAD
 2054   REF   1               15,2023  73257 0                  UTVIAN88      UNITLOS WAS VIA N88
 2055   REF   1               15,2024  32050 0                  UTSP46
 2056                         15,2025  77621 1           BDSU                 STARCODE-46(OCTAL)
 2057                         15,2026  77244 0           BPL    VLOAD         BRANCH IF STARCODE=46,47,50 OCTAL
 2058   REF   1               15,2027  73242 1                  UTST4650
 2059   REF   5  LAST  602    15,2030  11762 1                  ZEROVEC
 2060   REF   5  LAST  602    15,2031  17715 1           STODL  SAVEVEL       VC=0 FOR STAR
 2061   REF   6  LAST  602    15,2032  11762 1                  ZEROVEC
 2062   REF  11  LAST  602    15,2033  02307 1           STORE  R63TIME       STAR INDICATOR USED LATER IN CRS61.2
 2063                         15,2034  41335 1           SLOAD  DMP
 2064   REF   1               15,2035  32047 0                  UTSP6
 2065                         15,2036  00001 0                  0D            0D STILL = STARCODE
 2066                         15,2037  76750 1           LXA,1  VLOAD*
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2067    REF 255  LAST  599   15,2040   00155 0                     MPAC +1        STARCODE*6
2068    REF   1              15,2041   33776 1                     CATLOG,1       MPAC= UNIT STAR VECTOR
2069                         15,2042   53455 0  UTABERR   VAD      UNIT           CORRECT FOR ABERRATION
2070    REF   5  LAST  602   15,2043   03452 1                     VEL/C
2071                         15,2044   77650 1            GOTO                    GOTO COMMON AREA
2072    REF   1              15,2045   73226 0                     R63COM1

2073                         15,2046   00006 1  UTSP6     OCT      6              SINGLE PRE 6 FOR MULT STARCODE
2074                         15,2047   00046 0  UTSP46    OCT      46             SINGLE PRE 46 FOR DETERMINING PLANET

2075    REF   2  LAST  600   35,2000                      SETLOC P20S8
2076                         35,3242                      BANK

20765   REF   2 LAST  600 TO  601:     50      50*        COUNT* $$/CRS61
2077                         35,3242   70454 0  UTST4650 BZE      SR1            SUN,EARTH,MOON  OR PLANET PATH
2078    REF   1              35,3243   73251 0                     UTSUN          STARCODE=46 OCTAL (SUN)
2079                         35,3244   77230 0            BHIZ     VLOAD
2080    REF   1              35,3245   73254 0                     UTEARTH        STARCODE=47 OCTAL (EARTH)
2081    REF  16  LAST  602   35,3246   03351 0                     SCAXIS         VMOON     STARCODE= 50 OCTAL
2082                         35,3247   77650 1            GOTO
2083    REF   1              35,3250   32042 0                     UTABERR

2084                         35,3251   52175 0  UTSUN     VLOAD    GOTO
2085                         35,3252   00003 1                     2D             VSUN
2086    REF   2  LAST  603   35,3253   32042 0                     UTABERR

2087                         35,3254   52175 0  UTEARTH   VLOAD    GOTO
2088                         35,3255   00011 1                     8D             VEARTH
2089    REF   3  LAST  603   35,3256   32042 0                     UTABERR

2090                         35,3257   77775 1  UTVIAN88  VLOAD                   UNITLOS IN STARSAV3 VIA N88
2091    REF  21  LAST  600   35,3260   15336 0                     ZEROVECS
2092    REF   6  LAST  602   35,3261   17715 1            STODL    SAVEVEL        VC = 0 FOR N88 VECTOR
2093    REF  22  LAST  603   35,3262   15336 0                     ZEROVECS
2094    REF  12  LAST  602   35,3263   26307 1            STOVL    R63TIME        STAR INDICATOR USED LATER IN CRS61.2
2095    REF   3  LAST  556   35,3264   03732 1                     PLANVCUT       N88 UNIT VECTOR BAS REF
2096                         35,3265   53561 0            VXSC     UNIT
2097    REF   1              35,3266   33272 0                     1/SQRT3
2098                         35,3267   77650 1            GOTO
2099    REF   4  LAST  603   35,3270   32042 0                     UTABERR

2100                         35,3271   22363 1  1/SQRT3   2DEC     .57735021      1/SQUARE ROOT 3  B-0
2100                         35,3272   11623 0


2101    REF   4  LAST  601   37,2000                      SETLOC P20S
2102                         37,2462                      BANK

21025   REF   2 LAST  601 TO  602:     29      29*        COUNT* $$/CRS61
2103    REF   1              23,3526            UT166     EQUALS .166...
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  2104                               0000                UTSAP     =       0D            SA PRIME
  2105                               0006                UTSBP     =       6D            SB PRIME
  2106                               0022                UTSA      =       18D           SA
  2107                               0030                UTSB      =       24D           SB
  2108                               0000                UTUXP     =       0D            UX PRIME
  2109                               0006                UTUYP     =       6D            UY PRIME
  2110                               0014                UTUZP     =       12D           UZ PRIME
  2111                               0022                UTUX      =       18D           UX
  2112                               0030                UTUY      =       24D           UY
  2113                               0036                UTUZ      =       30D           UZ
 A2114                                                   UTX       =       SCAXIS        X
 A2115                                                   UTY       =       POINTVSM      Y
  2116                               0000                UTZ       =       0D            Z AFTER UNIT
  2117                               0044                UTZINIT   =       36D           Z BEFORE UNIT
  2118                               0006                UTAMG     =       6D            AMG
  2119                               0030                UTOGA     =       24D           OGA REVS B-0
  2120  REF   1                      0032                UTIGA     =       UTOGA +2      IGA REVS B-0
  2121  REF   2  LAST  604           0034                UTMGA     =       UTOGA +4      MGA REVS B-0

  2122  REF   1                   37,2462   34031 1   UTOPT45   STCALL  UTSB          SB=  ULOS BASIC REF. IN MPAC B-1
  2123  REF   3  LAST  601        37,2463   74437 1                     UTPRFAX
  2124  REF   1                   37,2464   00007 0             STORE   UTSBP         SB PRIME NAV BASE B-1

  2125                            37,2465   53435 0             VXV     UNIT
  2126  REF   2  LAST   34        37,2466   15332 1                     UNITY
  2127  REF   1                   37,2467   24001 0             STOVL   UTSAP         SA PRIME=(SB PRIME)X(0,1,0) B-1 NAV B
  2128  REF   2  LAST  604        37,2470   00031 0                     UTSB
  2129                            37,2471   53435 0             VXV     UNIT
  2130  REF   8  LAST  601        37,2472   03357 0                     POINTVSM      VXR    SAVED ABOVE
  2131  REF   9  LAST  604        37,2473   17357 0             STODL   POINTVSM      ULOS X (VXR) B-1
  2132  REF   4  LAST  553        37,2474   01353 0                     AZIMANGL
  2133                            37,2475   74346 0             COS     VXSC
  2134  REF  10  LAST  604        37,2476   03357 0                     POINTVSM
  2135  REF  17  LAST  603        37,2477   27351 0             STOVL   SCAXIS        B-2
  2136  REF   3  LAST  604        37,2500   00031 0                     UTSB
  2137                            37,2501   53435 0             VXV     UNIT
  2138  REF  11  LAST  604        37,2502   03357 0                     POINTVSM
  2139  REF  12  LAST  604        37,2503   17357 0             STODL   POINTVSM      ULOS X (ULOS X (VXR)) B-1
  2140  REF   5  LAST  604        37,2504   01353 0                     AZIMANGL
  2141                            37,2505   74356 1             SIN     VXSC          B-2
  2142  REF  13  LAST  604        37,2506   03357 0                     POINTVSM
  2143                            37,2507   76455 1             VAD     VSL1
  2144  REF  18  LAST  604        37,2510   03351 0                     SCAXIS
  2145  REF   1                   37,2511   24023 0             STOVL   UTSA          SA B-1
  2146  REF   2  LAST  604        37,2512   00001 0                     UTSAP                             START AXISGEN
  2147                            37,2513   53435 0             VXV     UNIT          UX PRIME ALREADY IN UTUXP B-1
  2148  REF   2  LAST  604        37,2514   00007 0                     UTSBP         UX       ALREADY IN UTUX  B-1
  2149  REF   1                   37,2515   24007 0             STOVL   UTUYP         UY PRIME B-1
  2150  REF   1                   37,2516   00001 0                     UTUXP
  2151                            37,2517   76435 1             VXV     VSL1
  2152    REF    2  LAST   604    37,2520    00007 0                        UTUYP
  2153    REF    1                37,2521    24015 0              STOVL    UTUZP              UZ PRIME B-1
  2154    REF    2  LAST   604    37,2522    00023 0                       UTSA
  2155                            37,2523    53435 0              VXV      UNIT
  2156    REF    4  LAST   604    37,2524    00031 0                       UTSB
  2157    REF    1                37,2525    24031 0              STOVL    UTUY               UY B-1
  2158    REF    1                37,2526    00023 0                       UTUX
  2159                            37,2527    76435 1              VXV      VSL1
  2160    REF    2  LAST   605    37,2530    00031 0                       UTUY
  2161    REF    1                37,2531    24037 0              STOVL    UTUZ               UZ B-1
  2162    REF    2  LAST   605    37,2532    00023 0                       UTUX
  2163                            37,2533    77761 1              VXSC
  2164    REF    2  LAST   604    37,2534    00001 0                       UTUXP
  2165    REF    1                37,2535    37351 1              STCALL   UTX
  2166    REF    1                37,2536    73273 0                       UTOPT45A

  2167    REF    3  LAST   603    35,2000                         SETLOC   P20S8
  2168                            35,3273                         BANK

  21685   REF    3 LAST   603 TO  603:       25      75*          COUNT*   $$/CRS61
  2169                            35,3273    77775 1  UTOPT45A    VLOAD
  2170    REF    3  LAST   605    35,3274    00031 0                       UTUY
  2171                            35,3275    53361 0              VXSC     VAD
  2172    REF    3  LAST   605    35,3276    00007 0                       UTUYP
  2173    REF    2  LAST   605    35,3277    03351 0                       UTX
  2174    REF    3  LAST   605    35,3300    27351 0              STOVL    UTX
  2175    REF    2  LAST   605    35,3301    00037 0                       UTUZ
  2176                            35,3302    53361 0              VXSC     VAD
  2177    REF    2  LAST   605    35,3303    00015 0                       UTUZP
  2178    REF    4  LAST   605    35,3304    03351 0                       UTX
  2179    REF    5  LAST   605    35,3305    27351 0              STOVL    UTX                UX NOT UNIT YET
  2180    REF    3  LAST   605    35,3306    00023 0                       UTUX
  2181                            35,3307    77761 1              VXSC
  2182    REF    3  LAST   605    35,3310    00003 1                       UTUXP +2
  2183    REF    1                35,3311    27357 0              STOVL    UTY
  2184    REF    4  LAST   605    35,3312    00031 0                       UTUY
  2185                            35,3313    53361 0              VXSC     VAD
  2186    REF    4  LAST   605    35,3314    00011 1                       UTUYP +2
  2187    REF    2  LAST   605    35,3315    03357 0                       UTY
  2188    REF    3  LAST   605    35,3316    27357 0              STOVL    UTY
  2189    REF    3  LAST   605    35,3317    00037 0                       UTUZ
  2190                            35,3320    53361 0              VXSC     VAD
  2191    REF    3  LAST   605    35,3321    00017 1                       UTUZP +2
  2192    REF    4  LAST   605    35,3322    03357 0                       UTY
  2193    REF    5  LAST   605    35,3323    27357 0              STOVL    UTY                UY NOT UNIT YET
  2194    REF    4  LAST   605    35,3324    00023 0                       UTUX
  2195                            35,3325    77761 1              VXSC
  2196    REF    4  LAST   605    35,3326    00005 1                       UTUXP +4
  2197    REF    1                35,3327    24045 0              STOVL    UTZINIT
  2198    REF    5  LAST   605    35,3330    00031 0                       UTUY
  2199                          35,3331   53361 0              VXSC     VAD
  2200    REF   5  LAST  605    35,3332   00013 0                       UTUYP +4
  2201    REF   2  LAST  605    35,3333   00045 0                       UTZINIT
  2202    REF   3  LAST  606    35,3334   24045 0              STOVL    UTZINIT
  2203    REF   4  LAST  605    35,3335   00037 0                       UTUZ
  2204                          35,3336   53361 0              VXSC     VAD
  2205    REF   4  LAST  605    35,3337   00021 1                       UTUZP +4
  2206    REF   4  LAST  606    35,3340   00045 0                       UTZINIT
  2207                          35,3341   77656 1              UNIT                       UTUZ AND UTZINIT ARE CLOBBERED BY UNIT
  2208    REF   1               35,3342   24001 0              STOVL    UTZ               UZ B-1
  2209    REF   6  LAST  605    35,3343   03357 0                       UTY
  2210                          35,3344   77656 1              UNIT
  2211    REF   7  LAST  606    35,3345   27357 0              STOVL    UTY               UY B-1
  2212    REF   6  LAST  605    35,3346   03351 0                       UTX
  2213                          35,3347   77656 1              UNIT
  2214    REF   7  LAST  606    35,3350   03351 0              STORE    UTX               UX B-1      END AXISGEN
  2215                          35,3351   53435 0              VXV      UNIT                          STATR CALCGA
  2216    REF  18  LAST  601    35,3352   01742 1                       REFSMMAT +6       YSM
  2217    REF   1               35,3353   00007 0              STORE    UTAMG             AMG B-1
  2218                          35,3354   77641 1              DOT
  2219    REF   2  LAST  606    35,3355   00001 0                       UTZ
  2220    REF   2  LAST  299    35,3356   24021 1              STOVL    COSTH             COS(OGA)= AMG.ZNB B-2
  2221    REF   2  LAST  606    35,3357   00007 0                       UTAMG
  2222                          35,3360   77641 1              DOT
  2223    REF   8  LAST  606    35,3361   03357 0                       UTY
  2224    REF   2  LAST  299    35,3362   34023 1              STCALL   SINTH             SIN(OGA)= AMG.YNB B-2
  2225    REF   2  LAST  299    35,3363   47311 1                       ARCTRIG
  2226    REF   3  LAST  604    35,3364   24031 0              STOVL    UTOGA             OGA REVS B-0
  2227    REF   3  LAST  606    35,3365   00007 0                       UTAMG
  2228                          35,3366   50235 0              VXV      DOT
  2229    REF   8  LAST  606    35,3367   03351 0                       UTX
  2230    REF  19  LAST  606    35,3370   01742 1                       REFSMMAT +6
  2231                          35,3371   77752 1              SL1
  2232    REF   3  LAST  606    35,3372   24021 1              STOVL    COSTH             COS(MGA)= YSM.(AMG X XNB) B-2
  2233    REF  20  LAST  606    35,3373   01742 1                       REFSMMAT +6
  2234                          35,3374   77641 1              DOT
  2235    REF   9  LAST  606    35,3375   03351 0                       UTX
  2236    REF   3  LAST  606    35,3376   34023 1              STCALL   SINTH             SIN(MGA)= YSM.XNB B-2
  2237    REF   3  LAST  606    35,3377   47311 1                       ARCTRIG
  2238    REF   1               35,3400   00035 1              STORE    UTMGA             MGA REVS B-0
  2239                          35,3401   45246 0              ABS      DSU
  2240    REF   1               35,3402   07527 0                       UT166
  2241                          35,3403   77644 1              BPL
  2242    REF   1               35,3404   73425 0                       UTGMLOCK
  2243                          35,3405   50375 0    UTCGA1    VLOAD    DOT
  2244    REF  21  LAST  606    35,3406   01750 1                       REFSMMAT +12D
  2245    REF   4  LAST  606    35,3407   00007 0                       UTAMG
  2246    REF   4  LAST  606    35,3410   24021 1              STOVL    COSTH             COS(IGA)= AMG.ZSM B-2
  2247    REF  22  LAST  606    35,3411   01734 0                       REFSMMAT
  2248                          35,3412   77641 1              DOT
  2249    REF   5  LAST  606   35,3413   00007 0                      UTAMG
  2250    REF   4  LAST  606   35,3414   34023 1            STCALL    SINTH                 SIN(IGA)= AMG.XSM B-2
  2251    REF   4  LAST  606   35,3415   47311 1                      ARCTRIG
  2252    REF   1              35,3416   00033 1            STORE     UTIGA                 IGA REVS B-0
  2253                         35,3417   47175 1            VLOAD     RT8
  2254    REF   4  LAST  606   35,3420   00031 0                      UTOGA                 CONVERT TO 2S COMP
  2255    REF   5  LAST  545   35,3421   45644 0                      V1STO2S               ORDER IS OGA,IGA,MGA
  2256    REF  18  LAST  601   35,3422   01310 1            STORE     THETAD                TRIPLE PREC
  2257                         35,3423   77650 1            GOTO
  2258    REF   4  LAST  601   35,3424   03705 0                      06111                 EXIT R63

  2259                         35,3425   77776 1  UTGMLOCK  EXIT                            GIMBAL LOCK HAS OCCURED
  2260    REF  22  LAST  467   35,3426   0 5671 1           TC        ALARM
  2261                         35,3427   00401 1            OCT       00401

  2262    REF 105  LAST  598   35,3430   0 6006 1           TC        INTPRET
  2263                         35,3431   77650 1            GOTO
  2264    REF   1              35,3432   73405 1                      UTCGA1

  2265    REF   3  LAST  589   27,2000                      SETLOC    R2251
  2266                         27,2636                      BANK

  22665   REF   1                                           COUNT*    $$/CRS61
  2267                         27,2636   05057 0  RADTOREV  2DEC      0.15915494            RADIANS TO REV
  2267                         27,2637   23015 1
  2268                         27,2640   07702 0  COSTEN    DEC       0.98481 B-2           COSINE OF 10 DEG.
  2269                         27,2641   00034 0  MAXRATE   2DEC      0.00174               .1 DEG./SEC. RATE
  2269                         27,2642   20206 1
  2270                         27,2643   06315 0  DELTYME   DEC       0.05 B2               1/DELTA TIME  = 1/20 SEC
  2271                         27,2644   01616 1  DEGREE10  DEC       .05556                10 DEG IN REV
  2272                         27,2645   37651 1  RVCS/RDS  2DEC      15.915494 B-4         100/2PI REV-CSEC/RAD-SEC.
  2272                         27,2646   16721 1
  2273                         27,2647   31463 1  TENTH     2DEC      .1 B+3                .1 B-3 (TO SCALE ANG.RATE TO .1 INREMS)
  2273                         27,2650   06315 0
  2274                         27,2651   20000 0  MBDYTCTL  2DEC      .5                                       7.25 DEG NEGATIVE
  2274                         27,2652   00000 1
  2275                         27,2653   00000 1            2DEC      0                                        X-AXIS ROTATION MATRIX
  2275                         27,2654   00000 1
  2276                         27,2655   00000 1            2DEC      0                                        CONVERTS BODY TO CTL
  2276                         27,2656   00000 1
  2277                         27,2657   00000 1            2DEC      0                                        AXES. SAME AS QUADROT
  2277                         27,2660   00000 1
  2278                         27,2661   17676 0            2DEC      .99200495 B-1         COS7.25 B1      BUT SCALED B1
  2278                         27,2662   20113 0
  2279                         27,2663   75766 1            2DEC      -.12619897 B-1        -SIN7.25 B1
  2279                         27,2664   45544 0
  2280                         27,2665   00000 1            2DEC      0
  2280                         27,2666   00000 1
  2281                         27,2667   02011 0            2DEC      .12619897 B-1         SIN7.25 B1
  2281                         27,2670   32233 1
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 2282                       27,2671   17676 0             2DEC    .99200495 B-1   COS7.25 B1
 2282                       27,2672   20113 0
 2283                       27,2673   00001 0  LOONE      OCT     00001           TO SET MPAC = 00001 FOR SPECIAL EXIT.
 2284   REF    3  LAST  563    7673            FURST3     EQUALS 13,14,15         CONSTANT FOR AUTOCK (OCT 70000).
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R2285     ..... S22.1 ORBITAL NAVIGATION ROUTINE
R2286     MOD 1

R2287     FUNCTIONAL DESCRIPTION
R2288      1. UPDATE CSM STATE VECTOR
R2289      2. UPDATE LANDMARK POSITION
R2290      3. CONVERT W MATRIX FROM 9 TO 6 DIMENSIONS

R2291     SUBROUTINES CALLED
R2292      INTSTALL,INTEGRV,GETUM,SETRE,R-TO-TP,RP-TO-R,BVECTORS,INCORP1,INCORP2
R2293      LALOTORV,S22F2410,LAT-LONG,ROWDOT

R2294     ERASABLE INITIALIZATION
R2295      W=9X9 MATRIX
R2296      ORBWFLAG=0 FOR INVALID W MATRIX,=1 FOR VALID W MATRIX
R2297      ASTRONAUT ENTRY OF KNOWN,L,OFF
R2298      8NN= NUMBER OF MARKS  DECIMAL INTEGER 8-14
R2299      REFSMMAT= TRANSFORMATION MATRIX
R2300      MARKSTAT= ADDRESS OF START OF MARK DATA (MARK DATA OF EACH MARK IS
R2301                STORED AS FOLLOWS,  TIME,AIG,SA,AMG,PA,AOG) TIME IS IN DOUBLE
R2302                PRECISION,ALL OTHERS ARE IN SINGLE PRECISION
R2303      CSM STATE VECTOR

R2304     OUTPUT
R2305      UPDATED CSM STATE VECTOR
R2306      UPDATED LANDMARK POSITION
R2307      NEW 6 DIMENSIONAL W MATRIX

R2308     DEBRIS
R2309      PUSH LIST,CSMPOS,ALPHAV,ERADM,UM,RCLP,USTAR,VARIANCE,X789,BVECTOR,8KK,
R2310      S22LOC, SVMRKDAT TABLE,22SUBSCL,LANDMARK,CXOFF,S22C,LAT,LONG,ALT,
R2311      TEMPOR1,S22TOFF,S221OFF,DSPTEM1,S22EORM,S22TPRIM

  2313    REF   1                 30,2000                        SETLOC P2056
  2314                            30,2466                        BANK

  2315    REF  16  LAST   564     E7,1751                        EBANK=  LANDMARK
  2316    REF   2 LAST   561 TO   565:     178    178*           COUNT*  $$/P22
  2317    REF  15  LAST   565     30,2466  0 5362 0   S22.1      TC      2PHSCHNG
  2318                            30,2467   00004 0              OCT     00004
  2319                            30,2470   05022 1              OCT     05022
  2320                            30,2471   13000 0              OCT     13000
  2321    REF 106  LAST   607     30,2472  0 6006 1              TC      INTPRET
  2322                            30,2473   45001 1              SETPD   CALL
  2323                            30,2474   00001 0                      0D
  2324    REF   5  LAST   583     30,2475   56603 1                      SHIFTNDX
  2325                            30,2476   45134 0   FIG2EXIT SXA,2   CALL
  2326    REF   2  LAST   129     30,2477   03673 0                      S22EORM            SET =0 EARTH,=2 MOON FOR SHIFTING
  2327    REF   4  LAST   583     30,2500   56462 1                      SETINTG
 R2328                       FLOWCHART D=0   THEN DIM0FLAG=0  D6OR9FLG NOT TESTED
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L          P20-P25                                                                                          USER'S PAGE NO.  59        E7 53

R2329                           FLOWCHART D=6   THEN DIM0FLAG=1  D6OR9FLG=0
R2330                           FLOWCHART D=9   THEN DIM0FLAG=1  D6OR9FLG=1

 2331                                   30,2501   43014 0                   BOFF    SETGO
 2332    REF   6  LAST   587   30,2502   01751 0                           ORBWFLAG
 2333    REF   1                        30,2503   60506 1                           SETWW5D          BRANCH TO SET W0-W5,ORBWFLAG,D
 2334    REF   7  LAST   588   30,2504   01436 1                           DIM0FLAG         FLOWCHART D=6 PATH
 2335    REF   1                        30,2505   60513 0                           SETVANDI
 2336                                   30,2506   71214 0  SETWW5D   CLEAR   DLOAD
 2337    REF   7  LAST   583   30,2507   02676 1                           RENDWFLG         FLOWCHART D=9 PATH
 2338    REF   1                        30,2510   02005 0                           WOR3POS
 2339                                   30,2511   34001 1                   STCALL  0
 2340    REF   2  LAST   580   30,2512   56612 1                           INITIALW
 2341                                   30,2513   77370 0  SETVANDI  AXT,1   VLOAD
 2342                                   30,2514   00022 1                   DEC     18
 2343    REF  23  LAST   603   30,2515   15336 0                           ZEROVECS
 2344                                   30,2516   77731 1                   SSP
 2345    REF  10  LAST   598   30,2517   00051 0                           S1
 2346                                   30,2520   00006 1                   DEC     6
 2347    REF  14  LAST   591   30,2521   06467 1  NEXTW2W8  STORE   W +54D,1         CLEAR W2
 2348    REF  15  LAST   610   30,2522   06555 1                   STORE   W +108D,1              W5
 2349    REF  16  LAST   610   30,2523   06577 1                   STORE   W +126D,1              W6
 2350    REF  17  LAST   610   30,2524   06621 1                   STORE   W +144D,1              W7
 2351    REF  18  LAST   610   30,2525   06643 0                   STORE   W +162D,1              W8
 2352                                   30,2526   43100 1                   TIX,1   CLEAR
 2353    REF   1                        30,2527   60521 1                           NEXTW2W8
 2354    REF   2  LAST   581   30,2530   02666 0                           DMENFLG          0=6X6W, 1=9X9W
 2355                                   30,2531   77624 1  S22NXTIN  CALL
 2356    REF   1                        30,2532   62357 1                           GETIF
 2357    REF  21  LAST   601   30,2533   34041 0                   STCALL  TDEC1
 2358    REF   7  LAST   584   30,2534   27236 0                           INTEGRV
 2359                                   30,2535   45154 0                   LXA,2   CALL
 2360    REF   3  LAST   609   30,2536   03673 0                           S22EORM
 2361    REF   3  LAST   585   30,2537   71327 1                           CMPOS
 2362                                   30,2540   45140 0                   LXC,1   CALL
 2363    REF   3  LAST   562   30,2541   03750 0                           S22LOC           SETUP ADDR. OF MARK DATA FOR GETUM SUBR.
 2364    REF   2  LAST   580   30,2542   47017 1  S2GETUM                   GETUM
 2365    REF   5  LAST   580   30,2543   01072 0                   STORE   UM
 2366                                   30,2544   41535 1  DMPINTEG  SLOAD   PUSH             TEST OFF=I
 2367    REF   6  LAST   564   30,2545   03746 1                           BKK
 2368                                   30,2546   45335 0                   SLOAD   DSU
 2369    REF   4  LAST   563   30,2547   03745 1                           CXOFF            BEFORE SUBT.
 2370                                   30,2550   43030 0                   BHIZ    BCN
 2371    REF   1                        30,2551   61042 0                           S22OFF=I         BRANCH HERE IF OFF=I
 2372    REF   3  LAST   610   30,2552   02706 1                           DMENFLG          0=6X6W, 1=9X9W
 2373    REF   1                        30,2553   61050 0                           S22D=9
 2374                                   30,2554   77624 1                   CALL
 2375    REF  12  LAST   586   30,2555   22327 1                           GRP2PC
 2376                                   30,2556   77614 1                   SET
 2377    REF   7  LAST   610   30,2557   01471 1                           ORBWFLAG
 2378                        30,2560   43014 0                SET      SET
 2379   REF    4  LAST  610  30,2561   02466 1                         CMENFLG          =0 ON FIRST PASS THRU HERE FOR D=0,ORG
 2380   REF    1             30,2562   01062 1                         22DSPFLG         =1 TO DISPLAY DR,DV ON FIRST PASS
 2381                        30,2563   77614 1                BON
 2382   REF    4  LAST  564  30,2564   03307 0                         KNOWNFLG
 2383   REF    1             30,2565   61204 0                         S22BOX22
 2384                        30,2566   53575 0                VLOAD    UNIT             UNIT ALSO PUTS ABVAL(RC) IN 36D
 2385   REF    4  LAST  585  30,2567   01046 1                         CSMPOS
 2386   REF    5  LAST  562  30,2570   36152 1                STCALL   ALPHAV           ALPHAV +4=SINL FOR SETRE
 2387   REF    1             30,2571   26654 1                         SETRE            ERADM= R0 METERS B-29 BOTH EARTH/MOON
 2388                        30,2572   77624 1                CALL                      COMPUTE RL FROM EQUATION 2.4.10
 2389   REF    1             30,2573   61331 1                         S22F2410         STORED IN X789,MPAC  B-27,B-29
 2390                        30,2574   70414 1                BOFF     VSR2             SCALE RL B-29 FOR BOTH EARTH/MOON
 2391   REF   13  LAST  601  30,2575   04343 1                         CMOONFLG
 2392                        30,2576   60577 1                         +1
 2393   REF    1             30,2577   02555 0                STORE    S22RL
 2394                        30,2600   72441 0                DOT      SL1
 2395   REF    6  LAST  610  30,2601   01072 0                         UM
 2396   REF    1             30,2602   24037 0                STOVL    S22D             D= UM.RL B-29
 2397   REF   24  LAST  610  30,2603   15336 0                         ZEROVECS
 2398                        30,2604   41401 1                SETPD    PUSH
 2399                        30,2605   00001 0                         0D
 2400                        30,2606   65206 0                PUSH     PDDL             SET 0-18D = I BACKWARDS
 2401   REF    5  LAST  562  30,2607   15334 1                         HIDPHALF         PD 18
 2402                        30,2610   77702 1                SR2                       B-3
 2403                        30,2611   00005 1                STORE    4D
 2404                        30,2612   00011 1                STORE    8D
 2405                        30,2613   24015 0                STOVL    12D
 2406   REF    7  LAST  611  30,2614   01072 0                         UM               B-1
 2407   REF    1             30,2615   24023 0                STOVL    S223X1
 2408   REF    2  LAST  611  30,2616   02555 0                         S22RL            B-29
 2409                        30,2617   77624 1                CALL                      (UM)(RL T) B-30 STORED IN S22UMRL THRU
 2410   REF    1             30,2620   62340 1                         S2231X13         S22UMRL +17D
 2411                        30,2621   66370 0                AXT,1    SSP
 2412                        30,2622   00022 1                DEC      18
 2413   REF   11  LAST  610  30,2623   00051 0                         S1
 2414                        30,2624   00006 1                DEC      6
 2415                        30,2625   70573 1      S22NXTU   VLOAD*   VSR2             (UM)(RL T) B-32
 2416   REF    1             30,2626   03524 1                         S22UMRL +18D,1
 2417                        30,2627   77741 0                V/SC
 2418   REF    2  LAST  611  30,2630   00037 0                         S22D             D B-29
 2419                        30,2631   45445 0                BVSU     STADR            SUBTRACT FROM I B-3
 2420   REF    2  LAST  611  30,2632   70253 1                STORE    S22UMRL +18D,1   U MATRIX B-3
 2421                        30,2633   76100 1                TIX,1    AXT,1            PD 0 AFTER TIX
 2422   REF    1             30,2634   60625 0                         S22NXTU
 2423                        30,2635   00044 1                DEC      36               S1 STILL 6 FROM ABOVE
 2424                        30,2636   64373 1      S22NXTWI  VLOAD*   MXV
 2425   REF   19  LAST  610  30,2637   02445 0                         W +36D,1         B-19
 2426   REF    3  LAST  611  30,2640   03502 0                         S22UMRL          B-3
 2427                        30,2641   77732 1                VSL3
 2428  REF  20  LAST  611   30,2642   06621 1             STORE   W +1440,1          W(I+18)= UW(I) B-19
 2429                       30,2643   71300 1             TIX,1   DLOAD
 2430  REF   1              30,2644   60636 1                     S22NXTWI
 2431  REF   1              30,2645   00041 1                     S22RHO             B-28,B-30
 2432                       30,2646   60414 0             BOFF    SR2                MAKE RHO B-30
 2433  REF  14  LAST  611   30,2647   04343 1                     CMOONFLG
 2434                       30,2650   60651 0                     +1
 2435                       30,2651   57101 0             NORM    XAD,2
 2436  REF   9  LAST  581   30,2652   00050 1                     X2
 2437  REF  10  LAST  612   30,2653   00047 1                     X2
 2438                       30,2654   41316 0             DSQ     DMP
 2439  REF   1              30,2655   24024 1                     SCTVAR             B+18
 2440                       30,2656   76142 1             SR1     AXT,1              ACCOUNTS FOR 1/2 IN NEXT FORMULA
 2441                       30,2657   00022 1             DEC     18
 2442  REF   2  LAST  612   30,2660   00041 1             STORE   S22RHO             1/2(RHO SQ)(VARSCT)
 2443                       30,2661   64373 1   S22NXXA   VLOAD*  MXV
 2444  REF   4  LAST  611   30,2662   03524 1                     S22UMRL +18D,1     B-3
 2445  REF   5  LAST  612   30,2663   03502 0                     S22UMRL            B-3
 2446                       30,2664   53761 1             VXSC    VSR*
 2447  REF   3  LAST  612   30,2665   00041 1                     S22RHO
 2448                       30,2666   57212 1                     0 -12D,2           WITH VARRP SCALED B-28
 2449  REF   1              30,2667   05136 0             STORE   S22UUT +18D,1      1/2(RHO SQ)(VARSCT)(U)(U T)
 2450                       30,2670   77300 1             TIX,1   VLOAD
 2451  REF   1              30,2671   60661 0                     S22NXXA
 2452  REF   8  LAST  611   30,2672   01072 0                     UM
 2453  REF   2  LAST  611   30,2673   34023 1             STCALL  S223X1             UM ALSO IN MPAC FOR S2231X13 SUBR.
 2454  REF   2  LAST  611   30,2674   62340 1                     S2231X13           (UM)(UM T) B-2 IN S22UMRL,P17D
 2455                       30,2675   50545 0             DLOAD   SR3
 2456  REF   2  LAST   93   30,2676   02240 0                     ERADM              RO B-29
 2457                       30,2677   63471 0             DDV     DSQ
 2458  REF   3  LAST  611   30,2700   00037 0                     S22D               B-29
 2459                       30,2701   76005 0             DMP     AXT,1
 2460  REF   1              30,2702   02010 1                     RPVAR              ***** METERS SQ
 2461                       30,2703   00022 1             DEC     18
 2462  REF   4  LAST  612   30,2704   00041 1             STORE   S22RHO             TEMP (VARRP)(RO/D)
 2463                       30,2705   74373 0   S22NXXB   VLOAD*  VXSC
 2464  REF   6  LAST  612   30,2706   03524 1                     S22UMRL +18D,1     (UM)(UM T) B-2
 2465  REF   5  LAST  612   30,2707   00041 1                     S22RHO
 2466                       30,2710   77653 1             VAD*
 2467  REF   2  LAST  612   30,2711   01136 1                     S22UUT +18D,1
 2468  REF   3  LAST  612   30,2712   05136 0             STORE   S22UUT +18D,1      SMALL E MATRIX
 2469                       30,2713   40100 1             TIX,1   BOV
 2470  REF   1              30,2714   60705 0                     S22NXXB
 2471                       30,2715   60716 1                     +1
 2472                       30,2716   50145 1             DLOAD   BMN
 2473  REF   4  LAST  612   30,2717   01134 0                     S22UUT +16D        E5
 2474  REF   1              30,2720   60741 0                     S22W76X
 2475                       30,2721   53166 0             SQRT    BZE
 2476  REF   2  LAST  612   30,2722   60741 0                     S22W76X
 2477                       30,2723   77742 0             SR1                        B-19
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L          P20-P25                                                                          USER'S PAGE NO.  62        E7 S3

  2478    REF  21  LAST  612   30,2724   16625 1             STODL  W +148D            W74= SQ ROOT E5
  2479    REF   5  LAST  612   30,2725   01132 0                    S22UUT +14D        E4
  2480                         30,2726   40071 0             DDV    BOV
  2481    REF  22  LAST  613   30,2727   02625 1                    W +148D
  2482    REF   1              30,2730   60733 0                    S22W72X
  2483                         30,2731   77702 1             SR2                       B-19
  2484    REF  23  LAST  613   30,2732   02623 1             STORE  W +146D            W73= E4/W74
  2485                         30,2733   56345 0   S22W72X   DLOAD  DDV
  2486    REF   6  LAST  613   30,2734   01130 1                    S22UUT +12D        E3
  2487    REF  24  LAST  613   30,2735   02625 1                    W +148D
  2488                         30,2736   40102 0             SR2    BOV                B-19
  2489    REF   3  LAST  612   30,2737   60741 0                    S22W76X
  2490    REF  25  LAST  613   30,2740   02621 0             STORE  W +144D            W72= E3/W74
  2491                         30,2741   63545 0   S22W76X   DLOAD  DSQ
  2492    REF  26  LAST  613   30,2742   02623 1                    W +146D
  2493                         30,2743   44312 1             SL2    BDSU
  2494    REF   7  LAST  613   30,2744   01124 1                    S22UUT +8D         E2
  2495                         30,2745   75440 0             BMN    SQRT
  2496    REF   1              30,2746   60763 0                    S22W78X
  2497                         30,2747   70454 0             BZE    SR1                B-19
  2498    REF   2  LAST  613   30,2750   60763 0                    S22W78X
  2499    REF  27  LAST  613   30,2751   16631 1             STODL  W +152D            W76= SQ ROOT (E2-W73 SQ)
  2500    REF  28  LAST  613   30,2752   02621 0                    W +144D            W72
  2501                         30,2753   62405 1             DMP    SL2
  2502    REF  29  LAST  613   30,2754   02623 1                    W +146D            W73
  2503                         30,2755   56221 0             BDSU   DDV
  2504    REF   8  LAST  613   30,2756   01122 1                    S22UUT +6D         E1
  2505    REF  30  LAST  613   30,2757   02631 1                    W +152D            W76
  2506                         30,2760   60400 0             BOV    SR2                B-19
  2507    REF   3  LAST  613   30,2761   60763 0                    S22W78X
  2508    REF  31  LAST  613   30,2762   02627 0             STORE  W +150D            W75= (E1-W72W73)/W76
  2509                         30,2763   63545 0   S22W78X   DLOAD  DSQ
  2510    REF  32  LAST  613   30,2764   02627 0                    W +150D
  2511                         30,2765   63525 0             PDDL   DSQ
  2512    REF  33  LAST  613   30,2766   02621 0                    W +144D            W72
  2513                         30,2767   62415 0             DAD    SL2
  2514                         30,2770   50021 1             BDSU   BMN
  2515    REF   9  LAST  613   30,2771   01114 1                    S22UUT             E0
  2516    REF   1              30,2772   60775 1                    S22SAVET
  2517                         30,2773   70566 0             SQRT   SR1                B-19
  2518    REF  34  LAST  613   30,2774   02635 0             STORE  W +156D            W78= SQ RT(E0-W72 SQ-W75 SQ)
  2519                         30,2775   77624 1   S22SAVET  CALL
  2520    REF   2  LAST  610   30,2776   62357 1                    GETTF
  2521    REF   2  LAST  129   30,2777   03672 1             STORE  S22TPRIM           SAVE PRESENT TIME FOR PIDS
  2522                         30,3000   77776 1   S22I=N    EXIT                      TEST I=N
  2523    REF  41  LAST  588   30,3001  0 5402 1             TC     PHASCHNG
  2524                         30,3002   04022 0             OCT    04022
  2525    REF   7  LAST  610   30,3003  4 1745 1             CS     BKK
  2526    REF   7  LAST  276   30,3004  6 1747 1             AD     BNN
  2527                         30,3005  0 0006 1             EXTEND
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 2528   REF   1               30,3006  6 3222 0               BZMF    S22F244X        EXIT TO FIGURE 2.4-4
 2529   REF   8  LAST  613    30,3007  3 1745 0               CA      8KK             I=I+1
 2530   REF  66  LAST  600    30,3010  6 4770 0               AD      ONE
 2531   REF   6  LAST  585    30,3011  55'135 0               TS      TEMPOR1
 2532   REF   4  LAST  610    30,3012  3 1750 1               CA      S22LOC          ADD 7 TO LOC TO GET ADDR. OF NEXT MARK
 2533   REF  12  LAST  568    30,3013  6 4774 1               AD      SEVEN
 2534   REF   7  LAST  614    30,3014  55'136 0               TS      TEMPOR1 +1
 2535   REF  42  LAST  613    30,3015  0 5402 1               TC      PHASCHNG
 2536                         30,3016   04022 0               OCT     04022
 2537   REF   8  LAST  614    30,3017  3 1135 1               CA      TEMPOR1
 2538   REF   9  LAST  614    30,3020  55'745 1               TS      8KK
 2539   REF   9  LAST  614    30,3021  3 1136 1               CA      TEMPOR1 +1
 2540   REF   5  LAST  614    30,3022  55'750 0               TS      S22LOC
 2541   REF 107  LAST  609    30,3023  0 6006 1               TC      INTPRET
 2542                         30,3024   77624 1               CALL                    FOR ALL INTEGRATIONS OTHER THAN FIRST
 2543   REF   5  LAST  609    30,3025   56462 1  S2INTS1              SETINTG
 2544                         30,3026   43014 0               BOFF    SET
 2545   REF   5  LAST  611    30,3027   02746 0                       DMENFLG         =0 D=0 OR 6, =1 D=9
 2546   REF   1               30,3030   61035 0                       S22D6Z
 2547   REF   8  LAST  610    30,3031   01476 0                       DIM0FLAG
 2548                         30,3032   77614 1               SETGO                   D=9 PATH
 2549   REF   2  LAST  588    30,3033   01435 1                       D6OR9FLG
 2550   REF   1               30,3034   60531 0                       S22NXTIN        RETURN ALWAYS EXCEPT OFFSET POINT MARK 1
 2551                         30,3035   43014 0  S22D6Z       BOFF    SETGO
 2552   REF   8  LAST  610    30,3036   01751 0                       ORBWFLAG
 2553   REF   2  LAST  614    30,3037   60531 0                       S22NXTIN        D=0,OFFSET MARK 1,NO W INTEGRATION
 2554   REF   9  LAST  614    30,3040   01436 1                       DIM0FLAG
 2555   REF   3  LAST  614    30,3041   60531 0                       S22NXTIN        D=6,OFFSET MARK 1, INTEGRATE W 6X6
 2556                         30,3042   77624 1  S22OFF=1     CALL
 2557   REF   3  LAST  613    30,3043   62357 1                       GETTF
 2558   REF   8  LAST  564    30,3044   27670 0               STOVL   S22TOFF         TIME SUB OFF
 2559   REF   9  LAST  612    30,3045   01072 0                       DM
 2560   REF   1               30,3046   35054 0               STCALL  S22UOFF         U SUB OFF
 2561   REF   1               30,3047   61000 0                       S22I=N          TEST I=N
 2562                         30,3050   77775 1  S22D=9       VLOAD                   D=9 PATH
 2563   REF   1               30,3051   01701 0                       X789
 2564                         30,3052   14001 0               STODL   0D              CALL PIOS TWICE TO TRANSFORM RL TO TIME
 2565   REF   3  LAST  613    30,3053   03672 1                       S22TPRIM        T(SUB F) FROM TIME T PRIME
 2566                         30,3054   00007 0               STORE   6D
 2567                         30,3055   45135 1               SLOAD   CALL
 2568   REF   4  LAST  610    30,3056   03674 1                       S22EORM         0=EARTH,NON-ZERO=MOON
 2569   REF   1               30,3057   55370 0  S2RTRP                R-TO-RP
 2570                         30,3060   45006 0               PUSH    CALL            R-TO-RP LEAVES PUSHLOC AT 0
 2571   REF   4  LAST  614    30,3061   62357 1                       GETTF
 2572                         30,3062   00007 0               STORE   6D
 2573                         30,3063   45135 1               SLOAD   CALL
 2574   REF   5  LAST  614    30,3064   03674 1                       S22EORM
 2575   REF   3  LAST  562    30,3065   55345 0  S2RPTR                RP-TO-R
 2576   REF   2  LAST  614    30,3066   01701 0  S22BOX32     STORE   X789
 2577                         30,3067   40014 0               SET     BOV
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2578    REF   8  LAST  584    30,3070   02464 0                     INCORFLG          FLAG=1
2579                          30,3071   61072 0                     +1                CLEAR OVERFLOW
2580                          30,3072   77651 0            VSU
2581    REF   5  LAST  611    30,3073   01046 1                     CSMPOS
2582    REF   6  LAST  584    30,3074   03531 0            STORE    RCLP              RCL=RL-RC
2583                          30,3075   47256 0            UNIT     VXV               USTAR=UNIT(UNIT(RCL)XUM)
2584    REF  10  LAST  614    30,3076   01072 0                     UM
2585                          30,3077   40056 0            UNIT     BOV
2586    REF   2  LAST  613    30,3100   60775 1                     S22SAVET          COMPUTATION OVERFLOW,SAVE TF
2587    REF   5  LAST  580    30,3101   01102 0            STORE    USTAR
2588                          30,3102   43345 1  S22BOX12  DLOAD    DAD
2589    REF   2  LAST  612    30,3103   24024 1                     SCTVAR            B+18
2590    REF   1               30,3104   24026 0                     IMUVARR            B+18
2591    REF   8  LAST  581    30,3105   27526 0            STOVL    VARIANCE
2592    REF   7  LAST  615    30,3106   03531 0                     RCLP               B-29 OR B-27
2593                          30,3107   60246 1            ABVAL    NORM
2594    REF  11  LAST  598    30,3110   00047 1                     X1
2595                          30,3111   41316 0            DSQ      DMP
2596    REF   9  LAST  615    30,3112   03526 0                     VARIANCE
2597                          30,3113   56070 0            XAD,1    XAD,1
2598    REF  12  LAST  615    30,3114   00046 0                     X1                DOUBLE NORM SHIFT SINCE RCLP WAS SQUARED
2599    REF   6  LAST  614    30,3115   03673 0                     S22EORM           DOUBLE EARTH OR MOON SHIFT,SAME REASON
2600                          30,3116   53670 0            XAD,1    SR*
2601    REF   7  LAST  615    30,3117   03673 0                     S22EORM
2602                          30,3120   20601 1                     0,1               SCALE VARIANCE B-40 FOR BOTH EARTH,MOON
2603                          30,3121   77751 1            TLOAD                      CHANGE MODE TO TRIPLE
2604    REF 256  LAST  603    30,3122   00155 0                     MPAC
2605    REF  10  LAST  615    30,3123   37526 1            STCALL   VARIANCE          CALC B0,B1,DELTAQ, NEW USTAR
2606    REF   2  LAST  580    30,3124   46756 1  S2BVTRS            BVECTORS
2607                          30,3125   57575 1            VLOAD    VCOMP
2608    REF  15  LAST  584    30,3126   03502 0                     BVECTOR
2609    REF  16  LAST  615    30,3127   37516 1            STCALL   BVECTOR +12D      B2=-B0
2610    REF   2  LAST  581    30,3130   75260 1  S2INCP1            INCORP1
2611                          30,3131   77624 1            CALL
2612    REF  13  LAST  610    30,3132   22327 1                     GRP2PC
2613                          30,3133   45014 0            BUFCLR   CALL
2614    REF   2  LAST  611    30,3134   01242 1                     22DSPFLG          =1 DISPLAY DELTA R,V  =0 DO NOT
2615    REF   1               30,3135   61164 0                     S22BOX42
2616    REF  14  LAST  615    30,3136   22327 1                     GRP2PC
2617                          30,3137   51575 1            VLOAD    ABVAL
2618    REF   9  LAST  582    30,3140   01114 1                     DELTAX            DELTA R
2619                          30,3141   53750 0            LXA,1    SR*
2620    REF   8  LAST  615    30,3142   03673 0                     S22EORM           SCALE DELTA R ALWAYS METERS B-29
2621                          30,3143   20601 1                     0,1
2622    REF  10  LAST  582    30,3144   27502 0            STOVL    N49DISP
2623    REF  10  LAST  615    30,3145   01122 1                     DELTAX +6         DELTA V
2624                          30,3146   53646 0            ABVAL    SR*               DELTA V=METERS/CSEC B-7 ALWAYS
2625                          30,3147   20601 1                     0,1
2626    REF  11  LAST  615    30,3150   03504 0            STORE    N49DISP +2
2627                          30,3151   77776 1            EXIT
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 2628   REF   1                30,3152  3 5030 1           CAF      V06N49EE
 2629   REF 129  LAST  589     30,3153  0 4636 0           TC       BANKCALL
 2630   REF   1                30,3154   21101 1           CADR     GOFLASHR
 2631   REF  21  LAST  568     30,3155  0 4103 1           TC       GOTOPOOH          V34E TERMINATE
 2632                          30,3156  0 3163 0           TC       +5                INCORPORATE CHANGES
 2633   REF   1                30,3157  0 3321 1           TC       P22OVER +1        V32E RECYCLE WITHOUT CONVERTING W
 2634   REF  29  LAST  597     30,3160  3 4766 1           CAF      BIT3
 2635   REF   7  LAST  568     30,3161  0 5516 0           TC       BLANKET
 2636   REF  65  LAST  585     30,3162  0 5205 0           TC       ENDOFJOB
 2637   REF 103  LAST  614     30,3163  0 6006 1           TC       INTPRET
 2638                          30,3164   77624 1  S22BOX42 CALL
 2639   REF   2  LAST  582     30,3165   75472 1                    INCORP2
 2640                          30,3166   45154 0           LXA,2    CALL
 2641   REF   9  LAST  615     30,3167   03673 0                    S22EORM
 2642   REF   4  LAST  610     30,3170   71327 1                    CMPOS
 2643                          30,3171   45014 0  CMPINCP2 BOFF     CALL
 2644   REF   9  LAST  615     30,3172   02744 1                    INCORFLG
 2645   REF   3  LAST  615     30,3173   60775 1                    S22SAVET          SAVE TF AND TEST I=N
 2646   REF  15  LAST  615     30,3174   22327 1                    GRP2PC
 2647                          30,3175   77214 0           CLEAR    VLOAD
 2648   REF  10  LAST  616     30,3176   02664 1                    INCORFLG          FLAG=0
 2649   REF   3  LAST  614     30,3177   01701 0                    X789
 2650                          30,3200   77651 0           VSU
 2651   REF   6  LAST  615     30,3201   01046 1                    CSMPOS
 2652   REF   8  LAST  615     30,3202   37531 1           STCALL   RCLP              RCL=RL-RC
 2653   REF   1                30,3203   61102 0                    S22BOX12
 2654                          30,3204   77735 0  S22BOX22 SLOAD
 2655   REF   1                30,3205   02007 1                    S22WSUBL
 2656   REF  35  LAST  613     30,3206   02621 0           STORE    W +144D
 2657   REF  36  LAST  616     30,3207   02631 1           STORE    W +152D
 2658   REF  37  LAST  616     30,3210   36641 1           STCALL   W +160D
 2659   REF   5  LAST  614     30,3211   62357 1                    GETTF
 2660                          30,3212   77624 1           CALL                       COMPUTE RL
 2661   REF   3  LAST  542     30,3213   26524 0                    CALGTORV
 2662                          30,3214   43175 0           VLOAD    BOFF
 2663   REF   6  LAST  611     30,3215   02152 0                    ALPHAV            RL B-29
 2664   REF  15  LAST  612     30,3216   04343 1                    CMOONFLG
 2665   REF   1                30,3217   61066 0                    S22BOX32
 2666                          30,3220   52152 0           VSL2     GOTO              SCALE RL B-27 FOR MOON
 2667   REF   2  LAST  616     30,3221   61066 0                    S22BOX32
 2668   REF 109  LAST  616     30,3222  0 6006 1  S22F244X TC       INTPRET
 2669                          30,3223   46135 1  S22F244  SLOAD    BHIZ              FIG 2.4-4   TEST OFF=0
 2670   REF   5  LAST  610     30,3224   03745 1                    CXOFF
 2671   REF   1                30,3225   61256 1                    S22BOX44
 2672                          30,3226   67206 1           PUSH     SLOAD
 2673   REF   8  LAST  613     30,3227   03750 0                    SNN
 2674                          30,3230   77625 0           DSU
 2675                          30,3231   45040 1           BMN      CALL              OFFSET GR. NO. MARKS, FORGET IT
 2676   REF   2  LAST  616     30,3232   61256 1                    S22BOX44
 2677   REF  16  LAST  616     30,3233   22327 1                    GRP2PC            GROUP 2 PHASE CHANGE
 2678                            30,3234   77745 1            DLOAD
 2679   REF   9  LAST  614       30,3235   03670 0                     S22TOFF
 2680   REF  22  LAST  610       30,3236   34041 0            STCALL  TDEC1         CALC RC AT OFFSET TIME
 2681   REF   3  LAST  510       30,3237   27145 1                     CSMPREC
 2682                            30,3240   77775 1            VLOAD
 2683   REF   6  LAST  515       30,3241   00017 1                     RATT1         RC METERS B-29 OR B-27
 2684   REF   7  LAST  616       30,3242   25046 1            STOVL   CSMPOS
 2685   REF   2  LAST  614       30,3243   01054 1                     S22UOFF
 2686   REF  11  LAST  615       30,3244   25072 0            STOVL   UM            U=UOFF
 2687   REF   4  LAST  616       30,3245   01701 0                     X789
 2688                            30,3246   43046 1            ABVAL   0OFF
 2689   REF  16  LAST  616       30,3247   04343 1                     CMOONFLG
 2690                            30,3250   61252 0                     +2
 2691                            30,3251   77702 1            SR2                   SCALE MOON RC B-29 FOR S22F2410 SUBR
 2692   REF   3  LAST  612       30,3252   36240 1            STCALL  ERADM
 2693   REF   2  LAST  611       30,3253   61331 1                     S22F2410
 2694                            30,3254   77650 1            GOTO
 2695   REF   1                  30,3255   61261 0                     S22BX44A
 2696                            30,3256   77624 1  S22BOX44  CALL
 2697   REF   6  LAST  616       30,3257   62357 1                     GETTF
 2698   REF  10  LAST  617       30,3260   03670 0            STORE   S22TOFF       PRESENT TIME FOR LAT-LONG SETUP
 2699                            30,3261   43175 0  S22BX44A  VLOAD   0OFF
 2700   REF   5  LAST  617       30,3262   01701 0                     X789
 2701   REF  17  LAST  617       30,3263   04343 1                     CMOONFLG
 2702   REF   1                  30,3264   61266 1                     S22BX44B
 2703                            30,3265   77742 0            VSR2                  SCALE RL MOON B-29 FOR LAT-LONG
 2704   REF   7  LAST  616       30,3266   16152 0  S22BX44B  STODL   ALPHAV        RL SCALED B-29 FOR LAT-LONG
 2705   REF  11  LAST  617       30,3267   03670 0                     S22TOFF       EITHER PRESENT OR OFFSET TIME
 2706                            30,3270   77624 1            CALL
 2707   REF   4  LAST  562       30,3271   26453 1                     LAT-LONG      **** ALT OUTPUT ALWAYS B-29
 2708                            30,3272   77624 1            CALL                  DISPLAY LAT/LONG/ALT
 2709   REF   1                  30,3273   62363 0                     LLASRD
 2710                            30,3274   77776 1            EXIT
 2711   REF   2  LAST  563       30,3275  3 5036 1            CAF     V06N89D
 2712   REF 130  LAST  616       30,3276  0 4636 0            TC      BANKCALL
 2713   REF  13  LAST  513       30,3277   20743 0            CADR    GOFLASH
 2714   REF   1                  30,3300  0 3324 1            TC      S22GTP        V34E TERMINATE
 2716   REF   1                  30,3301  0 3315 0            TC      S22.981X      PROCEED POINT  A IN IN GSOP
 2717   REF 110  LAST  616       30,3302  0 6006 1            TC      INTPRET       RECYCLE SAVE LANDING SITE COORD
 2718                            30,3303   77745 1            DLOAD
 2719   REF  12  LAST  617       30,3304   03670 0                     S22TOFF       EITHER PRESENT OR OFFSET TIME
 2720                            30,3305   24007 0            STOVL   6D            6-7D= LANDING SITE TIME FOR R-TO-RP
 2721   REF   6  LAST  617       30,3306   01701 0                     X789
 2722                            30,3307   00001 0            STORE   0D            0-5D= LANDING SITE VEC  FOR R-TO-RP
 2723                            30,3310   45135 1            SLOAD   CALL
 2724   REF   6  LAST  611       30,3311   15334 1                     HIDPHALF      ANY NON-ZERO FOR MOON
 2725   REF   2  LAST  614       30,3312   55370 0                     R-TO-RP       CONVERT RLS TO MOON-FIXED COORD
 2726   REF   7  LAST  562       30,3313   02026 1            STORE   RLS           LANDING SITE VECTOR
 2727                            30,3314   77776 1            EXIT
 2728   REF 111  LAST  617       30,3315  0 6006 1  S22.981X  TC      INTPRET
 2729                     30,3316   77624 1             CALL
 2730   REF   1           30,3317   61363 0                      90WT06DW
 2731                     30,3320   77776 1  P22OVER    EXIT
 2732   REF  43  LAST 614 30,3321  0 5402 1             TC       PHASCHNG
 2733                     30,3322   04022 0             OCT      04022
 2734   REF   2  LAST 561 30,3323  0 2206 1             TC       PROG22A
 2735   REF 112  LAST 617 30,3324  0 6006 1  S22GTP     TC       INTPRET           CONVERT W BEFORE TC GOTOPOOH
 2736                     30,3325   77624 1             CALL
 2737   REF   2  LAST 618 30,3326   61363 0                      90WT06DW
 2738                     30,3327   77776 1             EXIT
 2739   REF  22  LAST 616 30,3330  0 4103 1             TC       GOTOPOOH
 2740                     30,3331   77201 1  S22F2410   SETPD    VLOAD             COMPUTE FORMULA 2.4.10
 2741                     30,3332   00001 0                      0D
 2742   REF   8  LAST 617 30,3333   01046 1                      CSMPOS            RC B-29 EARTH,B-27 MOON
 2743                     30,3334   50256 0             UNIT     DOT               UNIT ALSO SETS 36D=ABVAL(RC) USED BELOW
 2744   REF  12  LAST 617 30,3335   01072 0                      UM
 2745                     30,3336   57552 1             SL1      DCOMP             GSOP CHANGE 8/18/67
 2746                     30,3337   63406 0             PUSH     DSQ               PD 2D 0D=COSA=-(UM.RC)/ABVAL(RC) B-1
 2747                     30,3340   65221 0             BDSU     PDDL              PD 4D 2D=1-COSA SQ=SINA SQ B-2
 2748   REF   1           30,3341   15326 1                      DEC182
 2749   REF   4  LAST 617 30,3342   02240 0                      ERADM             RO ALWAYS B-29 FROM SETRE
 2750                     30,3343   62414 1             BOFF     SL2               SCALE RO B-27 FOR MOON
 2751   REF  18  LAST 617 30,3344   04343 1                      CMOONFLG
 2752                     30,3345   61346 1                      +1
 2753                     30,3346   56362 0             SR1R     DDV               (RO/RC) B-1
 2754                     30,3347   00045 0                      36D
 2755                     30,3350   45316 1             DSQ      DSU               PD 2D (RO/RC) SQ - SINA SQ  B-2
 2756                     30,3351   44366 1             SQRT     BDSU              PD 0D COSA-SQRT((RO/RC)SQ-SINA SQ) B-1
 2757                     30,3352   77605 1             DMP                        DMP RESULT B-28 MOON,B-30 EARTH
 2758                     30,3353   00045 0                      36D               VXSC RESULT B-29 MOON, B-31 EARTH
 2759   REF   6  LAST 612 30,3354   00041 1             STORE    S22RHO            RHO FOR W INIT. OF UNKNOWN LMK B-28,B-30
 2760                     30,3355   77761 1             VXSC
 2761   REF  13  LAST 618 30,3356   01072 0                      UM
 2762                     30,3357   53352 0             VSL2     VAD               SCALE B-27 MOON,B-29 EARTH AND ADD RC
 2763   REF   9  LAST 618 30,3360   01046 1                      CSMPOS
 2764   REF   7  LAST 617 30,3361   01701 0             STORE    X789
 2765                     30,3362   77616 0             RVQ                        B-27 FOR EARTH OR B-29 FOR MOON
 2766   REF   1           31,2000                       SETLOC   P22S
 2767                     31,2340                       BANK

 27675  REF   1                                         COUNT*   $$/P22
 2768   REF   1           31,2340   00031 0  S2231X13   STORE    S221X3            MULT 3X1 BY 1X3,STORE RESULTING 3X3 IN
 2769                     31,2341   77131 1             SSP      AXT,2             S22UMRL- S22UMRL +17D
 2770   REF   7  LAST 538 31,2342   00052 0                      S2
 2771                     31,2343   00002 0             DEC      2
 2772                     31,2344   00006 1             DEC      6
 2773                     31,2345   77770 1             AXT,1
 2774                     31,2346   00022 1             DEC      18
 2775                     31,2347   73775 0  S2231NXT   VLOAD    VXSC*
 2776   REF   2  LAST 618 31,2350   00031 0                      S221X3
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  2777   REF   3  LAST  612   31,2351   77746 1                     S223X1 +6,2
  2778   REF   7  LAST  612   31,2352   07524 0            STORE    S22UMRL +18D,1
  2779                        31,2353   61110 0            INCR,1   TIX,2
  2780                        31,2354   77771 0            DEC      -6
  2781   REF   1              31,2355   62347 0                     S2231NXT
  2782                        31,2356   77616 0            RVQ
  2783                        31,2357   70740 0  GETTF     LXC,1    DLOAD*          SET MPAC= TF
  2784   REF   6  LAST  614   31,2360   03750 0                     S22LOC
  2785                        31,2361   00001 0                     0,1
  2786                        31,2362   77616 0            RVQ

 R2787   SUBROUTINE TO MODIFY ALT AND STORE LAT TO LAT+5 IN LANDLAT TO LANDLAT+5
 R2788   PRIOR TO DISPLAY.

  2789                        31,2363   70545 1  LLASRD    DLOAD    SR1
  2790   REF   7  LAST  459   31,2364   00751 1                     LONG
  2791   REF   4  LAST  563   31,2365   16351 1            STODL    LANDLONG
  2792   REF   4  LAST  291   31,2366   00753 0                     ALT
  2793   REF   3  LAST  294   31,2367   02353 0            STORE    LANDALT
  2794                        31,2370   77616 0            RVQ
 R2795   SUBROUTINE TO MODIFY LANDALT AND STORE LANDALT TO LANDALT+5 IN LAT TO
 R2796   LAT+5 AFTER LMK DATA LOADED BY ASTRONAUT.

  2797                        31,2371   72545 0  LLASRDA   DLOAD    SL1
  2798   REF   5  LAST  619   31,2372   02351 1                     LANDLONG
  2799   REF   8  LAST  619   31,2373   14751 1            STODL    LONG
  2800   REF   4  LAST  619   31,2374   02353 0                     LANDALT
  2801   REF   5  LAST  619   31,2375   00753 0            STORE    ALT
  2802                        31,2376   77616 0            RVQ
  2803   REF   2  LAST  609   30,2000                      SETLOC   P20S6
  2804                        30,3363                      BANK

  28045  REF   3 LAST   609 TO  618:    445    623*        COUNT*   $$/P22
  2805                        30,3363   40220 0  9DWTO6DW  STQ      SETPD
  2806   REF   1              30,3364   01053 0                     9DWXX
  2807                        30,3365   00001 0                     0D
  2808                        30,3366   41575 0            VLOAD    PUSH            CLEAR WORKING AREA OF PUSHLIST
  2809   REF   4  LAST  542   30,3367   15336 0                     HI6ZEROS        INCLUDING P
  2810                        30,3370   41406 0            PUSH     PUSH            PD 18D
  2811                        30,3371   77731 1            SSP
  2812   REF   1              30,3372   00017 1                     9DWJ            J=29   USE 2*29 FOR DP WORDS
  2813                        30,3373   00072 1            DEC      58
  2814                        30,3374   66150 0  9DWI=J    LXA,1    SXA,1           SET I=J
  2815   REF   2  LAST  619   30,3375   00016 0                     9DWJ
  2816   REF   1              30,3376   00012 1                     9DWI
  2817                        30,3377   77624 1  9DWEPCAL  CALL
  2818   REF   1              30,3400   61613 1                     ROWDOT
  2819                        30,3401   77750 0            LXA,1                    P VARIES 0-20 INSTEAD OF 20-0
  2820   REF   1              30,3402   00016 0                     9DWP
  2821   REF   1              30,3403   06641 1            STORE    EMATRIX +40D,1
 2822                         30,3404   66110 1                INCR,1  SXA,1
 2823                         30,3405   00002 0                DEC     2
 2824   REF   2  LAST  619    30,3406   00010 0                        9DWP
 2825                         30,3407   46135 1                SLOAD   BHIZ             TEST I=0
 2826   REF   2  LAST  619    30,3410   00013 0                        9DWI
 2827   REF   1               30,3411   61426 0                        9DWTESTJ
 2828                         30,3412   77625 0                DSU                      I=I-1
 2829   REF   1               30,3413   24022 1                        9DWI0
 2830   REF   3  LAST  620    30,3414   00013 0                STORE   9DWI
 2831                         30,3415   46025 1                DSU     BHIZ             TEST I=26
 2832   REF   1               30,3416   24020 0                        9DW26D
 2833   REF   1               30,3417   61422 1                        9DWSETI2
 2834                         30,3420   77650 1                GOTO                     NEXT E SUB P
 2835   REF   1               30,3421   61377 0                        9DWEPCAL
 2836                         30,3422   52131 0   9DWSETI2     SSP     GOTO             I=2
 2837   REF   4  LAST  620    30,3423   00013 0                        9DWI
 2838                         30,3424   00004 0                DEC     4
 2839   REF   2  LAST  620    30,3425   61377 0                        9DWEPCAL
 2840                         30,3426   46135 1   9DWTESTJ     SLOAD   BHIZ             TEST J=0
 2841   REF   3  LAST  619    30,3427   00017 1                        9DWJ
 2842   REF   1               30,3430   61445 0                        9DWFIG6
 2843                         30,3431   77625 0                DSU
 2844   REF   2  LAST  620    30,3432   24022 1                        9DWI0
 2845   REF   4  LAST  620    30,3433   00017 1                STORE   9DWJ             J=J-1
 2846                         30,3434   46025 1                DSU     BHIZ             TEST J=26
 2847   REF   2  LAST  620    30,3435   24020 0                        9DW26D
 2848   REF   1               30,3436   61441 1                        9DWSETJ2
 2849                         30,3437   77650 1                GOTO
 2850   REF   1               30,3440   61374 0                        9DWI=J
 2851                         30,3441   52131 0   9DWSETJ2     SSP     GOTO             SET J=2
 2852   REF   5  LAST  620    30,3442   00017 1                        9DWJ
 2853                         30,3443   00004 0                DEC     4
 2854   REF   2  LAST  620    30,3444   61374 0                        9DWI=J
 2855                         30,3445   77624 1   9DWFIG6      CALL
 2856   REF  17  LAST  616    30,3446   22327 1                        GRP2PC
 2857                         30,3447   77331 0                SSP     VLOAD            START OF FIGURE 2.4-6
 2858   REF   6  LAST  620    30,3450   00017 1                        9DWJ             J=29
 2859                         30,3451   00072 1                DEC     58
 2860   REF   5  LAST  619    30,3452   15336 0                        HI6ZEROS
 2861   REF   3  LAST  620    30,3453   00011 1                STORE   9DWP             P,N,I=0
 2862                         30,3454   66370 0                AXT,1   SSP
 2863                         30,3455   00154 1                DEC     108              CLEAR W0 TO W54
 2864   REF  12  LAST  611    30,3456   00051 0                        S1
 2865                         30,3457   00006 1                        6
 2866   REF  38  LAST  616    30,3460   06555 1   CLEARW54     STORE   W +1080,1
 2867                         30,3461   77700 0                TIX,1
 2868   REF   1               30,3462   61460 1                        CLEARW54
 2869                         30,3463   66150 0   9DWI=JA      LXA,1   SXA,1            I=J
 2870   REF   7  LAST  620    30,3464   00016 0                        9DWJ
 2871   REF   5  LAST  620    30,3465   00012 1                        9DWI
```

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  2872                           30,3466   77624 1              CALL
  2873   REF   2  LAST  619      30,3467   61613 1                       ROWDOT
  2874                           30,3470   43750 1              LXA,1   BDSU*
  2875   REF   4  LAST  620      30,3471   00010 0                      9DWP
  2876   REF   2  LAST  619      30,3472   02641 0                      EMATRIX +40D,1
  2877                           30,3473   66110 1              INCR,1  SXA,1            -(P+1)
  2878                           30,3474   00002 0                      2
  2879   REF   5  LAST  621      30,3475   00010 0                      9DWP
  2880                           30,3476   54140 0              LXC,1   XSU,1            -(I+N)
  2881   REF   6  LAST  620      30,3477   00012 1                      9DWI
  2882   REF   1                 30,3500   00014 1                      9DWN
  2883                           30,3501   71244 0              BPL     DLOAD            TEST WSQ LTE 0
  2884   REF   1                 30,3502   61504 1                      9DWAAA
  2885   REF   6  LAST  620      30,3503   15336 0                      HI6ZEROS         W=0
  2886                           30,3504   77766 0   9DWAAA     SQRT                     W= SQRT(WSQ)
  2887   REF  39  LAST  620      30,3505   06401 1   9DWAAB     STORE   W,I
  2888   REF   1                 30,3506   14001 0              STODL   WORKW
  2889   REF   8  LAST  620      30,3507   00017 1                      9DWJ             TEST J=0
  2890                           30,3510   77630 1              BHIZ
  2891   REF   1                 30,3511   61577 0                      9DWEXITX         EXIT
  2892                           30,3512   46135 1   TST2I=0    SLOAD   BHIZ             TEST I=0
  2893   REF   7  LAST  621      30,3513   00013 0                      9DWI
  2894   REF   1                 30,3514   61555 0                      9DWN=N+3
  2895                           30,3515   77625 0              DSU
  2896   REF   3  LAST  620      30,3516   24022 1                      9DWID
  2897   REF   8  LAST  621      30,3517   00013 0              STORE   9DWI             I=I-1
  2898                           30,3520   46025 1              DSU     BHIZ             TEST I=26
  2899   REF   3  LAST  620      30,3521   24020 0                      9DW26D
  2900   REF   1                 30,3522   61525 1                      9DWAAC
  2901                           30,3523   77650 1              GOTO
  2902   REF   1                 30,3524   61530 0                      9DWNEXEP
  2903                           30,3525   77731 1   9DWAAC     SSP                      I=2
  2904   REF   9  LAST  621      30,3526   00013 0                      9DWI
  2905                           30,3527   00004 0                      4
  2906                           30,3530   77624 1   9DWNEXEP CALL
  2907   REF   3  LAST  621      30,3531   61613 1                      ROWDOT
  2908                           30,3532   43750 1              LXA,1   BDSU*            (EP-ROWI*ROWJ)/W
  2909   REF   6  LAST  621      30,3533   00010 0                      9DWP
  2910   REF   3  LAST  621      30,3534   02641 0                      EMATRIX +40D,1
  2911                           30,3535   62071 0              DDV     INCR,I           P=P+1
  2912   REF   2  LAST  621      30,3536   00001 0                      WORKW
  2913                           30,3537   00002 0                      2
  2914                           30,3540   70130 1              SXA,1   LXC,1
  2915   REF   7  LAST  621      30,3541   00010 0                      9DWP
  2916   REF  10  LAST  621      30,3542   00012 1                      9DWI
  2917                           30,3543   40060 0              XSU,1   BOV              -(I+N)
  2918   REF   2  LAST  621      30,3544   00014 1                      9DWN
  2919   REF   1                 30,3545   61550 0                      SETWIN=0
  2920                           30,3546   77650 1              GOTO
  2921   REF   1                 30,3547   61552 1                      9DWSETWX
```

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 2922                          30,3550   77745 1  SETWIN=0  DLOAD                     W(I+N)=0
 2923  REF   7  LAST  621      30,3551   15336 0                      HI6ZEROS
 2924  REF  40  LAST  621      30,3552   06401 1  9DWSETWX  STORE     W,1
 2925                          30,3553   77650 1            GOTO
 2926  REF   1                 30,3554   61512 0                      TST2I=0
 2927                          30,3555   62150 1  9DWN=N+3  LXA,1     INCR,1             N=N+3
 2928  REF   3  LAST  621      30,3556   00014 1                      9DWN
 2929                          30,3557   00006 1                      6
 2930                          30,3560   67330 0            SXA,1     SLOAD              J=J-1
 2931  REF   4  LAST  622      30,3561   00014 1                      9DWN
 2932  REF   9  LAST  621      30,3562   00017 1                      9DWJ
 2933                          30,3563   77625 0            DSU
 2934  REF   4  LAST  621      30,3564   24022 1                      9DWID
 2935  REF  10  LAST  622      30,3565   00017 1            STORE     9DWJ
 2936                          30,3566   46025 1            DSU       BHIZ               TEST J=26
 2937  REF   4  LAST  621      30,3567   24020 0                      9DW26D
 2938  REF   1                 30,3570   61573 1                      SETJ=2A
 2939                          30,3571   77650 1            GOTO
 2940  REF   1                 30,3572   61463 1                      9DWI=JA
 2941                          30,3573   52131 0  SETJ=2A   SSP       GOTO               J=2
 2942  REF  11  LAST  622      30,3574   00017 1                      9DWJ
 2943                          30,3575   00004 0                      4
 2944  REF   2  LAST  622      30,3576   61463 1                      9DWI=JA
 2945                          30,3577   77624 1  9DWEXITX  CALL
 2946  REF  18  LAST  620      30,3600   22327 1                      GRP2PC
 2947                          30,3601   66370 0            AXT,1     SSP                CLEAR W6,W7,W8 USED TEMP FOR EMATRIX
 2948                          30,3602   00066 1            DEC       54
 2949  REF  13  LAST  620      30,3603   00051 0                      S1
 2950                          30,3604   00006 1                      6
 2951                          30,3605   77775 1            VLOAD
 2952  REF   8  LAST  622      30,3606   15336 0                      HI6ZEROS
 2953  REF  41  LAST  622      30,3607   06643 0  9DWEXXXA  STORE     W +162D,1
 2954                          30,3610   52100 1            TIX,1     GOTO
 2955  REF   1                 30,3611   61607 1                      9DWEXXXA
 2956  REF   2  LAST  619      30,3612   01053 0                      9DWXX
 2957                          30,3613   40131 0  ROWDOT    SSP       BOV
 2958  REF   1                 30,3614   00007 0                      XTMP1
 2959                          30,3615   00377 1            OCT       377
 2960                          30,3616   61617 0                      +1
 2961                          30,3617   71140 1            LXC,1     LXC,2
 2962  REF  11  LAST  621      30,3620   00012 1                      9DWI
 2963  REF  12  LAST  622      30,3621   00016 0                      9DWJ
 2964                          30,3622   41545 0            DLOAD     PUSH
 2965  REF   9  LAST  622      30,3623   15336 0                      HI6ZEROS
 2966                          30,3624   56743 1  ROWDOT1   DLOAD*    DMPR*
 2967  REF  42  LAST  622      30,3625   02401 0                      W,1
 2968  REF  43  LAST  622      30,3626   75376 1                      W,2
 2969                          30,3627   41415 1            DAD       PUSH
 2970                          30,3630   62000 0            BOV       INCR,1
 2971  REF   1                 30,3631   61645 1                      ROWDOT3
 2972                          30,3632   77771 0                DEC      -6
 2973                          30,3633   67314 0                INCR,2  SLOAD
 2974                          30,3634   77771 0                DEC      -6
 2975   REF   2  LAST  622     30,3635   00007 0                         XTMP1
 2976                          30,3636   70430 1                BHIZ     SR1
 2977   REF   1                30,3637   61643 1                         ROWDOT2
 2978   REF   3  LAST  623     30,3640   00007 0                STORE    XTMP1
 2979                          30,3641   77650 1                GOTO
 2980   REF   1                30,3642   61624 0                         ROWDOT1
 2981                          30,3643   77745 1   ROWDOT2      DLOAD
 2982                          30,3644   77616 0                RVQ
 2983                          30,3645   77614 1   ROWDOT3      CLRGO
 2984   REF   9  LAST  614     30,3646   01631 1                         ORBWFLAG
 2985   REF   2  LAST  623     30,3647   61643 1                         ROWDOT2
 2986                             0000             WORKW        =        0D
 2987                             0006             XTMP1        =        6D
 2988                             0010             9DWP         =        8D              P
 2989                             0012             9DWI         =        10D             I
 2990                             0014             9DWN         =        12D             N
 2991                             0016             9DWJ         =        14D             J
 2995                             0022             S223X1       =        18D             6
 2996                             0030             S221X3       =        24D             6
 2997                             0036             S22D         =        30D             2
 2998                             0040             S22RHO       =        32D             2
 3000   REF   1                32,2000                          SETLOC  P20S9
 3001                          32,2017                          BANK

 30015  REF   1                                                 COUNT*  $$/P22
 3002                          32,2017   00064 0   9DW26D       2DEC     52 B-14
 3002                          32,2020   00000 1
 3003                          32,2021   00002 0   9DWID        2DEC     2 B-14
 3003                          32,2022   00000 1
 3004                          32,2023   10306 0   SCTVAR       2DEC     1.0 E-6 B+18
 3004                          32,2024   36750 0
 3005                          32,2025   00253 0   IMUVARR      2DEC     0.04 E-6 B+18
 3005                          32,2026   31436 1
 3006   REF   6  LAST  574     26,3325             DEC182       =        DP1/4TH         1 B-2
 3007   REF   2  LAST  585        5030             V06N49EE     =        V06N49
 3008   REF   1                   5036             V06N89B      =        V06N89
 3010   REF   3  LAST  586     23,2000                          SETLOC  P20S2
 3011                          23,3143                          BANK
 30115  REF   1                                                 COUNT*  $$/R63
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R3013    SUBROUTINE NAME:    V89CALL
R3014    MOD NO: 0                     DATE: 8 FEB 1968
R3015    MOD BY:  DIGITAL DEVEL GROUP    LOG SECTION: P20-P25

R3016    FUNCTIONAL DESCRIPTION:

R3017    CALLED BY VERB 89 ENTER DURING P00. PRIO 10 USED. CALCULATES AND
R3018    DISPLAYS FINAL GIMBAL ANGLES TO POINT CSM +X AXIS OR PREFERRED AXIS
R3019    (UNIT(Z)COS55 DEG + UNIT(X)SIN55 DEG) AT LM.

R3020    1. KEY IN V 89 E ONLY IF IN PROG 00. IF NOT IN P00, OPERATOR ERROR AND
R3021    EXIT R63, OTHERWISE CONTINUE.

R3022    2. IF IN P00, DO IMU STATUS CHECK (R02BOTH). IF IMU ON AND ITS
R3023    ORIENTATION KNOWN TO CGC, CONTINUE.

R3024    3. FLASH DISPLAY V 04 N 06. R2 INDICATES WHICH SPACECRAFT AXIS IS TO
R3025    BE POINTED AT LM.  INITIAL CHOICE IS PREFERRED AXIS. (R2=1).
R3026    ASTRONAUT CAN CHANGE TO (+X) AXIS (R2 NOT= 1) BY V 22 E 2 E. CONTINUE
R3027    AFTER KEYING IN PROCEED.

R3028    4. SET PREFERRED ATTITUDE FLAG ACCORDING TO OPTION DESIRED. SET FLAG
R3029    FOR PREFERRED AXIS. RESET FLAG FOR X AXIS.

R3030    5. CURRENT TIME IS STORED AND R63COMP IS CALLED

R3031        R63COMP JOB:

R3032             UPDATES CSM AND LM STATE VECTORS USING CONIC EQUATIONS

R3033             CALCULATES BOTH PREFERRED AND X AXIS TRACKING ATT FROM CSM TO LM.

R3034             DESIRED GIMBAL ANGLES AS INDICATED BY PREFERRED ATTITUDE FLAG
R3035             ARE STORED FOR LATER R60CSM CALL.

R3036    6. FLASH DISPLAY V 06 N18 AND AWAIT RESPONSE.

R3037    7. RECYCLE- RETURN TO STEP 5.
R3038       TERMINATE- EXIT R63 ROUTINE
R3039       PROCEED- RESET 3AXISFLG AND CALL R60CSM FOR ATTITUDE MANEUVER.


R3040    CALLING SEQUENCE: V 89 E

R3041    SUBROUTINES CALLED: CHKPOOH, R02BOTH, GOXDSPF, R63COMP, R60CSM

R3042    ALARMS    1. OPERATOR ERROR IF NOT IN P00
R3043              2. PROGRAM ALARM IF IMU IS OFF
R3044              3. PROGRAM ALARM IF IMU ORIENTATION IS UNKNOWN
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L          P20-P25                                                                                   USER'S PAGE NO.  75      E7 S3

R3045      ERASABLE INITIALIZATION REQUIRED: NONE

R3046      DEBRIS:  OPTION1, OPTION1+1, PRFTRKAT(PREF ATT FLAG),P21TIME, 3AXISFLG


  3047                           23,3143   00000 1  DP1MIN    2DEC    6000
  3047                           23,3144   13560 0


  3048     REF  13  LAST  603    E4,1706                      EBANK=  R63TIME
  3050     REF   1               31,2000                      SETLOC  V89TAG
  3051                           31,2377                      BANK
  3052     REF   1                                            COUNT*  $$/R63


  3053     REF 131  LAST  617    31,2377  0 4636 0  V89CALL   TC      BANKCALL             IMU STATUS CHECK. RETURNS IF ORIENTATION
  3054     REF   4  LAST  565    31,2400   03731 1            CADR    R02BOTH              KNOWN. ALARMS IF NOT.
  3055     REF 113  LAST  618    31,2401  0 6006 1            TC      INTPRET
  3056                           31,2402   71214 0            CLEAR   DLOAD
  3057     REF   6  LAST  601    31,2403   05667 0                    AZIMFLAG
  3058     REF  25  LAST  611    31,2404   15336 0                    ZEROVECS
  3059     REF   7  LAST  559    31,2405   03740 1            STORE   UTPIT
  3060     REF   7  LAST  559    31,2406   03742 0            STORE   UTYAW
  3061                           31,2407   77776 1            EXIT

  3062     REF   1               31,2410  3 2443 0            CAF     V06N78
  3063     REF 132  LAST  626    31,2411  0 4636 0            TC      BANKCALL
  3064     REF   2  LAST  616    31,2412   21101 1            CADR    GOFLASHR
  3065     REF  28  LAST  522    31,2413  0 5524 1            TC      ENDEXT
  3066     REF   1               31,2414  1 2421 0            TCF     V89RECL
  3067                           31,2415  0 2410 0            TC      -5

  3068     REF  30  LAST  616    31,2416  3 4766 1            CAF     BIT3
  3069     REF   8  LAST  616    31,2417  0 5516 0            TC      BLANKET
  3070     REF  66  LAST  616    31,2420  0 5205 0            TC      ENDOFJOB

  3071     REF 114  LAST  626    31,2421  0 6006 1  V89RECL   TC      INTPRET
  3072                           31,2422   43234 0            RTB     DAD
  3073     REF  19  LAST  600    31,2423   51751 0                    LOADTIME             READ PRESENT TIME
  3074     REF   1               31,2424   07144 1                    DP1MIN               INTEGRATE TO 1 MIN FROM NOW
  3075     REF  14  LAST  626    31,2425   36307 0            STCALL  R63TIME              STORE TIME FOR CALL TO R63COMP. R63COMP
  3076     REF   1               31,2426   73171 1                    R63COMP              LEAVES DESIRED GIM ANGS IN THETAD,LOS IN
  3077                           31,2427   77776 1            EXIT                         POINTVSM, AND SELECTED AXIS IN SCAXIS.
  3078     REF   1               31,2430  3 5031 0            CAF     V06N18               V 06 N 18
  3079     REF 133  LAST  626    31,2431  0 4636 0            TC      BANKCALL             NOUN 18 REFERS TO THE DESIRED GIMBAL
  3080     REF  14  LAST  617    31,2432   20743 0            CADR    GOFLASH
  3081     REF  29  LAST  626    31,2433  0 5524 1            TC      ENDEXT               TERMINATE
  3082                           31,2434  0 2436 1            TC      +2                   PROCEED
  3083     REF   2  LAST  626    31,2435  0 2421 1            TC      V89RECL              RECYCLE
  3084     REF  39  LAST  579    31,2436  0 5561 0            TC      DOWNFLAG             RESET 3 AXIS FLAG
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 3085   REF   6  LAST  572   31,2437   00124 0             ADRES   3AXISFLG        RESET BIT 6 FLAG 5
 3086   REF 134  LAST  626   31,2440  0 4636 0             TC      BANKCALL        PERFORMS CSM MANEUVER TO ALIGN SELECTED
 3087   REF   3  LAST  572   31,2441   56074 1             CADR    R60CSM          SPACECRAFT AXIS TO LOS.
 3088   REF  30  LAST  626   31,2442  1 5524 0             TCF     ENDEXT

 3089                        31,2443   01516 1   VB06N78   VN      0678

 3090   REF   3  LAST  395      5031             VB06N18   =       V06N18

 3091   REF   2  LAST  595   35,3171             R63COMP   EQUALS  R63
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P3092   PROGRAM NAME- P23 CISLUNAR MIDCOURSE NAVIGATION
R3093   MOD NO
R3094   MOD BY- TOM KNATT
R3095   FUNCTIONAL DESCRIPTION- DO MIDCOURSE NAVIGATION BY INCORPORATION OF STAR
R3096   /EARTH AND STAR/MOON OPTICAL MEASUREMENTS.
R3097   CALLING SEQUENCE- ASTRONAUT OPERATED
R3098   SUBROUTINES CALLED-R52,R53,R57,R60,ORBITAL INTEGRATION (INTEGRV)
R3099   INCORP1,INCORP2,LALOTORV,LUNPCS  ,AND DISPLAY INTERFACE ROUTINES.
R3100   NORMAL EXIT MODES- VIA R00
R3101   ALARMS- NONE
R3102   ABORT MODES- NONE
R3103   ERASABLE INITIALIZATION REQUIRED- PAD-LOADED ERASABLES,ORBWFLAG RESET,
R3104   REFSMFLG=0 IF IMU OFF AND REFSMFLG=1 IF IMU ON
R3105   INPUTS BY USER REQUIRED- STAR NUMBER,LANDMARK LAT,LONG/2,ALT
R3106   IF LANDMARK IS USED,         NEAR OR FAR HORIZON IF HORIZON IS USED, AND
R3107   BODY TO BE MARKED ON(EARTH OR MOON).  SEE GSOP CHAPT 4.
R3108   OUTPUT-UPDATED CMC STATE VECTOR. VECTOR FROM S/C TO HORIZON OR LANDMARK
R3109   IN POINTAXS. POINTAXS CAN BE USED TO GENERATE THIS VECTOR APART FROM
R3110   P23 IF DESIRED.
R3111   DEBRIS-NO USABLE DEBRIS IS GENERATED. RENDWFLG IS RESET FOR P20 UPON
R3112   ENTRY INTO P23.    RUPTREGS AND ERASABLES USED BY DISPLAYS ARE DEBRIS
 3114   REF   1             31,2000                      SETLOC RT23
 3115                       31,2444                      BANK
 3116   REF   1                                          COUNT* $$/P23
 3117   REF  44  LAST  590  E7,1722                      EBANK= MRKBUF1
 3118   REF  40  LAST  626  31,2444  0 5561 0  P23       TC     DOWNFLAG
 3119   REF   9  LAST  588  31,2445   00010 0            ADRES  RNDVZFLG

 3120   REF  16  LAST  609  31,2446  0 5362 0            TC     2PHSCHNG
 3121                       31,2447   00004 0            OCT    00004              LEAVE GROUP 4
 3122                       31,2450   00012 1            OCT    00012              ENTER GROUP 2
 3123   REF   3  LAST  242  31,2451  3 5052 0            CAF    PRIO13
 3124   REF   3  LAST  577  31,2452  55'262 1            TS     PHSPRDT2
 3125   REF  41  LAST  628  31,2453  0 5561 0            TC     DOWNFLAG
 3126   REF   8  LAST  610  31,2454   00131 1            ADRES  RENDWFLG
 3127   REF 115  LAST  626  31,2455  0 6006 1  P23.00    TC     INTPRET
 3128                       31,2456   45014 0            BON    CALL
 3129   REF   4  LAST  588  31,2457   01702 0                   REFSMFLG           SET NOW AS INPUT, NORMALLY EXTERNAL CONT
 3130   REF   1             31,2460   62466 1                   P23.05             WHEN ALIGNED,PERFORM MEASUREMENT
 3131   REF   1             31,2461   76167 0                   R57                DO OPTICS CALIBRATION IF IMU NOT ALIGNED
 3132                       31,2462   77624 1            CALL
 3133   REF   1             31,2463   31571 0                   R53
 3134                       31,2464   77650 1            GOTO
 3135   REF   1             31,2465   62567 1                   P23.60
 3136                       31,2466   45014 0  P23.05    CLEAR  CALL
 3137   REF   1             31,2467   04665 0                   SAVECFLG
 3138   REF   2  LAST  628  31,2470   76167 0                   R57                PERFORM MARK CALIBRATION
 3139                       31,2471   45135 1  P23.06    SLOAD  CALL
 3140   REF   2  LAST  562  31,2472   23513 1                   V05N70
 3141   REF   1             31,2473   63355 1                   P23N7071
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  3142                           31,2474   77634 0  V94ENTER RTB
  3143   REF  20  LAST  626      31,2475   51751 0                     LOADTIME         READ CLOCK
  3144   REF  16  LAST  589      31,2476   35062 0           STCALL    MARKTIME
  3145   REF   1                 31,2477   63002 0                     POINTAXS         RETURN LOS IN MPAC
  3146   REF   2  LAST  125      31,2500   03642 1           STORE     UCLSTAR          TEMP
  3147                           31,2501   77776 1           EXIT
  3148   REF   1                 31,2502 3 3514 1            CAF       V50N25P
  3149   REF 135  LAST  627      31,2503 0 4636 0            TC        BANKCALL
  3150   REF   3  LAST  567      31,2504   21067 0           CADR      GOPERF1          GOPERF1 BLANKS OUT R2 AND R3.
  3151   REF  23  LAST  618      31,2505 0 4103 1            TC        GOTOPOOH
  3152                           31,2506 0 2510 1            TC        +2               PRO DO 3AXIS MANEUVER
  3153   REF   1                 31,2507 0 2552 1            TC        DOVECPT          ENTER DO VECPOINT MANEUVER
  3154   REF 116  LAST  628      31,2510 0 6006 1            TC        INTPRET
  3155                           31,2511   53575 0           VLOAD     UNIT
  3156   REF   3  LAST  629      31,2512   03642 1                     UCLSTAR
  3157   REF   3  LAST  444      31,2513   36706 0           STCALL    ZSM              UCL
  3158   REF   1                 31,2514   62614 0                     R23.55           COMPUTE STAR VECTOR AND LEAVE IN MPAC

  3159                           31,2515   53435 0  OCCLCOMP VXV       UNIT             COMPUTE CONSTRAINED BRSB MATRIX(SHAFT
  3160   REF   4  LAST  629      31,2516   02706 1                     ZSM                                               =180)
  3161   REF   4  LAST  444      31,2517   02700 1           STORE     YSM              UNIT(US* X UCL)
  3162                           31,2520   53435 0           VXV       UNIT
  3163   REF   5  LAST  629      31,2521   02706 1                     ZSM
  3164   REF  25  LAST  538      31,2522   02672 0           STORE     XSM              UNIT(UNIT(US* X UCL) X UCL)
  3165                           31,2523   76131 0           SSP       AXT,1
  3166   REF  14  LAST  622      31,2524   00051 0                     S1
  3167                           31,2525   00006 1                     6
  3168                           31,2526   00022 1                     18D
  3169                           31,2527   61373 1  NEXTVEC1 VLOAD*    VXM              COMPUTE BRNB = (SBNB)(BRSB)
  3170   REF   2  LAST  297      31,2530   06322 1                     NB1NB2 +18D,1
  3171   REF  26  LAST  629      31,2531   02672 0                     XSM
  3172                           31,2532   77656 1           UNIT
  3173   REF   4  LAST  432      31,2533   06736 0           STORE     XNB +18D,1       STORE IN XNB FOR CALCGA
  3174                           31,2534   76100 1           TIX,1     AXT,1
  3175   REF   1                 31,2535   62527 0                     NEXTVEC1
  3176                           31,2536   00022 1                     18D
  3177                           31,2537   77773 1  NEXTVEC2 VLOAD*                      LOAD REFSMMAT INTO XSM FOR CALCGA
  3178   REF  23  LAST  606      31,2540   01756 1                     REFSMMAT +18D,1
  3179   REF  27  LAST  629      31,2541   06714 0           STORE     XSM +18D,1
  3180                           31,2542   45100 1           TIX,1     CALL
  3181   REF   1                 31,2543   62537 1                     NEXTVEC2
  3182   REF   2  LAST  427      31,2544   47344 1                     CALCGA           COMPUTE DESIRED CDUS
  3183                           31,2545   45014 0           SET       CALL
  3184   REF   7  LAST  627      31,2546   02471 1                     3AXISFLG
  3185   REF   1                 31,2547   62765 1                     DCR60B
  3186                           31,2550   77650 1           GOTO
  3187   REF   1                 31,2551   62556 0                     P23.57A
  3188   REF 117  LAST  629      31,2552 0 6006 1   DOVECPT  TC        INTPRET
  3189                           31,2553   45175 0           VLOAD     CALL
  3190   REF   4  LAST  629      31,2554   03642 1                     UCLSTAR
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 3191   REF   2  LAST  567   31,2555   62756 1                      DOR60
 3192                        31,2556   77624 1  P23.57A   CALL
 3193   REF  19  LAST  622   31,2557   22327 1                      GRP2PC
 3194                        31,2560   43014 0  P23.57    CLEAR     SET
 3195   REF   3  LAST  566   31,2561   00666 1                      TARG2FLG
 3196   REF   2  LAST  275   31,2562   04464 0                      V94FLAG
 3197                        31,2563   77624 1            CALL
 3198   REF   4  LAST  566   31,2564   31005 0                      R52
 3199                        31,2565   77614 1            CLEAR
 3200   REF   3  LAST  630   31,2566   04664 1                      V94FLAG
 3201                        31,2567   77776 1  P23.60    EXIT
 3202                        31,2570  0 0004 0            INHINT
 3203                        31,2571  0 0006 1            EXTEND
 3204   REF  45  LAST  628   31,2572  3 1723 0            DCA       MRKBUF1
 3205   REF  17  LAST  629   31,2573  53'062 0            DXCH      MARKTIME
 3206   REF  46  LAST  630   31,2574  3 1727 1            CA        MRKBUF1 +5
 3207   REF   1              31,2575  57'754 0            XCH       TRUNION
 3208                        31,2576  0 0003 1            RELINT
 3209   REF  18  LAST  578   31,2577  3 6211 0            CAF       SIX
 3210   REF   7  LAST  578   31,2600  0 5607 0            TC        GENTRAN
 3211   REF  47  LAST  630   31,2601   01722 1            ADRES     MRKBUF1
 3212   REF   6  LAST  246   31,2602   01674 0            ADRES     MARKDOWN
 3213   REF 118  LAST  629   31,2603  0 6006 1            TC        INTPRET
 3214                        31,2604   45014 0            SET       CALL
 3215   REF   2  LAST  628   31,2605   04465 1                      SAVECFLG
 3216   REF  20  LAST  630   31,2606   22327 1                      GRP2PC
 3217                        31,2607   45135 1            SLOAD     CALL
 3218   REF   2  LAST  562   31,2610   23514 0                      V05N71
 3219   REF   2  LAST  628   31,2611   63355 1                      P23N7071
 3220                        31,2612   77624 1  P23.85    CALL
 3221   REF   2  LAST  629   31,2613   63002 0                      PCINTAXS
 3222                        31,2614   63256 0  R23.55    UNIT      POVL             RCLL IS IN MPAC
 3223                        31,2615   00043 0                      34D              RCLL * RCLL
 3224                        31,2616   24037 0            STOVL     30D              PUSH 30-31 =RCLL*RCLL  32-33=ABVAL RCLL
 3225   REF   2  LAST  125   31,2617   03634 0                      VZC
 3226                        31,2620   54361 1            VXSC      VSR
 3227   REF   1              31,2621   23475 0                      ONE/C
 3228                        31,2622   20620 1                      15D
 3229                        31,2623   77655 1            VAD                        PUSH UP RCLL(UNIT)
 3230                        31,2624   77656 1            UNIT
 3231   REF   5  LAST  629   31,2625   27642 1            STOVL     UCLSTAR
 3232   REF   3  LAST  630   31,2626   03634 0                      VZC
 3233                        31,2627   52342 0            VSR2      VSU
 3234   REF   2  LAST   93   31,2630   02141 1                      VESU
 3235                        31,2631   54361 1            VXSC      VSR
 3236   REF   2  LAST  630   31,2632   23475 0                      ONE/C
 3237                        31,2633   20616 1                      13D
 3238                        31,2634   53455 0            VAD       UNIT
 3239   REF   1              31,2635   02617 0                      US
 3240                        31,2636   77614 1            BOFF
 3241  REF   3  LAST  630   31,2637   04745 0                      SAVECFLG
 3242  REF   1              31,2640   62515 1                      OCCLCOMP
 3243  REF   1              31,2641   03650 1            STORE     USSTAR
 3244                       31,2642   72441 0            DOT       SCI
 3245  REF   6  LAST  630   31,2643   03642 1                      UCLSTAR
 3246                       31,2644   74315 0            PDVL      VXSC               PD 0,1 = USSTAR(DOT)UCLSTAR
 3247  REF   7  LAST  631   31,2645   03642 1                      UCLSTAR
 3248                       31,2646   51372 0            VSL1      BVSU
 3249  REF   2  LAST  631   31,2647   03650 1                      USSTAR
 3250                       31,2650   77656 1            UNIT
 3251  REF  17  LAST  615   31,2651   27502 0            STOVL     BVECTOR            USSTAR - COSQ(UCLSTAR
 3252  REF  26  LAST  626   31,2652   15336 0                      ZEROVECS
 3253  REF  18  LAST  631   31,2653   03510 0            STORE     BVECTOR +6
 3254  REF  19  LAST  631   31,2654   17516 0            STODL     BVECTOR +12D
 3255                       31,2655   00001 0                      0
 3256                       31,2656   57526 1            ACOS      DCOMP
 3257                       31,2657   77525 0            PDDL      EXIT
 3258  REF  27  LAST  631   31,2660   15336 0                      ZEROVECS
 3259  REF   1              31,2661  3 3505 1            CA        VARSUBL            PUT FIXED INTO ERASABLE FOR MSU
 3260  REF  71  LAST  592   31,2662  54 001 1            TS        L                  INSTRUCTION COMING UP
 3261  REF   2  LAST  630   31,2663  3 1754 0            CA        TRUNION            REQUIRED TO CHANGE 2:S COMPLEMENT
 3262                       31,2664  0 0006 1            EXTEND                       TRUNION TO 1:S COMPLEMENT
 3263  REF  72  LAST  631   31,2665  20 001 1            MSU       L                  TRUNION(2'S)-00000 CONVERTS TRUNION TO
 3264  REF 257  LAST  615   31,2666  54 154 0            TS        MPAC               1:S. VARSUBL=00000
 3265  REF 119  LAST  630   31,2667  0 6006 1            TC        INTPRET
 3266                       31,2670   67206 1            PUSH      SLOAD              PUSH IS DP. WHEN BDSU IS EXECUTED, 2ND
 3267  REF   2  LAST  568   31,2671   01025 1                      TRUNBIAS           HALF OF PUSHLIST IS GUARANTEED ZERO FROM
 3268                       31,2672   77621 1            BDSU                         DLOAD ZEROVECS ABOVE
 3269                       31,2673   43242 1            SR3       DAD
 3270                       31,2674   41215 1            DAD       DMP
 3271  REF   1              31,2675   23505 0                      TRUN19
 3272                       31,2676   00041 1                      32D
 3273                       31,2677   52405 1            DMP       SL3
 3274  REF   2  LAST  574   31,2700   07016 1                      PI/4.0
 3275                       31,2701   62414 1            BOFF      SL2
 3276  REF  19  LAST  618   31,2702   04343 1                      CMOONFLG
 3277  REF   1              31,2703   62704 0                      R23.51
 3278  REF   4  LAST  584   31,2704   17524 1  R23.51    STODL     DELTAQ
 3279                       31,2705   00037 0                      30D                RCLL * RCLL
 3280                       31,2706   47005 1            DMP       RTB
 3281  REF   1              31,2707   23511 0                      TRUNVAR
 3282  REF   2  LAST  581   31,2710   45657 1                      TPMODE
 3283                       31,2711   43171 1            TAD       CLEAR
 3284  REF   2  LAST  631   31,2712   23506 0                      VARSUBL
 3285  REF   6  LAST  614   31,2713   02666 0                      DMENFLG
 3286  REF  11  LAST  615   31,2714   37526 1            STCALL    VARIANCE
 3287  REF   3  LAST  615   31,2715   75260 1                      INCORP1
 3288                       31,2716   77624 1            CALL
 3289  REF  21  LAST  630   31,2717   22327 1                      GRP2PC
 3290                       31,2720   51575 1            VLOAD     ABVAL
 3291    REF  11  LAST  615    31,2721   01122 1                       DELTAX +6
 3292                          31,2722   60414 0             BOF       SR2              DISPLAY IS 2-27 IF IN LUNAR SPHERE
 3293    REF  20  LAST  631    31,2723   04343 1                       CMOONFLG
 3294    REF   1               31,2724   62725 0                       R23.52
 3295    REF  12  LAST  615    31,2725   27504 0  R23.52     STOVL     N49DISP +2
 3296    REF  12  LAST  632    31,2726   01114 1                       DELTAX
 3297                          31,2727   77646 0             ABVAL
 3298                          31,2730   60414 0             BOF       SR2
 3299    REF  21  LAST  632    31,2731   04343 1                       CMOONFLG
 3300    REF   1               31,2732   62733 1                       R23.53
 3301    REF  13  LAST  632    31,2733   03502 0  R23.53     STORE     N49DISP
 3302                          31,2734   77776 1             EXIT
 3303    REF   3  LAST  623    31,2735 3 5030 1  R23.6      CAF       V06N49
 3304    REF 136  LAST  629    31,2736 0 4636 0             TC        BANKCALL
 3305    REF   3  LAST  626    31,2737   21101 1             CADR      GOFLASHR
 3306    REF  24  LAST  629    31,2740 0 4103 1             TC        GOTOPOOH
 3307    REF   1               31,2741 0 2750 1             TC        R23.7            INCORPORATE DATA
 3308    REF  25  LAST  632    31,2742 0 4103 1             TC        GOTOPOOH
 3309    REF  31  LAST  626    31,2743 3 4766 1             CAF       BIT3             BLANK OUT R3
 3310    REF   9  LAST  626    31,2744 0 5516 0             TC        BLANKET
 3311    REF  44  LAST  618    31,2745 0 5402 1             TC        PHASCHNG
 3312                          31,2746   00012 1             OCT       00012
 3313    REF  67  LAST  626    31,2747 0 5205 0             TC        ENDOFJOB
 3314    REF 120  LAST  631    31,2750 0 6006 1  R23.7      TC        INTPRET
 3315                          31,2751   45014 0  R23.8      SET       CALL
 3316    REF   9  LAST  584    31,2752   00467 1                       VEHUPFLG
 3317    REF   3  LAST  616    31,2753   75472 1                       INCORP2
 3318                          31,2754   77776 1             EXIT
 3319    REF  26  LAST  632    31,2755 0 4103 1  R23.END    TC        GOTOPOOH
 3320                          31,2756   53521 1  DOR60      MXV       UNIT
 3321    REF  24  LAST  629    31,2757   01734 0                       REFSMMAT
 3322    REF  14  LAST  604    31,2760   27357 0             STOVL     POINTVSM
 3323    REF   1               31,2761   23517 0                       SCAXIS
 3324    REF  19  LAST  604    31,2762   03351 0             STORE     SCAXIS
 3325                          31,2763   77614 1             CLEAR
 3326    REF   8  LAST  629    31,2764   02671 0                       SAXISFLG         SET UP FOR VECPOINT IN R60
 3327                          31,2765   77420 1  DOR60B     STQ       EXIT
 3328    REF   1               31,2766   02657 1                       SRTEMP
 3329    REF   1               31,2767 3 3524 1             CAF       R60ADRS
 3330    REF   4  LAST  486    31,2770  54 373 1             TS        TEMPFLSH
 3331    REF  45  LAST  632    31,2771 0 5402 1             TC        PHASCHNG
 3332                          31,2772   00012 1             OCT       00012
 3333    REF   8  LAST  571    31,2773 0 4611 0  R60CALL    TC        E6SETTER
 3334    REF 137  LAST  632    31,2774 0 4636 0             TC        BANKCALL
 3335    REF   4  LAST  627    31,2775   56074 1             CADR      R60CSM
 3336    REF   5  LAST  442    31,2776 0 4606 0     +3      TC        E7SETTER
 3337    REF 121  LAST  632    31,2777 0 6006 1             TC        INTPRET
 3338                          31,3000   77650 1             GOTO
 3339    REF   2  LAST  632    31,3001   02657 1                       SRTEMP
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P3340
R3341     POINTAXIS SUBROUTINE
 3342                                31,3002   77620 0  POINTAXS STQ
 3343     REF    6  LAST  589        31,3003   01006 0                    POINTEX
 3344                                31,3004   71214 0  R23.05    BON     DLOAD
 3345     REF   10  LAST  623        31,3005   01711 1                    ORBWFLAG
 3346     REF    1                   31,3006   63012 1                    R23.1
 3347     REF    1                   31,3007   03001 0                    WMIDPOS
 3348                                31,3010   34001 1            STCALL  0
 3349     REF    3  LAST  610        31,3011   56612 1                    INITIALW          INITIALIZE W-MATRIX FIRST PASS IN P23
 3350                                31,3012   77624 1  R23.1     CALL
 3351     REF    6  LAST  614        31,3013   56462 1                    SETINTG           SETUP FOR CSM INTEGRATION
 3352                                31,3014   43014 0            BOFSET  SET
 3353     REF   11  LAST  633        31,3015   01451 0                    ORBWFLAG
 3354     REF    1                   31,3016   63020 0                    R23.2
 3355     REF   10  LAST  614        31,3017   01476 0                    DIMOFLAG
 3356                                31,3020   77624 1  R23.2     CALL
 3357     REF    8  LAST  610        31,3021   27236 0                    INTEGRV           INTEGRATE CSM STATE VEC. TO MARKTIME
 3358                                31,3022   77776 1            EXIT
 3359     REF   46  LAST  632        31,3023 0 5402 1             TC      PHASCHNG
 3360                                31,3024   04022 0            OCT     04022
 3361     REF  122  LAST  632        31,3025 0 6006 1             TC      INTPRET
 3362                                31,3026   77014 1  RECT.1    BOFF    AXT,2             SR TO SET ZMEASURE = 0 IF MEASUREMENT
 3363     REF   22  LAST  632        31,3027   04343 1                    CMOONFLG           PLANET AND PRIMARY PLANET ARE THE SAME
 3364     REF    1                   31,3030   63040 0                    RECT.3              OTHERWISE = 1
 3365                                31,3031   77775 1            DEC     -2
 3366                                31,3032   77614 1            BOFF                          VEC. AND SCALE B29 AND B7
 3367     REF   11  LAST  565        31,3033   01743 0                    LUNAFLAG
 3368     REF    1                   31,3034   63044 1                    RECT.4
 3369                                31,3035   52014 0  RECT.2    CLEAR   GOTO
 3370     REF    1                   31,3036   00265 0                    ZMEASURE
 3371     REF    1                   31,3037   63046 0                    RECT.5
 3372                                31,3040   43174 1  RECT.3    AXT,2   BOFF
 3373                                31,3041   00000 1                    0
 3374     REF   12  LAST  633        31,3042   01743 0                    LUNAFLAG
 3375     REF    1                   31,3043   63035 1                    RECT.2
 3376                                31,3044   77614 1  RECT.4    SET
 3377     REF    2  LAST  633        31,3045   00065 1                    ZMEASURE
 3378                                31,3046   44575 0  RECT.5    VLOAD   VSR7
 3379     REF    2  LAST  585        31,3047   01573 1                    DELTACSM          SCALED B22  OR  B18
 3380                                31,3050   53257 1            VSR*    VAD
 3381                                31,3051   57176 0                    0,2
 3382     REF    2  LAST  585        31,3052   01607 1                    RCVCSM            SCALED B29  OR  B27
 3383                                31,3053   77657 0            VSR*
 3384                                31,3054   57176 0                    0,2
 3385     REF    2  LAST  125        31,3055   27626 0            STOVL   RZC               NOW SCALED B29
 3386     REF    1                   31,3056   01601 1                    NUVCSM            SCALED B3  OR  B-1
 3387                                31,3057   53702 1            VSR4    VSR*
 3388                                31,3060   57176 0                    0,2
 3389                                31,3061   53655 1            VAD     VSR*
 3390   REF   1               31,3062   01615 1                     VCVCSM         SCALED B7  OR  B5
 3391                         31,3063   57176 0                     0,2
 3392   REF   4  LAST  630    31,3064   03634 0            STORE    VZC            NOW SCALED B7
 3393                         31,3065   77614 1            BOFF
 3394   REF   3  LAST  633    31,3066   00345 0                     ZMEASURE       IN SPHERE OF INFLUENCE OF PRIMARY BODY
 3395   REF   1               31,3067   63101 1                     R23.3
 3396                         31,3070   45145 0            DLOAD    CALL
 3397   REF  18  LAST  630    31,3071   01062 1                     MARKTIME
 3398   REF   1               31,3072   54141 1                     LUNPOS
 3399                         31,3073   57414 1            BON      VCOMP
 3400   REF  23  LAST  633    31,3074   04303 0                     CMOONFLG
 3401                         31,3075   63076 0                     +1
 3402                         31,3076   77655 1            VAD
 3403   REF   3  LAST  633    31,3077   03626 0                     RZC
 3404   REF   4  LAST  634    31,3100   03626 0            STORE    RZC
 3405                         31,3101   67201 0   R23.3    SETPD    SLOAD
 3406                         31,3102   00001 0                     0
 3407   REF  17  LAST  609    31,3103   03752 1                     LANDMARK       IF LANDMARK = 0, USE HORIZ SUBR
 3408                         31,3104   43030 0            BHIZ     SET
 3409   REF   1               31,3105   63114 0                     R23.4
 3410   REF   6  LAST  565    31,3106   00462 1                     ERADFLAG
 3411                         31,3107   45145 0            DLOAD    CALL
 3412   REF  19  LAST  634    31,3110   01062 1                     MARKTIME
 3413   REF   4  LAST  616    31,3111   26524 0                     LALOTORV
 3414                         31,3112   77650 1            GOTO
 3415   REF   1               31,3113   63337 0                     R23.5
 3416                         31,3114   65345 0   R23.4    DLOAD    PDDL           PUSH 0-1 = -AYO SCALED B0
 3417   REF   1               31,3115   01712 1                     -AYO
 3418   REF   1               31,3116   01714 1                     AXO
 3419                         31,3117   63325 0            PDDL     PDVL           PUSH 2-3 = +AX SCALED B0
 3420   REF   8  LAST  508    31,3120   15344 0                     DPPOSMAX
 3421   REF   2  LAST  630    31,3121   02617 0                     US
 3422                         31,3122   53435 0            VXV      UNIT
 3423   REF   5  LAST  634    31,3123   03626 0                     RZC
 3424   REF   2  LAST  125    31,3124   27620 0            STOVL    UBAR2
 3425                         31,3125   53435 0            VXV      UNIT           PUSH UP
 3426   REF   3  LAST  634    31,3126   03620 0                     UBAR2
 3427   REF   3  LAST  133    31,3127   27604 0            STOVL    UBAR0
 3428   REF   4  LAST  634    31,3130   03620 0                     UBAR2
 3429                         31,3131   53435 0            VXV      UNIT
 3430   REF   4  LAST  634    31,3132   03604 0                     UBAR0
 3431   REF   2  LAST  125    31,3133   03612 1            STORE    UBAR1
 3432                         31,3134   50214 0            BON      DOT
 3433   REF  13  LAST  633    31,3135   01703 1                     LUNAFLAG
 3434   REF   1               31,3136   63324 1                     HORIZ.6
 3435                         31,3137   00001 0                     0              UBAR1 DOT UZ
 3436   REF   8  LAST  617    31,3140   26156 1            STOVL    ALPHAV +4
 3437   REF   6  LAST  634    31,3141   03626 0                     RZC
 3438                         31,3142   41246 1            ABVAL    DMP
 3439   REF   1               31,3143   03376 0                     HORISLP
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  3440                          31,3144   43276 0              DCOMP  DAD
  3441   REF   1                31,3145   01346 1                     HORIZALT
  3442   REF   1                31,3146   34772 1              STCALL RATETEMP
  3443   REF   1                31,3147   26570 1                     GETERAD
  3444                          31,3150   65215 1              DAD    PDDL              MPAC HAS RADIUS OF FISHER SLLIPSOID
  3445   REF   2  LAST  635     31,3151   00772 0                     RATETEMP          PUSH 0-1 = BH SCALED B29
  3446   REF   1                31,3152   23477 1                     AEARTH
  3447                          31,3153   41415 1              DAD    PUSH              PUSH 2-3 = AH B29
  3448   REF   3  LAST  635     31,3154   00772 0                     RATETEMP
  3449                          31,3155   64375 1   HORIZ.1    VLOAD  MXV
  3450   REF   7  LAST  634     31,3156   03626 0                     RZC               B29
  3451   REF   5  LAST  634     31,3157   03604 0                     UBAR0             B1
  3452                          31,3160   63372 1              VSL1   PDVL              PUSH 4-9 = RH(XH,YH,ZH) B29
  3453   REF   3  LAST  634     31,3161   02617 0                     US
  3454                          31,3162   76521 0              MXV    VSL1
  3455   REF   6  LAST  635     31,3163   03604 0                     UBAR0
  3456                          31,3164   77725 1              PDDL                     PUSH 10-15 = USH B1
  3457                          31,3165   00003 1                     2                 AH
  3458                          31,3166   14043 0              STODL  34D
  3459                          31,3167   00005 1                     4                 XH
  3460                          31,3170   77624 1              CALL
  3461   REF   1                31,3171   63344 1                     DIVIDE
  3462                          31,3172   63457 1              SR*    DSQ
  3463                          31,3173   20611 0                     8D,1              NOW SCALED B9
  3464                          31,3174   14037 0              STODL  30D
  3465                          31,3175   00001 0                     0
  3466                          31,3176   14043 0              STODL  34D
  3467                          31,3177   00007 0                     6                 YH
  3468                          31,3200   77624 1              CALL
  3469   REF   2  LAST  635     31,3201   63344 1                     DIVIDE
  3470                          31,3202   63457 1              SR*    DSQ
  3471                          31,3203   20611 0                     8D,1              B9
  3472                          31,3204   41415 1              DAD    PUSH              PUSH 16-17 =A SCALED  B18
  3473                          31,3205   00037 0                     30D
  3474                          31,3206   75425 0              DSU    SQRT
  3475   REF   1                31,3207   23503 0                     1.0B18
  3476                          31,3210   77725 1              PDDL                     PUSH 18-19  SQRT(A-1) B9
  3477                          31,3211   00021 1                     16D
  3478                          31,3212   14043 0              STODL  34D
  3479                          31,3213   00005 1                     4                 XH
  3480                          31,3214   77624 1              CALL
  3481   REF   3  LAST  635     31,3215   63344 1                     DIVIDE
  3482                          31,3216   65257 1              SR*    PDDL
  3483                          31,3217   20622 0                     17D,1             PUSH 20-21 = XH/A B29
  3484                          31,3220   00007 0                     6                 YH
  3485                          31,3221   77624 1              CALL
  3486   REF   4  LAST  635     31,3222   63344 1                     DIVIDE
  3487                          31,3223   65257 1              SR*    PDDL
  3488                          31,3224   20622 0                     17D,1             PUSH 22-23 = YH/A B29
  3489                          31,3225   00023 0                     18D               SQRT(A-1)
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 3490                       31,3226   77624 1          CALL
 3491  REF   5  LAST  635   31,3227   63344 1                   DIVIDE
 3492                       31,3230   77657 0          SR*
 3493                       31,3231   20611 0                   80,1
 3494                       31,3232   14035 1          STODL    280
 3495                       31,3233   00001 0                   0             BH
 3496                       31,3234   14043 0          STODL    340
 3497                       31,3235   00003 1                   2             AH
 3498                       31,3236   77624 1          CALL
 3499  REF   6  LAST  636   31,3237   63344 1                   DIVIDE
 3500                       31,3240   41257 1          SR*      DMP           AH/BH  SCALED  B1
 3501                       31,3241   20601 1                   0,1
 3502                       31,3242   00035 1                   280           SQRT(A-1)/A
 3503                       31,3243   72405 0          DMP      SL1
 3504                       31,3244   00007 0                   6             YH
 3505                       31,3245   77725 1          PDDL
 3506                       31,3246   00003 1                   2             AH
 3507                       31,3247   14043 0          STODL    340
 3508                       31,3250   00001 0                   0
 3509                       31,3251   77624 1          CALL
 3510  REF   7  LAST  636   31,3252   63344 1                   DIVIDE
 3511                       31,3253   41257 1          SR*      DMP           BH/AH  SCALED  B1
 3512                       31,3254   20601 1                   0,1
 3513                       31,3255   00035 1                   280           SQRT (A-1)/A
 3514                       31,3256   72405 0          DMP      SL1
 3515                       31,3257   00005 1                   4             XH
 3516                       31,3260   43325 1          PDDL     DAD
 3517                       31,3261   00025 0                   200           XH/A
 3518                       31,3262   00031 0                   240           ALPHA
 3519                       31,3263   45325 1          PDDL     DSU
 3520                       31,3264   00027 1                   220           YH/A
 3521                       31,3265   00033 1                   260           BETA
 3522                       31,3266   40206 1          PUSH     SETPD
 3523                       31,3267   00021 1                   160
 3524                       31,3270   45345 1          DLOAD    DSU
 3525                       31,3271   00025 0                   200           XH/A
 3526                       31,3272   00031 0                   240           ALPHA
 3527                       31,3273   43325 1          PDDL     DAD
 3528                       31,3274   00027 1                   220           YH/A
 3529                       31,3275   00033 1                   260           BETA
 3530                       31,3276   41525 0          PDDL     PUSH
 3531  REF  28  LAST  631   31,3277   15336 0                   ZEROVECS
 3532                       31,3300   24041 1          STOVL    320           ZERO THIRD COMP. OF T-0 VECTOR
 3533                       31,3301   00035 1                   280
 3534                       31,3302   53451 1          VSU      UNIT
 3535                       31,3303   00005 1                   4             RH VECTOR
 3536                       31,3304   63241 0          DOT      PDVL          PUSH 22-23 A-SUB-ZERO
 3537                       31,3305   00013 0                   100           USH VECTOR
 3538                       31,3306   00021 1                   160           T1 VECTOR
 3539                       31,3307   53451 1          VSU      UNIT
 3540                            31,3310   00005 1                    4             RH VECTOR
 3541                            31,3311   41441 0           DOT      PUSH          PUSH 24-25 A-SUB-ONE
 3542                            31,3312   00013 0                    10D
 3543                            31,3313   50021 1           BDSU     BMN
 3544                            31,3314   00027 1                    22D           A-SUB-ZERO
 3545   REF   1                  31,3315   63330 1                    HORIZ.3
 3546                            31,3316   77614 1           BON
 3547   REF   1                  31,3317   00304 0                    NCRFHOR
 3548   REF   1                  31,3320   63333 1                    HORIZ.4
 3549                            31,3321   52175 0  HORIZ.2  VLOAD    GOTO
 3550                            31,3322   00035 1                    28D           T-0 VECTOR
 3551   REF   1                  31,3323   63335 1                    HORIZ.5
 3552                            31,3324   41545 0  HORIZ.6  DLOAD    PUSH
 3553   REF   1                  31,3325   23501 1                    RADMOON
 3554                            31,3326   52006 0           PUSH     GOTO
 3555   REF   1                  31,3327   63155 0                    HORIZ.1
 3556                            31,3330   77614 1  HORIZ.3  BON
 3557   REF   2  LAST  637       31,3331   00304 0                    NCRFHOR
 3558   REF   1                  31,3332   63321 1                    HORIZ.2
 3559                            31,3333   77775 1  HORIZ.4  VLOAD
 3560                            31,3334   00021 1                    16D           T1 VECTOR
 3561                            31,3335   76505 0  HORIZ.5  VXM      VSL1
 3562   REF   7  LAST  635       31,3336   03604 0                    UBAR0
 3563                            31,3337   40251 0  R23.5    VSU      SETPD
 3564   REF   8  LAST  635       31,3340   03626 0                    RZC
 3565                            31,3341   00001 0                    0
 3566                            31,3342   77650 1           GOTO
 3567   REF   7  LAST  633       31,3343   01006 0                    POINTEX
 3568                            31,3344   70501 1  DIVIDE   NORM     SR1
 3569   REF  13  LAST  615       31,3345   00047 1                    X1
 3570                            31,3346   14045 0           STODL    36D
 3571                            31,3347   00043 0                    34D
 3572                            31,3350   55301 0           NORM     BDDV
 3573   REF  15  LAST  629       31,3351   00051 0                    S1
 3574                            31,3352   00045 0                    36D
 3575                            31,3353   43460 1           XSU,1    RVQ
 3576   REF  16  LAST  637       31,3354   00050 1                    S1
 3577   REF   8  LAST  564       31,3355   03744 0  P23N7071 STORE    22SUBSCL
 3578                            31,3356   77420 1           STQ      EXIT
 3579   REF   8  LAST  637       31,3357   01006 0                    POINTEX
 3580   REF   9  LAST  637       31,3360 3 1743 0  DISP7071 CA       22SUBSCL
 3581   REF  17  LAST  563       31,3361 0 5535 1           TC       VNFLASH
 3582   REF  47  LAST  578       31,3362 0 5547 1  P23.15   TC       UPFLAG
 3583   REF  14  LAST  634       31,3363   00060 1           ADRES    LUNAFLAG
 3584   REF  18  LAST  634       31,3364 3 1751 0           CA       LANDMARK      IF C=2,LUNAFLAG=1. IF C=1,LUNAFLAG=0
 3585                            31,3365 0 0006 1           EXTEND
 3586   REF   1                  31,3366 1 3375 1           BZF      P23.151
 3587   REF   4  LAST  293       31,3367 3 1752 0           CA       HORIZON
 3588                            31,3370 0 0006 1           EXTEND
 3589                            31,3371 1 3373 1           BZF      +2
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  3590  REF   1             31,3372  0 3445 1              TC      R23.10        OPERATOR DSKY ERROR
  3591  REF  19  LAST  637  31,3373  3 1751 0              CA      LANDMARK
  3592  REF   1             31,3374  0 3400 0              TC      P23.152
  3593  REF   5  LAST  637  31,3375  3 1752 0   P23.151    CA      HORIZON
  3594                      31,3376  0 0006 1              EXTEND
  3595  REF   2  LAST  638  31,3377  1 3445 0              BZF     R23.10
  3596  REF   1             31,3400  7 3526 1   P23.152    MASK    BITS7-9       IS C EQUAL TO 1 OR 2
  3597  REF   1             31,3401  6 5221 0              AD      NEG100
  3598                      31,3402  0 0006 1              EXTEND
  3599  REF   1             31,3403  1 3410 0              BZF     P23.16
  3600  REF   2  LAST  638  31,3404  6 5221 0              AD      NEG100
  3601                      31,3405  0 0006 1              EXTEND
  3602  REF   1             31,3406  1 3412 1              BZF     P23.176
  3603  REF   3  LAST  638  31,3407  0 3445 1              TC      R23.10
  3604  REF  42  LAST  628  31,3410  0 5561 0   P23.16     TC      DOWNFLAG
  3605  REF  15  LAST  637  31,3411    00060 1              ADRES   LUNAFLAG
  3606  REF  48  LAST  637  31,3412  0 5547 1   P23.176    TC      UPFLAG
  3607  REF   3  LAST  637  31,3413    00004 0              ADRES   NORFHOR
  3608  REF   6  LAST  638  31,3414  3 1752 0              CA      HORIZON
  3609                      31,3415  0 0006 1              EXTEND
  3610  REF   1             31,3416  1 3427 1              BZF     P23.20
  3611  REF   1             31,3417  7 3527 0              MASK    BITS4-6
  3612  REF   1             31,3420  6 6171 0              AD      -OCT10
  3613                      31,3421  0 0006 1              EXTEND
  3614  REF   1             31,3422  1 3433 1              BZF     P23.18
  3615  REF   2  LAST  638  31,3423  6 6171 0              AD      -OCT10
  3616                      31,3424  0 0006 1              EXTEND
  3617  REF   1             31,3425  1 3435 1              BZF     P23.30
  3618  REF   4  LAST  638  31,3426  0 3445 1              TC      R23.10
  3619  REF 123  LAST  633  31,3427  0 6006 1   P23.20     TC      INTPRET
  3620                      31,3430    77624 1              CALL
  3621  REF   5  LAST  565  31,3431    60304 0                      P22SUBRB
  3622                      31,3432    77776 1              EXIT
  3623  REF  43  LAST  638  31,3433  0 5561 0   P23.18     TC      DOWNFLAG
  3624  REF   4  LAST  638  31,3434    00004 0              ADRES   NORFHOR
  3625  REF   7  LAST  556  31,3435  3 1140 0   P23.30     CA      STARCODE      IS STARCODE GREATER THAN OR
  3626                      31,3436  0 0006 1              EXTEND                EQUAL TO 0 AND LESS THAN 37
  3627  REF   1             31,3437  1 3464 0              BZF     LOPLANET
  3628                      31,3440  0 0006 1              EXTEND
  3629  REF   5  LAST  638  31,3441  6 3445 1              BZMF    R23.10
  3630  REF   1             31,3442  6 3525 0              AD      NEG37
  3631                      31,3443  0 0006 1              EXTEND
  3632  REF   1             31,3444  6 3447 0              BZMF    P23.170
  3633  REF  11  LAST  564  31,3445  0 4362 1   R23.10     TC      FALTON
  3634  REF   1             31,3446  0 3360 1              TC      DISP7071
  3635  REF 124  LAST  638  31,3447  0 6036 1   P23.170    TC      INTPRET
  3636                      31,3450    41535 1   P23.17     SLOAD   PUSH
  3637  REF   8  LAST  638  31,3451    01141 1                      STARCODE
  3638                      31,3452    41335 1              SLOAD   CMP
  3639  REF   1             31,3453    23516 1                      SPSIX
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 3640                          31,3454   66150 0                LXA,1   SXA,1
 3641  REF 258  LAST  631      31,3455   00155 0                        MPAC +1
 3642  REF   5  LAST  233      31,3456   00302 0                        BESTI              BESTI = 6XSTAR NUMBER
 3643                          31,3457   77624 1                CALL
 3644  REF   1                 31,3460   30000 1                        LOWMEMRY           NEEDED TO RETRIEVE STAR VECTOR FROM LOW
 3645  REF   2  LAST   98      31,3461   02617 0   P23.31       STORE   STARSAV2           STORE FOR R53,P23. US(IN P23)=STARSAV2
 3646                          31,3462   77650 1                GOTO
 3647  REF   9  LAST  637      31,3463   01006 0                        POINTEX
 3648  REF   2  LAST  560      31,3464 3 5035 1   LOPLANET     CAF     V06N88
 3649  REF  18  LAST  637      31,3465 0 5535 1                TC      VNFLASH
 3650  REF 125  LAST  638      31,3466 0 6006 1                TC      INTPRET
 3651                          31,3467   74375 0                VLOAD   VXSC
 3652  REF   5  LAST  556      31,3470   03705 0                        STARSAV3
 3653  REF   1                 31,3471   23531 1                        1DSQR3
 3654                          31,3472   52056 0                UNIT    GOTO
 3655  REF   1                 31,3473   63461 1                        P23.31
 3656                          31,3474   26305 0   ONE/C        2DEC*   .333564049 E-6 B+21*
 3656                          31,3475   05432 1
 3657                          31,3476   00302 0   AEARTH       2DEC    6378166 B-29       A AXIS OF EARTH(METERS B-29)
 3657                          31,3477   24533 1
 3658                          31,3500   00065 1   RADMOON      2DEC    1738090 B-29       RADIUS OF MOON IN METERS
 3658                          31,3501   01265 1
 3659                          31,3502   00000 1   1.0B18       2DEC    1.0 B-18
 3659                          31,3503   02000 0
 3660                          31,3504   01604 1   TRUN19       OCT     01604
 3661                          31,3505   00000 1   VARSUBL      DEC     0
 3662                          31,3506   01505 0   VARSUBL3     2DEC*   3.4299040 E+6 B-26*
 3662                          31,3507   14100 0
 3663                          31,3510   00012 1   TRUNVAR      2DEC    2.5 E-9 B+18
 3663                          31,3511   27462 1
 3664                          31,3512   01306 0   V05N70       VN      0570
 3665                          31,3513   01307 1   V05N71       VN      0571
 3666                          31,3514   00202 1   V50N25P      OCT     00202
 3667                          31,3515   00006 1   SPSIX        OCT     00006
 3668                          31,3516   10464 0   JCAXIS       2DEC    .2688190620        1/2(SIN 32.523 DEG)  TRACK AXIS
 3668                          31,3517   12467 1
 3669                          31,3520   00000 1                2DEC    0
 3669                          31,3521   00000 1
 3670                          31,3522   15373 1                2DEC    .4215878460        1/2(COS 32.523 DEG)
 3670                          31,3523   11346 0
 3671  REF   1                 31,3524   62776 0   R60ADRS      CADR    R60CALL +3
 3672                          31,3525   77732 1   NEG37        DEC     -37
 3673                          31,3526   00700 0   BITS7-9      OCT     700
 3674                          31,3527   00070 0   BITS4-6      OCT     70
 3675                          31,3530   22363 1   1DSQR3       2DEC    0.57735021
 3675                          31,3531   11623 0
 3676  REF 126  LAST  639      31,3532 0 6006 1   V94NTR       TC      INTPRET
 3677                          31,3533   77650 1                GOTO
 3678  REF   1                 31,3534   62474 1                        V94ENTER
 3679  REF   1                 14,2000                          SETLOC  R153
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  3680                          14,2000                               BANK
  36805  REF   1                                                      COUNT*  $$/STARS
  3681                          14,2000   43573 1  LOWMEMKY VLOAD*  RVQ
  3682   REF   2  LAST  603     14,2001   33776 1                    CATLOG,1
  36825  REF   2  LAST  551        4000                               SETLOC  FFTAG2
  3683                             4546                               BANK

  36835  REF   1                                                      COUNT*  $$/R22
  3684                             4546  0 0006 1  GOTOV56  EXTEND                        P20 TERMINATES BY GOTOV56 INSTEAD OF
  3685   REF   1                   4547  3 4552 1           DCA      VB56CADR             GOTOPOOH
  3686   REF   3  LAST  382        4550  1 5214 1           TCF      SUPDXCHZ
  3687   REF   7  LAST  532     E7,1777                     EBANK=   WHOCARES
  3688   REF   2  LAST  249        4551   02641 0  VB56CADR 2CADR    TRACKTRM
  3688                             4552   66107 1
  3693   REF  11  LAST  392     40,2000                     SETLOC   PINBALL1
  3694                          40,3636                     BANK
  3695   REF   1                                            COUNT*   $$/EXTVB
  3696   REF 127  LAST  639     40,3636  0 6006 1  V67CALL  TC       INTPRET
  3697                          40,3637   77624 1           CALL
  3698   REF   1                40,3640   61706 1                    V67WW
  3699                          40,3641   77776 1           EXIT
  3700   REF   1                40,3642  3 3770 1  V06N99DS CAF      V06N99A
  3701   REF 138  LAST  632     40,3643  0 4636 0           TC       BANKCALL
  3702   REF  14  LAST  521     40,3644   20576 1           CADR     GOXDSPF
  3703   REF  31  LAST  627     40,3645  1 5524 0           TCF      ENDEXT
  3704   REF   1                40,3646  0 3650 1           TC       V06N9933
  3705   REF   1                40,3647  0 3642 1           TC       V06N99DS
  3706   REF 128  LAST  640     40,3650  0 6006 1  V06N9933 TC       INTPRET
  3707                          40,3651   46135 1           SLOAD    BHIZ                   IF R3 OF V67 = 0 EXIT
  3708   REF   2  LAST  295     40,3652   02316 1                    WWOPT
  3709   REF   1                40,3653   61704 0                    V67COMEX
  3710                          40,3654   73150 1  V6N99INP LXA,1    LXA,2
  3711   REF   2  LAST  295     40,3655   02311 0                    WWPOS
  3712   REF   2  LAST  295     40,3656   02313 1                    WWVEL
  3713                          40,3657   45335 0           SLOAD    DSU
  3714   REF   3  LAST  640     40,3660   02316 1                    WWOPT
  3715   REF   1                40,3661   21774 0                    V67DEC2
  3716                          40,3662   51030 0           BHIZ     BPL
  3717   REF   1                40,3663   61672 0                    V67WORB
  3718   REF   1                40,3664   61677 0                    V67WMID
  3719                          40,3665   67130 1           SXA,1    SXA,2
  3720   REF   3  LAST  580     40,3666   02000 0                    WRENDPOS
  3721   REF   1                40,3667   02001 1                    WRENDVEL
  3722                          40,3670   77650 1           GOTO
  3723   REF   1                40,3671   61702 0                    V67EXITX
  3724                          40,3672   67130 1  V67WORB  SXA,1    SXA,2
  3725   REF   2  LAST  610     40,3673   02004 1                    WORBPOS
  3726   REF   1                40,3674   02005 0                    WORBVEL
  3727                          40,3675   77650 1           GOTO
  3728   REF   2  LAST  640     40,3676   61702 0                    V67EXITX
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 3729                          40,3677   67130 1  V67WMID  SXA,1   SXA,2
 3730   REF   2  LAST  633     40,3700   03000 1                   WMIDPOS
 3731   REF   1                40,3701   03001 0                   WMIDVEL
 3732                          40,3702   77614 1  V67EXITX CLEAR
 3733   REF  12  LAST  633     40,3703   01671 0                   CRBWFLAG
 3734                          40,3704   77776 1  V67COMEX EXIT
 3735   REF  32  LAST  640     40,3705  1 5524 0           TCF     ENDEXT
 3736                          40,3706   40020 1  V67WW    STQ     BCV
 3737   REF   8  LAST  618     40,3707   00051 0                   S2
 3738                          40,3710   61711 1                   +1
 3739                          40,3711   77624 1           CALL
 3740   REF  16  LAST  588     40,3712   27516 0                   INTSTALL
 3741                          40,3713   71331 0           SSP     DLOAD
 3742   REF  17  LAST  637     40,3714   00051 0                   S1
 3743                          40,3715   00006 1           DEC     6
 3744   REF  29  LAST  636     40,3716   15336 0                   ZEROVECS
 3745   REF   3  LAST  640     40,3717   02312 0           STORE   WWPOS
 3746   REF   3  LAST  640     40,3720   02314 0           STORE   WWVEL
 3747   REF   4  LAST  640     40,3721   02316 1           STORE   WWOPT
 3748                          40,3722   77770 1           AXT,1
 3749                          40,3723   00044 1           DEC     36
 3750                          40,3724   47573 0  NXPOSVEL VLOAD*  VSQ
 3751   REF  44  LAST  622     40,3725   02445 0                   W +36D,1
 3752                          40,3726   77615 0           DAD
 3753   REF   4  LAST  641     40,3727   02312 0                   WWPOS
 3754   REF   5  LAST  641     40,3730   02312 0           STORE   WWPOS
 3755                          40,3731   47573 0           VLOAD*  VSQ
 3756   REF  45  LAST  641     40,3732   02533 0                   W +90D,1
 3757                          40,3733   77615 0           DAD
 3758   REF   4  LAST  641     40,3734   02314 0                   WWVEL
 3759   REF   5  LAST  641     40,3735   02314 0           STORE   WWVEL
 3760                          40,3736   75500 0           TIX,1   SQRT
 3761   REF   1                40,3737   61724 1                   NXPOSVEL
 3762   REF   6  LAST  641     40,3740   16314 0           STODL   WWVEL
 3763   REF   6  LAST  641     40,3741   02312 0                   WWPOS
 3764                          40,3742   77766 0           SQRT
 3765   REF   7  LAST  641     40,3743   02312 0           STORE   WWPOS
 3766                          40,3744   52000 0           BOV     GOTO
 3767                          40,3745   61747 1                   +2
 3768   REF   1                40,3746   61753 1                   V67XXX
 3769                          40,3747   77745 1           DLOAD
 3770   REF   9  LAST  634     40,3750   15344 0                   DPPOSMAX
 3771   REF   8  LAST  641     40,3751   02312 0           STORE   WWPOS
 3772   REF   7  LAST  641     40,3752   02314 0           STORE   WWVEL
 3773                          40,3753   45345 1  V67XXX   DLOAD   DSU
 3774   REF   9  LAST  641     40,3754   02312 0                   WWPOS
 3775   REF   1                40,3755   21772 0                   FT99999
 3776                          40,3756   71240 1           BMN     DLOAD
 3777                          40,3757   61762 0                   +3
 3778   REF   2  LAST  641     40,3760   21772 0                   FT99999
```

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  3779    REF  10  LAST  641    40,3761    02312 0              STORE   WWPOS
  3780                          40,3762    66150 0              LXA,1   SXA,1
  3781    REF   9  LAST  641    40,3763    00051 0                      S2
  3782    REF   1               40,3764    00052 0                      QPRET
  3783                          40,3765    77776 1              EXIT
  3784    REF  40  LAST  556    40,3766  0 4655 0               TC      POSTJUMP
  3785    REF   1               40,3767    27527 1              CADR    INTWAKE
  3789                          40,3770    01543 1   V06N99A    VN      0699
  3790                          40,3771    01670 1   FT99999    2DEC    30479 B-19
  3790                          40,3772    17000 1
  3791                          40,3773    00002 0   V67DEC2    2DEC    2 B-14
  3791                          40,3774    00000 1
  3792    REF   9  LAST  517    30,2000                         SBANK=  LOWSUPER
```

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L        P30,P31                                                                   USER'S PAGE NO.   1       E0 5?

P0001    PROGRAM DESCRIPTION  P30     DATE 5-1-69

R0002    MOD.I BY S. ZELDIN- TO ADD P31 AND ADAPT P30 FOR P31 USE.     22DEC67
R0003    MOD.II BY P.WOLFF TO REDUCE CODING AND DELETE RESTART PROTECTION 4-30-69
R0004    MOD.III BY C.BEALS TO DELETE P31 1NOV69
R0005    FUNCTIONAL DESCRIPTION
R0006    P30(EXTERNAL DELTA-V TARGETTING PROGRAM)
R0007        ACCEPTS ASTRONAUT INPUTS OF TIG,DELV(LV) AND COMPUTES,FOR DISPLAY,
R0008        APOGEE,PERIGEE,DELV(MAG),MGA ASSOCIATED WITH DESIRED MANEUVER

R0009        THE FOLLOWING SUBROUTINES ARE USED IN P30
R0010           S30/31.1  COMPUTES APOGEE AND PERIGEE ALTITUDE
R0011           P30/P31 - DISPLAYS TIG
R0012           CNTUP30 - DISPLAYS DELV(LV)
R0013           COMPTGO  CLOCKTASK COMPUTE TTOGO
R0014           LOMAT       COMPUTE X,Y,Z IN LV COORDS
R0015           PARAM30 - DISPLAYS APOGEE,PERIGEE,DELV(MAG),MGA,TIME FROM TIG,
R0016                     MARKS SINCE LAST THRUSTING MANEUVER

R0017    CALLING  SEQUENCE VIA JOB FROM V37

R0018    EXIT VIA V37 CALL OR GOTOPOOH

R0019    OUTPUT FOR POWERED FLIGHT
R0020             VTIG    X
R0021             RTIG
R0022             DELVSIN X
R0023    P30 CALCULATIONS

R0024    P30 CALC BASED ON STORED TARGET PARAMETERS(R OF IGNITION(RTIG),V OF
R0025    IGNITION(VTIG),TIME OF IGNITION(TIG),DELV(LV),COMPUTE PERIGEE ALTITUDE
R0026    APOGEE ALTITUDE AND DELTA-V REQUIRED IN REF. COORDS.(DELVSIN)
R0027    ERASABLE INITIALIZATION REQUIRED
R0028             TIG         TIME OF IGNITION                         DP       B28CS
R0029             DELVSLV   SPECIFIED DELTA-V IN LOCAL VERT.
R0030                       COORDS. OF ACTIVE VEHICLE AT
R0031             TIME OF IGNITION                             VCT.     B+7M/CS
R0032    SUBROUTINES CALLED
R0033             THISPREC
R0034    OUTPUT
R0035             RTIG         POSITION AT TIG                 VCT.     B+29M
R0036             VTIG         VELOCITY AT TIG                 VCT.     B+7M
R0037             DELVSIN      DELVSLV IN REF COORDS           VCT.     B+7M/CS
R0038    DEBRIS QTEMP    TEMP. ERASABLE
R0039           QPRET,MPAC
R0040           PUSHLIST

  0041   REF   1                 35,2000                      SETLOC P30S1
  0042                           35,3433                      BANK
```

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L       P30,P31                                                                                   USER'S PAGE NO.   2        E0 5?

 0043   REF   7  LAST  561   E7,1625                               EBANK= +MGA

 0044   REF   1                                                    COUNT* $$/P30
 0045   REF  49  LAST  638   35,3433  0 5547 1  P30      TC     UPFLAG
 0046   REF   6  LAST  588   35,3434   00027 1           ADRES  UPDATFLG           SET UPDATFLG
 0047   REF  50  LAST  644   35,3435  0 5547 1           TC     UPFLAG
 0048   REF  10  LAST  588   35,3436   00031 0           ADRES  TRACKFLG           SET TRACKFLG
 0049   REF   3  LAST  527   35,3437  3 5026 0  DSP0633  CAF    V06N33             DISPLAY TIME OF IGNITION
 0050   REF  19  LAST  639   35,3440  0 5535 1           TC     VNFLASH
 0051   REF   2  LAST  484   35,3441  3 4535 0           CAF    V06N81
 0052   REF  20  LAST  644   35,3442  0 5535 1           TC     VNFLASH
 0053   REF  51  LAST  644   35,3443  0 5547 1           TC     UPFLAG
 0054   REF   2  LAST  494   35,3444   00045 0           ADRES  XDELVFLG           BIT 8 FLAG 2
 0055   REF 129  LAST  640   35,3445  0 6006 1           TC     INTPRET
 0056                        35,3446   71214 0           CLEAR  LLOAD
 0057   REF   7  LAST  644   35,3447   00670 0                  UPDATFLG           RESET UPDATFLG
 0058   REF  42  LAST  586   35,3450   03413 1                  TIG                TIME IGNITION SCALED AT 2(+28)CS
 0059   REF  23  LAST  617   35,3451   34041 0           STCALL TDEC1
 0060   REF   3  LAST  518   35,3452   27145 1                  THISPREC           ENCKE ROUTINE FOR

 0061                        35,3453   67175 0           VLOAD  SXA,2
 0062   REF  15  LAST  601   35,3454   00007 0                  VATT
 0063   REF  11  LAST  538   35,3455   03746 1                  RTX2
 0064   REF   3  LAST  127   35,3456   27640 0           STOVL  VTIG
 0065   REF  17  LAST  601   35,3457   00001 0                  RATT
 0066   REF   2  LAST  127   35,3460   03632 0           STORE  RTIG
 0067   REF  21  LAST  500   35,3461   03540 0           STORE  RACT3
 0068                        35,3462   53435 0           VXV    UNIT
 0069   REF   4  LAST  644   35,3463   03640 0                  VTIG
 0070   REF  11  LAST  500   35,3464   36617 1           STCALL UNRM
 0071   REF   3  LAST  481   35,3465   72721 0                  LCMAT
 0072                        35,3466   61375 1           VLOAD  VXM
 0073   REF   6  LAST  185   35,3467   03405 0                  DELVSLV
 0074                        35,3470   00001 0
 0075                        35,3471   66172 0           VSL1   SXA,1
 0076   REF   8  LAST  502   35,3472   03745 1                  RTX1
 0077   REF   4  LAST  485   35,3473   03646 0           STORE  DELVSIN
 0078                        35,3474   77646 0           ABVAL
 0079   REF   4  LAST  294   35,3475   27763 0           STOVL  VGDISP             MAG DELV
 0080   REF   3  LAST  644   35,3476   03632 0                  RTIG
 0081                        35,3477   53315 0           PDVL   VAD
 0082   REF   5  LAST  644   35,3500   03646 0                  DELVSIN
 0083   REF   5  LAST  644   35,3501   03640 0                  VTIG
 0084                        35,3502   77624 1           CALL
 0085   REF   1              35,3503   54021 0                  S30/31.1
 0086                        35,3504   77776 1           EXIT
 0087   REF   1              35,3505  3 3553 1  PARAM30  CAF    V06N42             DISPLAY HAPO,HPER,DELTAV
 0088   REF  21  LAST  644   35,3506  0 5535 1           TC     VNFLASH
 0089   REF 130  LAST  644   35,3507  0 6006 1  REFTEST  TC     INTPRET
 0090                        35,3510   77214 0           BOFF   VLOAD
```

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L         P30,P31                                                                                 USER'S PAGE NO.   3      E7 S3

 0091     REF    5  LAST  628    35,3511   01742 1                   REFSMFLG        TEST FOR REFSMFLAG ON
 0092     REF    1               35,3512   73544 0                   NOTSET
 0093     REF    6  LAST  644    35,3513   03646 0                   DELVSIN
 0094                            35,3514   45006 0            PUSH   CALL
 0095     REF    2  LAST  485    35,3515   56444 0                   GET+MGA
 0096                            35,3516   77776 1            EXIT
 0097     REF    2  LAST  485    35,3517  0 3525 0  DISPMGA   TC     COMPTGO

 0098     REF    2  LAST  485    35,3520  3 4536 0  DISP45    CAF    V16N45          DISPLAY MARK CNT,TFI,+MGA
 0099     REF   22  LAST  644    35,3521  0 5535 1            TC     VNFLASH
 0100     REF   44  LAST  638    35,3522  0 5561 0            TC     DOWNFLAG
 0101     REF    3  LAST  528    35,3523   00155 0            ADRES  TIMRFLAG        RESET TIMRFLAG
 0102     REF   27  LAST  632    35,3524  1 4103 0            TCF    GOTOPOOH

 0103                            35,3525  0 0006 1  COMPTGO   EXTEND
 0104     REF    1               35,3526  23'272 1            QXCH   PHSPRDT6

 0105     REF   52  LAST  644    35,3527  0 5547 1            TC     UPFLAG          SET TIMRFLAG
 0106     REF    4  LAST  645    35,3530   00155 0            ADRES  TIMRFLAG
 0107     REF  123  LAST  590    35,3531  3 4772 1            CAF    ZERO
 0108     REF    3  LAST  531    35,3532  54 777 1            TS     NVWORD1

 0109     REF   67  LAST  614    35,3533  3 4770 0            CAF    ONE
 0110     REF   17  LAST  557    35,3534  0 5233 0            TC     WAITLIST
 0111     REF   43  LAST  644    E7,1412                      EBANK= TIG
 0112     REF    4  LAST  528    35,3535   03225 1            2CADR  CLOKTASK
 0112                            35,3536   50067 0

 0113     REF   17  LAST  628    35,3537  0 5362 0            TC     2PHSCHNG
 0114                            35,3540   40036 0            OCT    40036           6.3SPOT FOR CLOKTASK
 0115                            35,3541   05024 1            OCT    05024           GROUP 4 CONTINUES HERE
 0116                            35,3542   13000 0            OCT    13000

 01165    REF    3  LAST  528    01,2325            6P3SPT1   =      6.3SPOT
 0117     REF    2  LAST  645    35,3543  0 1272 1            TC     PHSPRDT6

 0118                            35,3544   57545 1  NOTSET    DLOAD  DCOMP
 0119     REF    1               35,3545   33552 0                   MARSDP
 0120     REF    8  LAST  644    35,3546   03626 0            STORE  +MGA
 0121                            35,3547   77634 0            RTB
 0122     REF    1               35,3550   73517 0                   DISPMGA
 0123                            35,3551   00000 1  MARSDP    OCT    00000           (00000) (16440)  = (+00001)
 0124                            35,3552   35100 0            OCT    35100
A0125                                                                                ( .01 ) DEGREES IN THE LOW ORDER REGISTE
 0126                            35,3553   01452 0  V06N42    VN     0642
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R0127    S30/31.1  SUBROUTINE USED BY P30/P31 CALCULATIONS
R0128    MOD NO 1          LOG SECTION  P30,P37
R0129    FUNCTIONAL DESCRIPTION
R0130    THROUGH A SERIES OF CALLS COMPUTES APOGEE AND PERIGEE ALTITUDE
R0131    SUBROUTINES CALLED
R0132              PERIAPO1
R0133              SHIFTR1
R0134              MAXCHK
R0135    CALLING SEQUENCE
R0136        L     CALL
R0137        L+1           S30/31.1
R0138    NORMAL EXIT MODE
R0139        AT L+2 OR CALLING SEQUENCE
R0140           OUTPUT
R0141              HAPO          APOGEE ALT.                   DP       B+29M
R0142              HPER          PERIGEE ALT.                  DP       B+29M

 0143    REF   1                26,2000                        SETLOC P30S1A
 0144                           26,2021                        BANK

 0145    REF   1                                               COUNT* $$/P30
 0146                           26,2021   45020 1  S30/31.1  STQ     CALL
 0147    REF   2  LAST  127     26,2022   03657 0                     QTEMP
 0148    REF   2  LAST  468     26,2023   45174 1                     PERIAPO1
 0149                           26,2024   77624 1            CALL
 0150    REF   2  LAST  468     26,2025   45330 0                     SHIFTR1
 0151                           26,2026   77624 1            CALL
 0152    REF   3  LAST  524     26,2027   46745 0                     MAXCHK
 0153    REF   2  LAST  291     26,2030   16357 1            STODL   HPER              PERIGEE ALT B+29
 0154                           26,2031   00005 1                     4D
 0155                           26,2032   77624 1            CALL
 0156    REF   3  LAST  646     26,2033   45330 0                     SHIFTR1
 0157                           26,2034   77624 1            CALL
 0158    REF   4  LAST  646     26,2035   46745 0                     MAXCHK
 0159    REF   3  LAST  291     26,2036   36355 1            STCALL  HAPO              APOGEE ALT B+29
 0160    REF   3  LAST  646     26,2037   03657 0                     QTEMP
```

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R0161    SUBROUTINE NAME:         DELRSPL                                        (CONTINUATION OF V 82 IN CSM IF P11 ACTI
R0163    TRANSFERRED COMPLETELY FROM SUNDISK, P30S REV 33. 9 SEPT 67.
R0164    MOD NO:  0               MOD BY:  ZELDIN            DATE:
R0165    MOD NO:  1               MOD BY:  RR BAIRNSFATHER   DATE:  11 APR 67
R0166    MOD NO:  2               MOD BY:  RR BAIRNSFATHER   DATE:  12 MAY 67    ADD UR.RT CALC WHEN BELOW 300K FT
R0168    MOD NO:  2.1             MOD BY:  RR BAIRNSFATHER   DATE: 5 JULY 67     FIX ERROR IN MOD. 2.
R0170    MOD NO:  3               MOD BY:  RR BAIRNSFATHER   DATE:  12 JUL 67    CHANGE SIGN OF DISPLAYED ERROR.
R0172    MOD 4                    MOD BY   S.ZELDIN          DATE  3 APRIL 68    CHANGE EQUATIONS FOR L/D=.18 WHICH REPLA
R0174    FUNCTION:                CALCULATE (FOR DISPLAY ON CALL) AN APPROXIMATE     MEASURE OF IN-PLANE SPLASH DOWN
R0176                             ERROR. IF THE FREE-FALL TRANSFER ANGLE TO 300K FT  ABOVE PAD RADIUS IS POSITIVE:
R0178                             SPLASH ERROR= -RANGE TO TARGET + FREE-FALL TRANSFER ANGLE + ESTIMATED ENTRY ANGLE.
R0180                             THE TARGET LOCATION AT ESTIMATED TIME OF IMPACT IS USED.  IF THE FREE-FALL TRANSFER
R0182                             ANGLE IS NEGATIVE:  SPLASH ERROR= -RANGE TO TARGET
R0183                             THE PRESENT TARGET LOCATION IS USED.
R0184    CALLING SEQUENCE         CALLED AFTER SR30.1 IF IN CSM AND IF P11 OPERATING (UNDER CONTROL OF V82)
R0186    SUBROUTINES CALLED: VGAMCALC, TFF/TRIG, LALOTORV.
R0187    EXIT                     RETURN DIRECTLY TO V 82 PROG. AT SPLRET
R0188    ERASABLE INITIALIZATION   LEFT BY SR30.1 AND V82GON1
R0189    OUTPUT:  RSP-RREC  RANGE IN REVOLUTIONS                                 DSKY DISPLAY IN N. MI.
R0191    DEBRIS:  QPRET, PDL0 ...PDL7 ,PDL10

R0192              THETA(1)
R0193

 0194    REF   1                  32,2000                     SETLOC DELRSPL1
 0195                             32,2027                     BANK
 0196    REF   1                                              COUNT* $$/P30                PROGRAMS: P30 EXTERNAL DELTA V

 0197                             32,2027   00011 1  DELRSPL  STORE  8D
 0198                             32,2030   45244 1           BPL    DSU
 0199    REF   1                  32,2031   64077 0                  CANTDO                GONE PAST 300K FT ALT
 0200    REF   1                  32,2032   16425 0                  13ITDP
 0201                             32,2033   45000 0           BOV    CALL
 0202    REF   2  LAST  647       32,2034   64077 0                  CANTDO                POSMAX INDICATES NO 300K FT SOLUTION.
 0203    REF   1                  32,2035   55054 0                  VGAMCALC              +GAMMA(REV) IN PMAC,V300 MAG(0-7)=PDL 0
 0204                             32,2036   45006 0           PUSH   CALL
 0205    REF   1                  32,2037   57052 1                  TFF/TRIG
 0206                             32,2040   77624 1           CALL
 0207    REF   1                  32,2041   64105 1                  AUGEKUGL
 0208                             32,2042   65525 0           PDDL   ACOS                  T ENTRY PDL 6
 0209    REF   1                  32,2043   00017 1                  CDELF/2
 0210                             32,2044   77615 0           DAD
 0211                             32,2045   00005 1                  4
 0212    REF   2  LAST   95       32,2046   26341 0  GETARG   STOVL  THETA(1)
 0213    REF   9  LAST  442       32,2047   03401 1                  LAT(SPL)
 0214    REF   8  LAST  538       32,2050   14747 0           STODL  LAT
 0215    REF  10  LAST  622       32,2051   15336 0                  HI6ZEROS
 0216    REF   6  LAST  619       32,2052   14753 0           STODL  ALT                   ALT=0  = LAT +4
 0217    REF   6  LAST  530       32,2053   01044 0                  PIPTIME
 0218                             32,2054   71214 0           BON    CLOAD
 0219   REF   4  LAST  510   32,2055   03711 0                     V37FLAG
 0220                        32,2056   64060 0                     +2
 0221   REF   6  LAST  519   32,2057   02316 1                     TSTART82
 0222                        32,2060   43225 0            DSU      DAD
 0223                        32,2061   00011 1                     8D
 0224                        32,2062   45014 0            CLEAR    CALL
 0225   REF   7  LAST  634   32,2063   00662 0                     ERADFLAG
 0226   REF   5  LAST  634   32,2064   26524 0                     CALGTURV        R RECOV. IN ALPHAV AND MPAC

 0227                        32,2065   63256 0            UNIT     PDVL
 0228   REF  14  LAST  524   32,2066   02320 1                     RCNE
 0229                        32,2067   50256 0            UNIT     DOT
 0230                        32,2070   65552 0            SL1      ARCCOS
 0231                        32,2071   77621 1            BDSU                     ERROR = THETA EST - THETA TARG
A0232                                                                    NEGATIVE NUMBER SIGNIFIES THAT WILL FALL SHORT.
A0233                                                                    POSITIVE NUMBER SIGNIFIES THAT WILL OVERSHOOT.
 0234   REF   3  LAST  647   32,2072   02341 0                     THETA(1)
 0235   REF   3  LAST  292   32,2073   36347 1  DELRDONE STCALL   RSP-RREC        DOWNRANGE RECOVERY RANGE ERROR    /360
 0236   REF   3  LAST  515   32,2074   27525 0                     INTWAKE0
 0237                        32,2075   77624 1            CALL
 0238   REF   1              32,2076   46616 1                     SPLRET
 0239                        32,2077   65345 0  CANTDO    DLOAD    PDDL            INITIALIZE ERASE TO DOT TARGET AND UR
A0240                                                                              FOR RANGE ANGLE.
 0241   REF   7  LAST  617   32,2100   15334 1                     HIDPHALF        TO PDL 0 FOR DEN IN DDV.
 0242   REF  11  LAST  647   32,2101   15336 0                     HI6ZEROS
 0243                        32,2102   77606 1            PUSH                     ZERO TO PDL 2 FOR PHI ENTRY
 0244                        32,2103   34011 0            STCALL   8D
 0245   REF   1              32,2104   64046 1                     GETARG          GO SET RSP-RREC =0

 0246                        32,2105   77775 1  AUGEKUGL  VLOAD
 0247   REF   1              32,2106   24266 0                     X1CON -2
 0248   REF  14  LAST  637   32,2107   14045 0            STODL    X1 -2
 0249                        32,2110   00001 0                     0
 0250                        32,2111   50025 0            DSU      BMN
 0251   REF   1              32,2112   24260 0                     V(21K)
 0252   REF   1              32,2113   64140 0                     LOOPSET
 0253                        32,2114   65060 1            XSU,1    XCHX,2
 0254   REF  18  LAST  641   32,2115   00050 1                     S1
 0255   REF  15  LAST  648   32,2116   00046 0                     X1
 0256                        32,2117   45324 0            XCHX,2   DSU
 0257   REF  19  LAST  648   32,2120   00050 1                     S1
 0258   REF   1              32,2121   24246 1                     V(3K)
 0259                        32,2122   65040 0            BMN      XCHX,2
 0260   REF   2  LAST  648   32,2123   64140 0                     LOOPSET
 0261   REF  20  LAST  648   32,2124   00050 1                     S1
 0262                        32,2125   50025 0            DSU      BMN
 0263   REF   1              32,2126   24256 0                     V(4K)
 0264   REF   3  LAST  648   32,2127   64140 0                     LOOPSET
 0265                        32,2130   65124 0            XCHX,2   XCHX,2
 0266   REF  21  LAST  648   32,2131   00050 1                     S1
 0267   REF  16  LAST  648   32,2132   00046 0                     X1
 0268                        32,2133   50025 0           DSU       BMN
 0269   REF   1              32,2134   24242 0                     V(400)
 0270   REF   4  LAST  648   32,2135   64140 0                     LOOPSET
 0271                        32,2136   77730 0           SXA,1
 0272   REF  22  LAST  648   32,2137   00050 1                     S1
 0273                        32,2140   52110 0  LOOPSET  INCR,1    GOTO
 0274                        32,2141   00001 0           DEC       1
 0275   REF   1              32,2142   64145 0                     K1K2LOOP
 0276                        32,2143   77730 0  K2CALC   SXA,1
 0277   REF  23  LAST  649   32,2144   00050 1                     S1
 0278                        32,2145   44745 1  K1K2LOOP DLOAD     DSU*
 0279                        32,2146   00001 0                     0
 0280   REF   1              32,2147   24255 0                     V(32K) +1,1
 0281                        32,2150   42603 1           DMP*      DAD*
 0282   REF   1              32,2151   24241 0                     YK1K2 +1,1
 0283   REF   1              32,2152   24225 1                     CK1K2 +1,1
 0284                        32,2153   60125 1           PDDL      TIX,1
 0285                        32,2154   00003 1                     2
 0286   REF   1              32,2155   64143 0                     K2CALC
 0287                        32,2156   55225 1           DSU       30DV
 0288                        32,2157   40006 0           PUSH      80V                  PHI ENTRY PDL 40
 0289   REF   1              32,2160   64203 1                     MAXPHI
 0290                        32,2161   45240 0           BMN       DSU
 0291   REF   2  LAST  649   32,2162   64203 1                     MAXPHI
 0292   REF   1              32,2163   24210 1                     MAXPHIC
 0293                        32,2164   77644 1           BPL
 0294   REF   3  LAST  649   32,2165   64203 1                     MAXPHI
 0295                        32,2166   45345 1  PHICALC  DLOAD     DSU
 0296                        32,2167   00001 0                     0
 0297   REF   1              32,2170   24266 0                     V(26K)
 0298                        32,2171   71244 0           BPL       DLOAD
 0299   REF   1              32,2172   64200 1                     TGR26
 0300   REF   1              32,2173   24262 1                     TLESS26
 0301                        32,2174   77671 1           DDV
 0302                        32,2175   00001 0                     0
 0303                        32,2176   43405 1  TENT     DMP       RVQ
 0304                        32,2177   00005 1                     40
 0305                        32,2200   52145 0  TGR26    DLOAD     GOTO
 0306   REF   1              32,2201   24264 1                     TGR26CON
 0307   REF   1              32,2202   64176 0                     TENT


 0308                        32,2203   65345 0  MAXPHI   DLOAD     PDDL
 0309   REF   2  LAST  649   32,2204   24210 1                     MAXPHIC
 0310                        32,2205   77650 1           GOTO
 0311   REF   1              32,2206   64166 1                     PHICALC
 0312                        32,2207   02755 1  MAXPHIC  2DEC      .09259298           2000 NM FOR MAXIMUM PHI ENTRY
 0312                        32,2210   01307 1
 0313   REF   2 LAST  647 TO  649:   114   114*          COUNT*  $$/P30
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A0314                                                                                   BELOW
A0315                                                                  <<<< TABLE IS INDEXED. KEEP IN ORDER >>>

 0316                  32,2211   00013 0            2DEC     7.07304526 E-4  5500
 0316                  32,2212   22652 0
 0317                  32,2213   00005 1            2DEC     3.08641975 E-4  2400
 0317                  32,2214   01642 0
 0318                  32,2215   00005 1            2DEC     3.08641975 E-4  2400
 0318                  32,2216   01642 0
 0319                  32,2217   77556 1            2DEC     -8.8888888 E-3  -3.2
 0319                  32,2220   53522 1
 0320                  32,2221   00055 1            2DEC     2.7777777 E-3    1
 0320                  32,2222   20266 1
 0321                  32,2223   00155 0  CK1K2     2DEC     6.6666666 E-3   2.4
 0321                  32,2224   07202 0
 0322                  32,2225   00000 1            2DEC     0               0
 0322                  32,2226   00000 1
 0323                  32,2227   77730 0            2DEC*    -1.86909989 E-5 B7*        -.443
 0323                  32,2230   71525 0
 0324                  32,2231   00000 1            2DEC     0
 0324                  32,2232   00000 1
 0325                  32,2233   04445 0            2DEC*    1.11639691 E-3 B7*         .001225
 0325                  32,2234   10102 0
 0326                  32,2235   03726 1            2DEC*    9.56911636 E-4 B7*         .00105
 0326                  32,2236   31201 0
 0327                  32,2237   01040 1  YK1K2     2DEC*    2.59733157 E-4 B7*              .000285
 0327                  32,2240   26313 1
 0328                  32,2241   00234 1  V(400)    2DEC     1.2192 B-7
 0328                  32,2242   01660 0
 0329                  32,2243   25254 0  V(28K)    2DEC     85.344 B-7
 0329                  32,2244   01014 0
 0330                  32,2245   02222 1  V(3K)     2DEC     9.144 B-7
 0330                  32,2246   15646 1
 0331                  32,2247   22223 1  V(24K)    2DEC     73.152 B-7
 0331                  32,2250   16457 0
 0332                  32,2251   25254 0            2DEC     85.344 B-7
 0332                  32,2252   01014 0
 0333                  32,2253   30304 0  V(32K)    2DEC     97.536 B-7
 0333                  32,2254   23351 1
 0334                  32,2255   03030 1  V(4K)     2DEC     12.192 B-7
 0334                  32,2256   22335 1
 0335                  32,2257   20001 1  V(21K)    2DEC     64.008 B-7
 0335                  32,2260   00611 1
 0336                  32,2261   00033 1  TLESS26   2DEC*    5.70146688 E7 B-35*     8660PHI/V
 0336                  32,2262   05763 0
 0337                  32,2263   00053 1  TGR26CON  2DEC     7.2 E5 B-28       PHI/3
 0337                  32,2264   36200 0
 0338                  32,2265   23637 1  V(26K)    2DEC     79.248 B-7        26000
 0338                  32,2266   27636 1
 0339                  32,2267   00012 1  X1CON     DEC      10
```

```
L        P30,P31                                                                        USER'S PAGE NO.   9      E7 S3

 0340                              32,2270   00010 0          DEC     8
 0341                              32,2271   00006 1          DEC     6
A0342                                                                             <<<< TABLE IS INDEXED. KEEP IN ORDER >>>
A0343                                                                                               ABOVE
```

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L        P30,P31                                                                                    USER'S PAGE NO.  10       E7 S3

P0344    ***** AVFLAGA/P *****

R0345    SUBROUTINES USED

R0346          UPFLAG
R0347          DOWNFLAG
 0348    REF   2  LAST  487      4000                        SETLOC P30SUBS
 0349                            4553                        BANK
 03495   REF   1                                             COUNT* $$/P30
 0350    REF  12  LAST  507   E4,1760                        EBANK= SUBEXIT
 0351                            4553  0 0006 1  AVFLAGA    EXTEND                    AVFLAG = CSM
 0352    REF  13  LAST  652      4554  23'760 1              QXCH   SUBEXIT
 0353    REF  45  LAST  645      4555  0 5561 0              TC     DOWNFLAG
 0354    REF   5  LAST  500      4556   00050 1              ADRES  AVFLAG             BIT 5  FLAG 2
 0355    REF   6  LAST  632      4557  0 4606 0              TC     E7SETTER
 0356    REF   2  LAST  185   E7,1424                        EBANK= ECSTEER
 0357    REF  24  LAST  529      4560  3 4754 0              CAF    BIT13
 0358    REF   3  LAST  652      4561  55'424 0              TS     ECSTEER            SET ECSTEER = 1
 0359    REF   2  LAST  428      4562  3 4756 1              CAF    EBANK4
 0360    REF  18  LAST  572      4563  54 0003 0             TS     EBANK
 0361    REF  14  LAST  652   E4,1760                        EBANK= SUBEXIT
 0362    REF  15  LAST  652      4564  0 1760 1              TC     SUBEXIT
 0363                            4565  0 0006 1  AVFLAGP    EXTEND                    AVFLAG = LEM
 0364    REF  16  LAST  652      4566  23'760 1              QXCH   SUBEXIT
 0365    REF  53  LAST  645      4567  0 5547 1              TC     UPFLAG
 0366    REF   6  LAST  652      4570   00050 1              ADRES  AVFLAG             BIT 5  FLAG 2
 0367    REF  17  LAST  652      4571  0 1760 1              TC     SUBEXIT
 0368                            4572  0 0006 1  P20FLGON   EXTEND
 0369    REF  18  LAST  652      4573  23'760 1              QXCH   SUBEXIT
 0370    REF  54  LAST  652      4574  0 5547 1              TC     UPFLAG
 0371    REF  11  LAST  644      4575   00031 0              ADRES  TRACKFLG
 0372    REF  55  LAST  652      4576  0 5547 1              TC     UPFLAG
 0373    REF   8  LAST  644      4577   00027 1              ADRES  UPDATFLG
 03734   REF  46  LAST  652      4600  0 5561 0              TC     DOWNFLAG
 03736   REF   5  LAST  586      4601   00244 0              ADRES  PCFLAG
 0374    REF  19  LAST  652      4602  0 1760 1              TC     SUBEXIT
```

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L        P30,P31                                                                            USER'S PAGE NO.  11      E4 S3

P0375
 0376   REF   1                04,2000                         SETLOC P31TAG
 0377                          04,3303                         BANK

 03775  REF   1                                                COUNT* $$/P3136
 0378   REF   3  LAST  472     04,3303  0 4553 0  P31          TC     AVFLAGA
 0379   REF   3  LAST  472     04,3304  0 4572 0               TC     P20FLGON      SET TRACK,UPDATE, CLEAR FINAL FLAGS
 0380   REF 131  LAST  644     04,3305  0 6006 1               TC     INTPRET
 0381                          04,3306   45014 0  P31ALMRT CLEAR  CALL
 0382   REF   3  LAST  217     04,3307   05671 1                      CSISFLAG
 0383   REF   1                04,3310   11546 0                      INPUTOSP
 0391                          04,3311   74014 1               BOFF   AXC,1
 0392   REF  24  LAST  634     04,3312   04343 1                      CMOONFLG
 0393   REF   1                04,3313   11315 0                      COMPMU
 0394                          04,3314   00012 1                      10D
 0395                          04,3315   51575 1  COMPMU       VLOAD  ABVAL
 0396   REF   6  LAST  555     04,3316   01555 0                      RRECTCSM
 0397                          04,3317   62606 0               PUSH   PDVL*                     PL AT 04D
 0398   REF   3  LAST  496     04,3320   22301 0                      MUTABLE,1     RTX1=1/MU  B+34,B+28,  RTMU=SQRT(MU)
 0399   REF   9  LAST  644     04,3321   27746 1               STODL  RTX1          B-18,B-15,  RTSR1/MU=1/SQRT(MU)  B+17,B+14
 0400   REF   2  LAST  528     04,3322   01563 0                      VRECTCSM
 0401                          04,3323   57236 1               VSQ    DMPR
 0402   REF  10  LAST  653     04,3324   03746 1                      RTX1          VSQ/MU                            B+20 ,B+18
 0403                          04,3325   52405 1               DMP    SL3           R VSQ/MU              PL AT 02D   B-6
 0404                          04,3326   74421 0               BDSU   SR1R
 0405   REF   1                04,3327   33416 1                      D1/32         ( 2 - R VSQ/MU )                  B-7
 0406                          04,3330   41471 0               DDV    PUSH          ( 2 - R VSQ/MU )/R    AT 00D      B+22,B+20
 0407                          04,3331   55366 1               SQRT   DDDV          2 PI R/(2 - R VSQ/MU)             B-15,B-14
 0408   REF   1                04,3332   33430 0                      2PISC
 0409                          04,3333   65205 0               DMP    PDDL          2PI R SQRT(MU)/(2MU-R VSQ)    B-2,B-
 0410   REF   3  LAST  496     04,3334   03752 1                      RTSR1/MU
 0411                          04,3335   65301 0               NORM   PDDL
 0412   REF  17  LAST  649     04,3336   00047 1                      X1
 0413                          04,3337   56257 1               SL*    DDV
 0414                          04,3340   20172 1                      0 -70,1       HAFPAI = PERIOD/2                 B-28
 0415                          04,3341   77621 1               BDSU                 TIG = ( TCSI - HAFPAI )           B-28
 0416   REF   5  LAST  283     04,3342   02463 1                      TCSI
 0418   REF  44  LAST  645     04,3343   03413 1               STORE  TIG           TIG = ( TCSI - PERIOD/2 )         B-28
 0419                          04,3344   77776 1               EXIT
 0420   REF   4  LAST  644     04,3345  3 5026 0               CA     V06N33
 0421   REF  23  LAST  645     04,3346  0 5535 1               TC     VNFLASH
 0422   REF 132  LAST  653     04,3347  0 6006 1               TC     INTPRET
 0423                          04,3350   77624 1  P31UNWRD CALL
 0424   REF   3  LAST  472     04,3351   11217 0                      SELECTMU
 0425                          04,3352   71214 0  P31RECYC SET        DLOAD
 0426   REF   1                04,3353   05470 1                      HAFLAG
 0427   REF   6  LAST  653     04,3354   02463 1                      TCSI
 0428                          04,3355   77624 1               CALL
 0429   REF   1                04,3356   11441 0                      P31ENT
 0430                          04,3357   77775 1  P31RT        VLOAD
```

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L          P30,P31                                                                                          USER'S PAGE NO.  12       E4 33

  0433     REF    7  LAST  602   04,3360   11762 1                        ZEROVEC
  0434     REF   16  LAST  514   04,3361   17405 0             STODL      DELVLVC
  0435     REF    3  LAST  293   04,3362   02633 0                        DIFFALT          DELTA H AT COH
  0436                           04,3363   57215 0             DAD        DMPR
  0437     REF    2  LAST   96   04,3364   02370 1                        HAMDELH          METERS            B-29
  0438     REF    1              04,3365   11376 0                        25THOUS          K = -.025                           B-
  0439                           04,3366   45081 1             SL         CALL
  0440                           04,3367   20206 1                        50
  0441     REF    1              04,3370   24005 1                        N90/N81
  0442                           04,3371   77624 1             CALL                                  X
  0443     REF    4  LAST  496   04,3372   73027 0                        VN1645           S32/33.1,DISPLAYS AND COMPUTES DELVLVC
  0444                           04,3373   77650 1             GOTO                        AND DELVSIN.
  0445     REF    1              04,3374   11352 0                        P31RECYC
  0447                           04,3375   56574 1   25THOUS   2DEC*      -.4114470842 E-5 B+17*                               B+17
  0447                           04,3376   47556 1
  04471                          04,3377   13434 0   130DEGLO  OCT        13434
  04472                          04,3400   16163 1             OCT        16163
  04473                          04,3401   22407 1   208DEGLO  OCT        22407
  04474                          04,3402   36673 0             OCT        36673
  0448     REF    1              22,2000                       SETLOC     P36TAG
  0449                           22,3334                       BANK
```

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P0450                    PLANE CHANGE TARGETING PROGRAM  P36
R0451     PURPOSE

R0452                    TO COMPUTE PARAMETERS FOR PLANE CHANGE MANEUVER
R0453     INPUT

R0454                    TCSI
R0455     OUTPUT

R0456                    TIG     TIME OF PLANE CHANGE MANEUVER  COMPUTED TO BE
R0457                    TCSI + 90 DEG TRANSFER TIME
R0458                    DELVLVC DELTA VELOCITY AT PC - LOCAL VERTICAL
R0459                    DELVSIN DELTA VELOCITY AT PC - REFERENCE

 04595 REF   1                                              COUNT* $$/P3136
 0460  REF   4  LAST  653   22,3334  0 4553 0  P36          TC      AVFLAGA
 0461  REF   4  LAST  653   22,3335  0 4572 0               TC      P20FLGON       SET TRACK,UPDATE - CLEAR PC FLAGS
 0462  REF  56  LAST  652   22,3336  0 5547 1               TC      UPFLAG
 0463  REF   6  LAST  652   22,3337   00244 0               ADRES   PCFLAG

 0464  REF 133  LAST  653   22,3340  0 6006 1               TC      INTPRET
 0465                       22,3341   77624 1               CALL
 0466  REF   4  LAST  653   22,3342   11217 0                       SELECTMU
 0467                       22,3343   71214 0  P36A         SET     DLOAD
 0468  REF   3  LAST  644   22,3344   01067 1                       XDELVFLG
 0469  REF   7  LAST  653   22,3345   02463 1                       TCSI
 0470  REF  24  LAST  644   22,3346   34041 0               STCALL  TDEC1
 0471  REF   5  LAST  600   22,3347   27170 1                       CSMCONIC       INTEGRATE STATES TO TCSI
 0472                       22,3350   43145 0               DLOAD   SET
 0473  REF  30  LAST  641   22,3351   15336 0                       ZEROVECS
 0474  REF   3  LAST  468   22,3352   03466 0                       RVSW
 0475  REF   4  LAST  468   22,3353   16734 0               STODL   CSTH           COS 90 DEGREES
 0476  REF   1              22,3354   05547 1                       CS359+
 0477  REF   4  LAST  468   22,3355   26732 0               STOVL   SNTH           SINE 90 DEGREES
 0478  REF  18  LAST  644   22,3356   00001 0                       RATT
 0479                       22,3357   45115 0               PDVL    CALL
 0480  REF  16  LAST  644   22,3360   00007 0                       VATT
 0481  REF   1              22,3361   45320 1                       VECSHIFT
 0482  REF   6  LAST  498   22,3362   26746 0               STOVL   VVEC
 0483                       22,3363   77626 0               STADR
 0484  REF   4  LAST  498   22,3364   41120 1               STCALL  RVEC           COMPUTE TRANSFER TIME OF 90 DEG
 0485  REF   3  LAST  468   22,3365   25002 1                       TIMETHET
 0486                       22,3366   77615 0               DAD
 0487  REF   8  LAST  655   22,3367   02463 1                       TCSI
 0488  REF  45  LAST  653   22,3370   03413 1               STORE   TIG
 0489                       22,3371   77776 1               EXIT
 0490  REF   5  LAST  653   22,3372  3 5026 0               CAF     V06N33
 0491  REF  24  LAST  653   22,3373  0 5535 1               TC      VNFLASH
 0492  REF 134  LAST  655   22,3374  0 6006 1               TC      INTPRET
 0493                       22,3375   77624 1               CALL
 0494    REF   5  LAST  654    22,3376    73027 0                          VN1645
 0495                          22,3377    45175 0   P36RECYC VLOAD  CALL
 0496    REF  31  LAST  655    22,3400    15336 0                          ZEROVECS
 0497    REF   2  LAST  654    22,3401    24005 1                          N90/N81          DISPLAY N90,N81 COMPUTE YDOT
 0498                          22,3402    77624 1            CALL
 0499    REF   6  LAST  656    22,3403    73027 0                          VN1645
 0500                          22,3404    77650 1            GOTO
 0501    REF   1               22,3405    45377 0                          P36RECYC
 0502    REF   1               12,2000                       SETLOC        N90TAG
 0503                          12,2005                       BANK
```

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P0504    ****** N90/N81 ******* COMPUTES YDOT, DISPLAYS N90 AND N81 FOR P31,P36
 05045   REF   1                                            COUNT* $$/P3136
 0505                          12,2005   77620 0  N90/N81   STQ
 0506    REF   2  LAST  105    12,2006   02551 1                    N90RET
 0507    REF  17  LAST  654    12,2007   17405 0            STODL   DELVLVC
 0508    REF  46  LAST  655    12,2010   03413 1                    TIG
 0509    REF  25  LAST  655    12,2011   34041 0            STCALL  TDEC1
 0510    REF   3  LAST  472    12,2012   45236 1                    PRECSET
 0511                          12,2013   43014 0            BON     SET
 0512    REF   7  LAST  496    12,2014   01311 0                    FINALFLG
 0513                          12,2015   24017 1                    +2
 0514    REF   9  LAST  652    12,2016   00470 1                    UPDATFLG
 0515                          12,2017   77775 1         +2 VLOAD
 0516    REF  13  LAST  500    12,2020   03546 0                    VACT3
 0517    REF   6  LAST  644    12,2021   27640 0            STOVL   VTIG
 0518    REF  22  LAST  644    12,2022   03540 0                    RACT3
 0519    REF   4  LAST  644    12,2023   37632 1            STCALL  RTIG
 0520    REF   1               12,2024   15756 1                    DISPN90
 0525                          12,2025   77624 1            CALL
 0526    REF   4  LAST  644    12,2026   72721 0                    LOMAT
 0527                          12,2027   61375 1            VLOAD   VXM
 0528    REF  18  LAST  657    12,2030   03405 0                    DELVLVC          ROTATE DV (LV TO REF)
 0529                          12,2031   00001 0                    0D
 0530                          12,2032   77772 0            VSL1
 0531    REF   7  LAST  645    12,2033   37646 1            STCALL  DELVSIN
 0532    REF   3  LAST  657    12,2034   02551 1                    N90RET
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L       P32-P33, P72-P73                                                        USER'S PAGE NO.  1      E0 53

R0010   COELLIPTIC SEQUENCE INITIATION (CSI) PROGRAMS (P32 AND P72)

R0011   MCO NO -1         LOG SECTION - P32-P35, P72-P75
R0012   MOD BY WHITE.P  DATE  1JUNE67

R0013   PURPOSE

R0014           (1) TO CALCULATE PARAMETERS ASSOCIATED WITH THE FOLLOWING
R0015               CONCENTRIC FLIGHT PLAN MANEUVERS - THE CO-ELLIPTIC SEQUENCE
R0016               INITIATION (CSI) MANEUVER AND THE CONSTANT DELTA ALTITUDE
R0017               (CDH) MANEUVER.

R0018           (2) TO CALCULATE THESE PARAMETERS BASED UPON MANEUVER DATA
R0019               APPROVED AND KEYED INTO THE DSKY BY THE ASTRONAUT.

R0020           (3) TO DISPLAY TO THE ASTRONAUT AND THE GROUND DEPENDENT VARIABLES
R0021               ASSOCIATED WITH THE CONCENTRIC FLIGHT PLAN MANEUVERS FOR
R0022               APPROVAL BY THE ASTRONAUT/GROUND.

R0023           (4) TO STORE THE CSI TARGET PARAMETERS FOR USE BY THE DESIRED
R0024               THRUSTING PROGRAM.

R0025   ASSUMPTIONS

R0026           (1) AT A SELECTED TPI TIME THE LINE OF SIGHT BETWEEN THE ACTIVE
R0027               AND PASSIVE VEHICLES IS SELECTED TO BE A PRESCRIBED ANGLE (E)
R0028               FROM THE HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE
R00285              POSITION.

R0029           (2) THE TIME BETWEEN CSI IGNITION AND CDH IGNITION MUST BE
R0030               COMPUTED TO BE GREATER THAN 10 MINUTES FOR SUCCESSFUL
R0031               COMPLETION OF THE PROGRAM.

R0032           (3) THE TIME BETWEEN CDH IGNITION AND TPI IGNITION MUST BE
R0033               COMPUTED TO BE GREATER THAN 10 MINUTES FOR SUCCESSFUL
R0034               COMPLETION OF THE PROGRAM.

R0035           (4) CDH DELTA V IS SELECTED TO MINIMIZE THE VARIATION OF THE
R0036               ALTITUDE DIFFERENCE BETWEEN THE ORBITS.

R0037           (5) CSI BURN IS DEFINED SUCH THAT THE IMPULSIVE DELTA V IS IN THE
R0038               HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE POSITION AT CSI
R00385              IGNITION.

R0039           (6) THE PERICENTER ALTITUDE OF THE ORBIT FOLLOWING CSI AND CDH
R0040               MUST BE GREATER THAN 35,000 FT (LUNAR ORBIT) OR 85 NM (EARTH
R0041               ORBIT) FOR SUCCESSFUL COMPLETION OF THIS PROGRAM.

R0042           (7) THE CSI AND CDH MANEUVERS ARE ORIGINALLY ASSUMED TO BE
R0043               PARALLEL TO THE PLANE OF THE CSM ORBIT.  HOWEVER CREW
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R0044               MODIFICATION OF DELTA V (LV) COMPONENTS MAY RESULT IN AN
R0045               OUT-OF-PLANE CSI MANEUVER.

R0046          (8)  STATE VECTOR UPDATES BY P27 ARE DISALLOWED DURING AUTOMATIC
R0047               STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION 10).

R0048          (9)  COMPUTED VARIABLES MAY BE STORED FOR LATER VERIFICATION BY
R0049               THE GROUND.  THESE STORAGE CAPABILITIES ARE NORMALLY LIMITED
R0050               ONLY TO THE PARAMETERS FOR ONE THRUSTING MANEUVER AT A TIME
R0051               EXCEPT FOR CONCENTRIC FLIGHT PLAN MANEUVER SEQUENCES.

R0052         (10)  THE RENDEZVOUS RADAR MAY OR MAY NOT BE USED TO UPDATE THE LM
R0053               OR CSM STATE VECTORS FOR THIS PROGRAM.  IF RADAR USE IS
R0054               DESIRED THE RADAR WAS TURNED ON AND LOCKED ON THE CSM BY
R0055               PREVIOUS SELECTION OF P20.  RADAR SIGHTING MARKS WILL BE MADE
R0056               AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN ENABLED BY THE
R0057               TRACK AND UPDATE FLAGS (SEE P20).  THE RENDEZVOUS TRACKING
R0058               MARK COUNTER IS ZEROED BY THE SELECTION OF P20 AND AFTER EACH
R0059               THRUSTING MANEUVER.

R0060         (11)  THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

R0061         (12)  THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

R0062                    ACTIVE VEHICLE FLAG - DESIGNATES THE VEHICLE WHICH IS
R0063                    DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH
R0064                    CALCULATES THE MANEUVER PARAMETERS.  SET AT THE START OF
R0065                    EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

R0066                    FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS
R0067                    COMPLETED THE FINAL MANEUVER COMPUTATION AND DISPLAY
R0068                    CYCLE.

R0069                    EXTERNAL DELTA V STEERING FLAG - DESIGNATES THE TYPE OF
R0070                    STEERING REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE
R0071                    THRUSTING PROGRAM SELECTED AFTER COMPLETION OF THIS
R0072                    PROGRAM.

R0073         (13)  IT IS NORMALLY REQUIRED THAT THE ISS BE ON FOR 1 HOUR PRIOR TO
R0074               A THRUSTING MANEUVER.

R0075         (14)  THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

R0076                    P32 IF THIS VEHICLE IS ACTIVE VEHICLE.

R0077                    P72 IF THIS VEHICLE IS PASSIVE VEHICLE.

R0110     INPUT

R0111           (1) TCSI      TIME OF THE CSI MANEUVER
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R0112           (2) NN        NUMBER OF APSIDAL CROSSINGS THRU WHICH THE ACTIVE
R0113                         VEHICLE ORBIT CAN BE ADVANCED TO OBTAIN THE CDH
R0114                         MANEUVER POINT
R0115           (3) ELEV      DESIRED LOS ANGLE AT TPI
R0116           (4) TTPI      TIME OF THE TPI MANEUVER
R0130   OUTPUT

R0131           (1) TRKMKCNT NUMBER OF MARKS
R0132           (2) TTOGO     TIME TO GO
R0133           (3) +MGA      MIDDLE GIMBAL ANGLE
R0134           (4) DIFFALT  DELTA ALTITUDE AT CDH
R0135           (5) T1TOT2   DELTA TIME FROM CSI TO CDH
R0136           (6) T2TOT3   DELTA TIME FROM CDH TO TPI
R0137           (7) DELVLVC  DELTA VELOCITY AT CSI - LOCAL VERTICAL COORDINATES
R0138           (8) DELVLVC  DELTA VELOCITY AT CDH - LOCAL VERTICAL COORDINATES

R0139   DOWNLINK

R01391          (1) TCSI      TIME OF THE CSI MANEUVER
R01392          (2) TCDH      TIME OF THE CDH MANEUVER
R01393          (3) TTPI      TIME OF THE TPI MANEUVER
R01394          (4) TIG       TIME OF THE CSI MANEUVER
R01395          (5) DELVEET1 DELTA VELOCITY AT CSI - REFERENCE COORDINATES
R01396          (6) DELVEET2 DELTA VELOCITY AT CDH - REFERENCE COORDINATES
R01397          (7) DIFFALT  DELTA ALTITUDE AT CDH
R01398          (8) NN        NUMBER OF APSIDAL CROSSINGS THRU WHICH THE ACTIVE
R01399                        VEHICLE ORBIT CAN BE ADVANCED TO OBTAIN THE CDH
R0140                         MANEUVER POINT
R01401          (9) ELEV      DESIRED LOS ANGLE AT TPI

R01402  COMMUNICATION TO THRUSTING PROGRAMS

R01403          (1) TIG       TIME OF THE CSI MANEUVER
R01404          (2) RTIG      POSITION OF ACTIVE VEHICLE AT CSI - BEFORE ROTATION
R01405                        INTO PLANE OF PASSIVE VEHICLE
R01406          (3) VTIG      VELOCITY OF ACTIVE VEHICLE AT CSE - BEFORE ROTATION
R01407                        INTO PLANE OF PASSIVE VEHICLE
R01408          (4) DELVSIN  DELTA VELOCITY AT CSI - REFERENCE COORDINATES
R01409          (5) DELVSAB  MAGNITUDE OF DELTA VELOCITY AT CSI
R0141           (6) XDELVFLG SET TO INDICATE EXTERNAL DELTA V VG COMPUTATION

R0150   SUBROUTINES USED

R0151           AVFLAGA
R0152           AVFLAGP
R01525          P20FLGON
R0153           VARALARM
R0154           BANKCALL
R0155           GOFLASH
R0156           GOTOPOOH
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R01562          VNPOOH
R01564          GOFLASHR
R0157           BLANKET
R0158           ENDOFJOB
R0159           SELECTMU
R0160           ADVANCE
R0161           INTINT
R0162           PASSIVE
R0163           CSI/A
R0164           S32/33.1
R0165           DISDVLVC
R0166           VN1645

  0401   REF   1                 04,2000                               SETLOC  CSI/CDH1
  0402                           04,3403                               BANK
  0403   REF  20  LAST  652      E4,1760                               EBANK=  SUBEXIT
  0404   REF   1                                                       COUNT*  $$/P3272
  0500   REF   5  LAST  655      04,3403   0 4553 0   P32              TC      AVFLAGA
  0502   REF   1                 04,3404   0 3424 0                    TC      P32/P72A

  0503   REF   3  LAST  472      04,3405   0 4565 0   P72              TC      AVFLAGP
  05031  REF   2  LAST  661      04,3406   0 3424 0                    TC      P32/P72A
  05032                          04,3407    77734 1   ALMXITA          SXA,2
  05033  REF   2  LAST  133      04,3410    03664 0                            CSIALRM
  05034                          04,3411    77740 1   ALMXIT           LXC,1
  05035  REF   3  LAST  661      04,3412    03664 0                            CSIALRM
  05038                          04,3413    77533 1                    SLOAD*  EXIT
  05039  REF   1                 04,3414    13270 0                            ALARM/TB -1,1
  0504   REF 259  LAST  639      04,3415   3 0154 1                    CA      MPAC
  05041  REF   2  LAST  167      04,3416   0 5770 1                    TC      VARALARM
  05042  REF   2  LAST  467      04,3417   3 5023 0                    CAF     V05N09
  05043  REF 139  LAST  640      04,3420   0 4636 0                    TC      BANKCALL
  05044  REF  15  LAST  626      04,3421    20743 0                    CADR    GOFLASH
  05045  REF  28  LAST  645      04,3422   0 4103 1                    TC      GOTOPOOH
  05046                          04,3423   0 3417 0                    TC      -4
  0505   REF   5  LAST  655      04,3424   0 4572 0   P32/P72A         TC      P20FLGON
  05051  REF 135  LAST  655      04,3425   0 6006 1                    TC      INTPRET
  0506                           04,3426    45014 0                    BON     CALL
  0507   REF   2  LAST  653      04,3427    05710 1                            HAFLAG
  0508   REF   1                 04,3430    11306 1                            P31ALMRT
  0509   REF   2  LAST  653      04,3431    11546 0                            INPUTDSP
  0521                           04,3432    71214 0                    CLEAR   DLOAD
  05215  REF   4  LAST  653      04,3433    05671 1                            CSISFLAG
  0522   REF   9  LAST  655      04,3434    02463 1                            TCSI
  0523   REF  47  LAST  657      04,3435    37413 0                    STCALL  TIG
  0524   REF   5  LAST  655      04,3436    11217 0                            SELECTMU
  0525                           04,3437    77745 1   P32/P72B         DLOAD
  05251  REF  48  LAST  661      04,3440    03413 1                            TIG
  05252                          04,3441    77624 1   P31ENT           CALL
  0526   REF   2  LAST  220      04,3442    76560 0                            ADVANCE
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 0527                          04,3443   77201 1               SETPD  VLOAD
 0528                          04,3444   00001 0                      0D
 0529     REF   1              04,3445   03512 1                      VPASS1
 0530                          04,3446   65315 0               PDVL   PDDL
 0531     REF   2  LAST  133   04,3447   03756 0                      RPASS1
 0532     REF  10  LAST  661   04,3450   02463 1                      TCSI
 0533                          04,3451   65325 0               PDDL   PDDL
 0534     REF  11  LAST  476   04,3452   03663 1                      TTPI
 0535     REF   2  LAST  653   04,3453   33430 0                      2PISC
 0536                          04,3454   41512 1               SL2    PUSH
 05365                         04,3455   77624 1               CALL
 0537     REF   3  LAST  461   04,3456   72740 1                      INTINT
 0538                          04,3457   77624 1               CALL
 0539     REF   3  LAST  500   04,3460   45314 0                      PASSIVE
 0540                          04,3461   77624 1               CALL
 0541     REF   1              04,3462   15672 0                      CSI/A
 0542                          04,3463   43214 1   P32/P72C BONCLR DAD
 05421    REF   3  LAST  661   04,3464   05610 0                      HAFLAG
 05422    REF   1              04,3465   11357 0                      P31RT
 05423    REF   2  LAST  231   04,3466   26731 0                      600SECS
 05424    REF   2  LAST  293   04,3467   03656 1               STORE  T2TOT3

 05425                         04,3470   43014 0               BON    SET
 0543     REF   8  LAST  657   04,3471   01311 0                      FINALFLG
 0544     REF   1              04,3472   11474 0                      P32/P72D
 0545     REF  10  LAST  657   04,3473   00470 1                      UPDATFLG
 0546                          04,3474   77745 1   P32/P72D DLOAD
 0547     REF   3  LAST  293   04,3475   02547 0                      T1TOT2
 0548     REF   4  LAST  662   04,3476   02547 0   P32/P72E STORE     T1TOT2
 0549                          04,3477   51025 1               DSU    BPL
 0550     REF   1              04,3500   13267 0                      60MIN
 0551     REF   1              04,3501   11476 1                      P32/P72E
 0552                          04,3502   77745 1               DLOAD
 0553     REF   3  LAST  662   04,3503   03656 1                      T2TOT3
 0554     REF   4  LAST  662   04,3504   03656 1   P32/P72F STORE     T2TOT3
 0555                          04,3505   51025 1               DSU    BPL
 0556     REF   2  LAST  662   04,3506   13267 0                      60MIN
 0557     REF   1              04,3507   11504 0                      P32/P72F
 0558                          04,3510   77414 0               BON    EXIT            BYPASS N75 IN MINKEY
 05581    REF  13  LAST  580   04,3511   05310 0                      AUTOSEQ
 05582    REF   1              04,3512   11516 0                      PASS75

 0559     REF   1              04,3513  3 4605 0               CAF    V06N75
 0560     REF  25  LAST  655   04,3514  0 5535 1               TC     VNFLASH
 0561     REF 136  LAST  661   04,3515  0 6006 1               TC     INTPRET
 0562                          04,3516   77624 1   PASS75      CALL
 0563     REF   1              04,3517   76537 1                      DISDVLVC        ROTATE TO LV, DISP N90, ROTATE TO REF
 0564                          04,3520   77775 1               VLOAD
 0565     REF   2  LAST  105   04,3521   02453 1                      RACT2
 0566     REF   2  LAST  105   04,3522   36541 1               STCALL RACT1
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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971  MENELAUS.061  PAGE  663

L          P32-P33, P72-P73                                                                  USER'S PAGE NO.    6        E4 53

 0567    REF    2  LAST  220    04,3523    32050 0                      S32/33.X        GET REF/LV MATRIX AT 0D
 0568                           04,3524    64375 1             VLOAD    MXV
 0569    REF    4  LAST  220    04,3525    03667 0                      DELVEET2
 0570                           04,3526    00001 0                      0D
 0571                           04,3527    77772 0             VSL1
 0572    REF   14  LAST  514    04,3530    03540 0             STORE    DELVLV          LV FOR N 82 DISPLAY
 0573                           04,3531    77414 0             BON      EXIT
 0574    REF   14  LAST  662    04,3532    05310 0                      AUTOSEQ
 0575    REF    1               04,3533    11537 0                      PASS82
 0576    REF    1               04,3534  3 3545 0              CAF      V06N82
 0577    REF   26  LAST  662    04,3535  0 5535 1              TC       VNFLASH
 0578    REF  137  LAST  662    04,3536  0 6006 1              TC       INTPRET
 0579                           04,3537    77745 1   PASS82    DLOAD
 0580    REF   12  LAST  662    04,3540    03663 1                      TTPI
 0581    REF    1               04,3541    36465 0             STCALL   TTPI0
 0582    REF    7  LAST  656    04,3542    73027 0                      VN1645
 0583                           04,3543    77650 1             GOTO
 0584    REF    1               04,3544    11437 1                      P32/P72B
 0585                           04,3545    01522 0   V06N82    VN       0682

 05855   REF    1               15,3432              HIGH1     EQUALS   ONEBIT +1

 058552                         04,3546    71220 1   INPUTDSP  STQ      CLOAD
 058554  REF    4  LAST  657    04,3547    02551 1                      N90RET
 058556  REF    1               04,3550    11400 0                      130DEGLO
 058558  REF    7  LAST  468    04,3551    17754 1             STODL    CENTANG
 05856   REF    1               04,3552    11402 1                      208DEGLO
 058562  REF   12  LAST  476    04,3553    03744 0             STORE    ELEV
 058564                         04,3554    67214 1             BON      SLOAD
 058566  REF    5  LAST  661    04,3555    05711 0                      CSISFLAG
 058568  REF    1               04,3556    11561 0                      PASSNN
 05857   REF    1               04,3557    33433 0                      HIGH1
 058572  REF   10  LAST  479    04,3560    03766 0             STORE    NN
 058574                         04,3561    77776 1   PASSNN    EXIT
 058576  REF    1               04,3562  3 4603 0              CAF      V06N11
 058578  REF   27  LAST  663    04,3563  0 5535 1              TC       VNFLASH
 05858   REF    3  LAST  467    04,3564  3 4533 0              CAF      V06N55
 058582  REF   26  LAST  663    04,3565  0 5535 1              TC       VNFLASH
 058584  REF    3  LAST  467    04,3566  3 4532 1              CAF      V06N37
 058586  REF   29  LAST  663    04,3567  0 5535 1              TC       VNFLASH
 058588  REF  138  LAST  663    04,3570  0 6006 1              TC       INTPRET
 05859                          04,3571    77650 1             GOTO
 058592  REF    5  LAST  663    04,3572    02551 1                      N90RET
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P0586     CONSTANT DELTA HEIGHT (CDH) PROGRAMS (P33 AND P73)

R0587     MOD NO -1        LOG SECTION - P32-P35, P72-P75
R0588     MOD BY WHITE.P  DATE  1JUNE67
R0589     PURPOSE

R0590               (1) TO CALCULATE PARAMETERS ASSOCIATED WITH THE CONSTANT DELTA
R0591                   ALTITUDE MANEUVER (CDH).

R0592               (2) TO CALCULATE THESE PARAMETERS BASED UPON MANEUVER DATA
R0593                   APPROVED AND KEYED INTO THE DSKY BY THE ASTRONAUT.

R0594               (3) TO DISPLAY TO THE ASTRONAUT AND THE GROUND DEPENDENT VARIABLES
R0595                   ASSOCIATED WITH THE CDH MANEUVER FOR APPROVAL BY THE
R0596                   ASTRONAUT/GROUND.

R0597               (4) TO STORE THE CDH TARGET PARAMETERS FOR USE BY THE DESIRED
R0598                   THRUSTING PROGRAM.

R0599     ASSUMPTIONS

R0600               (1) THIS PROGRAM IS BASED UPON PREVIOUS COMPLETION OF THE
R0601                   CO-ELLIPTIC SEQUENCE INITIATION (CSI) PROGRAM (P32/P72).
R0602                   THERFORE -

R0603                   (A) AT A SELECTED TPI TIME (NOW IN STORAGE) THE LINE OF SIGHT
R0604                       BETWEEN THE ACTIVE AND PASSIVE VEHICLES WAS SELECTED TO BE
R0605                       A PRESCRIBED ANGLE (E) (NOW IN STORAGE) FROM THE
R0606                       HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE POSITION.

R0607                   (B) THE TIME BETWEEN CSI IGNITION AND CDH IGNITION WAS
R0608                       COMPUTED TO BE GREATER THAN 10 MINUTES.

R0609                   (C) THE TIME BETWEEN CDH IGNITION AND TPI IGNITION WAS
R0610                       COMPUTED TO BE GREATER THAN 10 MINUTES.

R0611                   (D) THE VARIATION OF THE ALTITUDE DIFFERENCE BETWEEN THE
R0612                       ORBITS WAS MINMIZED.

R0613                   (E) CSI BURN WAS DEFINED SUCH THAT THE IMPULSIVE DELTA V WAS
R0614                       IN THE HORIZONTAL PLANE DEFINED BY ACTIVE VEHICLE

R0615                       POSITION AT CSI IGNITION.

R0616                   (F) THE PERICENTER ALTITUDES OF THE ORBITS FOLLOWING CSI AND
R0617                       CDH WERE COMPUTED TO BE GREATER THAN 35,000 FT FOR LUNAR
R0618                       ORBIT OR 85 NM FOR EARTH ORBIT.

R0619                   (G) THE CSI AND CDH MANEUVERS WERE ASSUMED TO BE PARALLEL TO
R0620                       THE PLANE OF THE PASSIVE VEHICLE ORBIT.  HOWEVER, CREW
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R0621                 MODIFICATION OF DELTA V (LV) COMPONENTS MAY HAVE RESULTED
R0622                 IN AN OUT-OF-PLANE MANEUVER.

R0623            (2) STATE VECTOR UPDATES BY P27 ARE DISALLOWED DURING AUTOMATIC
R0624                STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION 4).

R0625            (3) COMPUTED VARIABLES MAY BE STORED FOR LATER VERIFICATION BY
R0626                THE GROUND.  THESE STORAGE CAPABILITES ARE NORMALLY LIMITED
R0627                ONLY TO THE PARAMETERS FOR ONE THRUSTING MANEUVER AT A TIME
R0628                EXCEPT FOR CONCENTRIC FLIGHT PLAN MANEUVER SEQUENCES.

R0629            (4) THE RENDEZVOUS RADAR MAY OR MAY NOT BE USED TO UPDATE THE LM
R0630                OR CSM STATE VECTORS FOR THIS PROGRAM.  IF RADAR USE IS
R0631                DESIRED THE RADAR WAS TURNED ON AND LOCKED ON THE CSM BY
R0632                PREVIOUS SELECTION OF P20.  RADAR SIGHTING MARKS WILL BE MADE
R0633                AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN ENABLED BY THE
R0634                TRACK AND UPDATE FLAGS (SEE P20).  THE RENDEZVOUS TRACKING
R0635                MARK COUNTER IS ZEROED BY THE SELECTION OF P20 AND AFTER EACH
R0636                THRUSTING MANEUVER.

R0637            (5) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

R0638            (6) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

R0639                 ACTIVE VEGICLE FLAG - DESIGNATES THE VEHICLE WHICH IS
R0640                 DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH
R0641                 CALCULATES THE MANEUVER PARAMETERS.  SET AT THE START OF
R0642                 EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

R0643                 FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS
R0644                 COMPLETED THE FINAL MANEUVER COMPUTATION AND DISPLAY
R0645                 CYCLE.

R0646                 EXTERNAL DELTA V STEERING FLAG - DESIGNATES THE TYPE OF
R0647                 STEERING REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE
R0648                 THRUSTING PROGRAM SELECTED AFTER COMPLETION OF THIS
R0649                 PROGRAM.

R0650            (7) IT IS NORMALLY REQUIRED THAT THE ISS BE ON FOR 1 HOUR PRIOR TO
R0651                A THRUSTING MANEUVER.

R0652            (8) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

R0653                 P33 IF THIS VEHICLE IS ACTIVE VEHICLE.

R0654                 P73 IF THIS VEHICLE IS PASSIVE VEHICLE.

R0655      INPUT

R0656            (1) TTPI0    TIME OF THE TPI MANEUVER - SAVED FROM P32/P72
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R0657            (2) ELEV     DESIRED LOS ANGLE AT TPI - SAVED FROM P32/P72
R0658            (3) TCDH     TIME OF THE CDH MANEUVER

R0659     OUTPUT

R0660            (1) TRKMKCNT NUMBER OF MARKS
R0661            (2) TTOGO    TIME TO GO
R0662            (3) +MGA     MIDDLE GIMBAL ANGLE
R0663            (4) DIFFALT  DELTA ALTITUDE AT CDH
R0664            (5) T2TOT3   DELTA TIME FROM CDH TO COMPUTED TPI
R0665            (6) NOMTPI   DELTA TIME FROM NOMINAL TPI TO COMPUTED TPI
R0666            (7) DELVLVC  DELTA VELOCITY AT CDH - LOCAL VERTICAL COORDINATES

R0667     DOWNLINK

R0668            (1) TCDH     TIME OF THE CDH MANEUVER
R0669            (2) TTPI     TIME OF THE TPI MANEUVER
R0670            (3) TIG      TIME OF THE CDH MANEUVER
R0671            (4) DELVEET2 DELTA VELOCITY AT CDH - REFERENCE COORDINATES
R0672            (5) DIFFALT  DELTA ALTITUDE AT CDH
R0673            (6) ELEV     DESIRED LOS ANGLE AT TPI
R0674     COMMUNICATION TO THRUSTING PROGRAMS

R0675            (1) TIG      TIME OF THE CDH MANEUVER
R0676            (2) RTIG     POSITION OF ACTIVE VEHICLE AT CDH - BEFORE ROTATION
R0677                         INTO PLANE OF PASSIVE VEHICLE
R0678            (3) VTIG     VELOCITY OF ACTIVE VEHICLE AT CDH - BEFORE ROTATION
R0679                         INTO PLANE OF PASSIVE VEHICLE
R0680            (4) DELVSIN  DELTA VELOCITY AT CDH - REFERENCE COORDINATES
R0681            (5) DELVSAB  MAGNITUDE OF DELTA VELOCITY AT CDH
R0682            (6) XDELVFLG SET TO INDICATE EXTERNAL DELTA V VG COMPUTATION

R0683     SUBROUTINES USED

R0684            AVFLAGA
R0685            AVFLAGP
R0686            P20FLGON
R0687            VNPOOH
R0688            SELECTMU
R0689            ADVANCE
R0690            CDHMVR
R0691            INTINT3P
R0692            ACTIVE
R0693            PASSIVE
R0694            S33/34.1
R0695            ALARM
R0696            BANKCALL
R0697            GOFLASH
R0698            GOTOPOOH
R0699            S32/33.1
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R0700           VN1645

 0701   REF   1                                            COUNT* $$/P3373
 0702   REF   5  LAST  661   04,3573  0 4553 0  P33        TC      AVFLAGA
 0703   REF   1              04,3574  0 3576 0             TC      P33/P73A
 0704   REF   4  LAST  661   04,3575  0 4565 0  P73        TC      AVFLAGP
 0705   REF   6  LAST  661   04,3576  0 4572 0  P33/P73A   TC      P20FLGON
 0708   REF   1              04,3577  3 4604 1             CAF     V06N13          TCDH
 0709   REF  30  LAST  663   04,3600  0 5535 1             TC      VNFLASH
 0710   REF 139  LAST  663   04,3601  0 6006 1             TC      INTPRET
 0711                        04,3602    77745 1             DLOAD
 0712   REF   2  LAST  663   04,3603    02465 1                     TTPI0
 0713   REF  13  LAST  663   04,3604    17663 1             STODL   TTPI
 0714   REF   6  LAST  586   04,3605    02461 0                     TCDH
 0715   REF  49  LAST  661   04,3606    37413 0             STCALL  TIG
 0716   REF   5  LAST  661   04,3607    11217 0                     SELECTMU
 0717                        04,3610    45145 0  P33/P73B  DLOAD   CALL
 07175  REF  50  LAST  667   04,3611    03413 1                     TIG
 0718   REF   3  LAST  661   04,3612    76560 0                     ADVANCE
 0719                        04,3613    77624 1             CALL
 0720   REF   2  LAST  220   04,3614    56674 1                     CDHMVR
 0721   REF   3  LAST  180   04,3615    02445 0             STORE   DELVEET1        CDH DV TO USE DISDVLVC SUB FOR N81 DISP
 0722                        04,3616    77201 1             SETPD   VLOAD
 0723                        04,3617    00001 0                     0D
 0724   REF  14  LAST  657   04,3620    03546 0                     VACT3
 0725                        04,3621    45115 0             PDVL    CALL
 0726   REF   3  LAST  662   04,3622    02453 1                     RACT2
 0727   REF   1              04,3623    63615 0                     INTINT3P
 0728                        04,3624    77624 1             CALL
 0729   REF   3  LAST  500   04,3625    45304 1                     ACTIVE
 0730                        04,3626    77201 1             SETPD   VLOAD
 0731                        04,3627    00001 0                     0D
 0732   REF   2  LAST  105   04,3630    02617 0                     VPASS2
 0733                        04,3631    45115 0             PDVL    CALL
 0734   REF   2  LAST  105   04,3632    02625 1                     RPASS2
 0735   REF   2  LAST  667   04,3633    63615 0                     INTINT3P
 0736                        04,3634    77624 1             CALL
 0737   REF   4  LAST  662   04,3635    45314 0                     PASSIVE
 0738                        04,3636    43145 0             DLOAD   SET
 0739   REF   8  LAST  654   04,3637    11762 1                     ZEROVEC
 0740   REF   5  LAST  473   04,3640    03461 1                     ITSWICH
 0741   REF   7  LAST  483   04,3641    36355 1             STCALL  NOMTPI
 0742   REF   2  LAST  467   04,3642    72251 1                     S33/34.1
 0743                        04,3643    77454 1             BZE     EXIT
 0744   REF   1              04,3644    24035 1                     P33/P73C
 0745   REF  23  LAST  607   04,3645  0 5671 1             TC      ALARM
 0746                        04,3646    00611 1             OCT     611
 0747   REF   3  LAST  661   04,3647  3 5023 0             CAF     V05N09
 0748   REF 140  LAST  661   04,3650  0 4636 0             TC      BANKCALL
 0749   REF  16  LAST  661   04,3651    20743 0             CADR    GOFLASH
 0750   REF  29  LAST  661   04,3652  0 4103 1              TC      GOTOPOOH
 0751                        04,3653  0 3655 1              TC      +2
 0752   REF   2  LAST  667   04,3654  0 3576 0              TC      P33/P73A
 0753   REF 140  LAST  667   04,3655  0 6006 1              TC      INTPRET
 0754                        04,3656   77745 1              DLOAD
 0755   REF   9  LAST  667   04,3657   11762 1                      ZEROVEC
 0756   REF   8  LAST  667   04,3660   36355 1              STCALL  NOMTPI
 0757   REF   2  LAST  667   04,3661   24035 1                      P33/P73C
 0758   REF   1              12,2000                        SETLOC  CSI/CDH2
 0759                        12,2035                        BANK

 07595  REF   1                                             COUNT*  $$/P3373
 0760                        12,2035   43014 0  P33/P73C BON     SET
 0761   REF   9  LAST  662   12,2036   01311 0                      FINALFLG
 0762   REF   1              12,2037   24041 1                      P33/P73D
 0763   REF  11  LAST  662   12,2040   00470 1                      UPDATFLG
 0764                        12,2041   43345 1  P33/P73D DLOAD   DAD
 0765   REF   9  LAST  668   12,2042   02355 0                      NOMTPI
 0766   REF  14  LAST  667   12,2043   03663 1                      TTPI
 0767   REF  15  LAST  668   12,2044   03663 1              STORE   TTPI
 0768                        12,2045   52025 1              DSU     GOTO
 0769   REF   7  LAST  667   12,2046   02461 0                      TCDH
 0770   REF   1              12,2047   11662 0                      P33/P73E
 0771   REF   2  LAST  661   04,2000                        SETLOC  CSI/CDH1
 0772                        04,3662                        BANK

 07725  REF   2 LAST  667 TO  668:      55     55*          COUNT*  $$/P3373
 0773                        04,3662   51025 1  P33/P73E DSU     BPL
 0774   REF   3  LAST  662   04,3663   13267 0                      60MIN
 0775   REF   2  LAST  668   04,3664   11662 0                      P33/P73E
 0776                        04,3665   77615 0              DAD
 0777   REF   4  LAST  668   04,3666   13267 0                      60MIN
 0778   REF   5  LAST  662   04,3667   16547 0              STODL   T1TOT2
 0779   REF  16  LAST  668   04,3670   03663 1                      TTPI
 0780                        04,3671   41425 1              DSU     PUSH
 0781   REF   3  LAST  667   04,3672   02465 1                      TTPI0
 0782                        04,3673   45246 0  P33/P73F ABS     DSU
 0783   REF   5  LAST  668   04,3674   13267 0                      60MIN
 0784                        04,3675   43244 1              BPL     DAD
 0785   REF   1              04,3676   11673 0                      P33/P73F
 0786   REF   6  LAST  668   04,3677   13267 0                      60MIN
 0787                        04,3700   45565 0              SIGN    STADR
 0788   REF   5  LAST  662   04,3701   74121 0              STORE   T2TOT3
 0789                        04,3702   77414 0              BON     EXIT
 0790   REF  15  LAST  663   04,3703   05310 0                      AUTOSEQ
 0791   REF   1              04,3704   11710 1                      SKIP75

 0792   REF   2  LAST  662   04,3705  3 4605 0              CAF     V06N75
 0793   REF  31  LAST  667   04,3706  0 5535 1              TC      VNFLASH
 0794   REF 141  LAST  668   04,3707  0 6006 1              TC      INTPRET
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L        P32-P33, P72-P73                                                             USER'S PAGE NO.  12       E4 S3

 0795                            04,3710   77624 1   SKIP75    CALL
 0796    REF   2  LAST  662      04,3711   76537 1                       DISDVLVC         PUT UP N81, COMPUTE DELVSIN
 0797                            04,3712   77624 1             CALL
 0798    REF   8  LAST  663      04,3713   73027 0                       VN1645
 0799                            04,3714   77650 1             GOTO
 0800    REF   1                 04,3715   11610 0                       P33/P73B
 0801    REF   3  LAST  592         4000                       SETLOC  FFTAG12
 0802                               4603                       BANK

 08025   REF   1                                               COUNT*  $$/P3272
 0803                               4603   01413 0   V06N11    VN      0611
 0804                               4604   01415 0   V06N13    VN      0613
 0805                               4605   01513 1   V06N75    VN      0675
```

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P0807     ..... DISDVLVC .....

R0808     SUBROUTINES USED

R0809           S32/33.X
R0810            VNPOOH

 0811     REF    1                37,2000                        SETLOC COMTAG3
 0812                             37,2537                        BANK

 08125    REF    1                                               COUNT* $$/CSI
 0813                             37,2537   45020 1   DISDVLVC STQ    CALL
 0814     REF   15   LAST   500   37,2540   01023 1                   NCRMEX
 0815     REF    3   LAST   663   37,2541   32050 0                   S32/33.X
 0816                             37,2542   64375 1            VLOAD  MXV
 0817     REF    4   LAST   667   37,2543   02445 0                   DELVEET1
 0818                             37,2544   00001 0                   0D
 0819                             37,2545   77772 0            VSL1
 0820     REF   19   LAST   657   37,2546   37405 1            STCALL DELVLVC          REF TO L V
 0821     REF    2   LAST   657   37,2547   15756 1                   DISPN9D
 0826                             37,2550   77624 1            CALL
 0827     REF    4   LAST   670   37,2551   32050 0                   S32/33.X
 0828                             37,2552   61375 1            VLOAD  VXM
 0829     REF   20   LAST   670   37,2553   03405 0                   DELVLVC
 0830                             37,2554   00001 0                   0D
 0831                             37,2555   77772 0            VSL1
 0832     REF    8   LAST   657   37,2556   37646 1            STCALL DELVSIN          L V TO REF
 0833     REF   16   LAST   670   37,2557   01023 1                   NCRMEX
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L        P32-P33, P72-P73                                                                          USER'S PAGE NO. 14       E4 53

R0834    ..... CSI/A       .....

R0835    SUBROUTINES USED

R0836           VECSHIFT
R0837           TIMETHET
R0838           PERIAPO
R0839           SHIFTR1
R0840           INTINT2C
R0841           CDHMVR
R0842           PERIAPO1
R0843           INTINT
R0844           ACTIVE

 0846   REF   1                 05,2000                          SETLOC CSITAG1
 0847                           05,3266                          BANK
 0848   REF  21  LAST  661      E4,1760                          EBANK= SUBEXIT
 0849   REF   1                                                  COUNT* $$/CSI
 0850                           05,3266   00025 0   60MIN        2DEC   360000
 0850                           05,3267   37100 1
 0855                           05,3270   00600 1   ALARM/TB OCT    00600             NO 1
 0856                           05,3271   00601 0            OCT    00601                2
 0857                           05,3272   00602 0            OCT    00602                3
 0858                           05,3273   00603 1            OCT    00603                4
 0859                           05,3274   00604 0            OCT    00604                5
 0860                           05,3275   00605 1            OCT    00605                6
 0861                           05,3276   00606 1            OCT    00606                7
 0862   REF   1                 15,3416             LOOPMX   =      01/1024 -1        16 B-28
 0863                           05,3277   00003 1   INITST   2DEC   .03048 B-7             INITIAL DELDV = 10 FPS
 0863                           05,3300   34661 1
 0864                           05,3301   00606 1   DVMAX1   2DEC   3.0480 B-7             MAXIMUM DV1 = 1000 FPS
 0864                           05,3302   04467 0
 0865                           05,3303   00601 0   DVMAX2   2DEC   3.014472 B-7                          989 FPS
 0865                           05,3304   33216 1
 0866   REF   2  LAST   34      15,3411             1DPB2    =      01/4              1 B-2
 0867   REF   2  LAST  663      15,3431             1DPB28   =      ONEBIT            1 B-28
 0868                           05,3305   00000 1   EPSILN1  2DEC   .0003048 B-7         .1 FPS
 0868                           05,3306   01177 1
 0869                           05,3307   77754 1   FIFPSDP  2DEC   -.152400 B-7         50  FPS
 0869                           05,3310   57611 0
 0870                           05,3311   00116 1   DELMAX1  2DEC   .6096000 B-7         200 FPS
 0870                           05,3312   00730 0
 0871   REF   4  LAST  488      35,2000                          SETLOC CSI/CDH
 0872                           35,3554                          BANK
 08725  REF   1                                                  COUNT* $$/CSI
 0873                           35,3554   00004 0   PMINE    2DEC   157420 B-29       84 NM.   - MUST BE 8 WORDS BEFORE PMINM
 0873                           35,3555   31566 0
 0874                           35,3556   00002 0   NICKELDP 2DEC   .021336 B-7       7 FPS
 0874                           35,3557   27311 1
 0875                           35,3560   00003 1   INITST1  2DEC   .03048 B-7        INITIAL DELDV = 10 FPS
 0875                           35,3561   34661 1
 0876                           35,3562   00000 1  ONETHTH  2DEC    .0001 B-3
 0876                           35,3563   06433 0
 0877                           35,3564   00000 1  PMINM    2DEC    10668 B-29       35000 FT - MUST BE 8 WORDS AFTER RMINA.
 0877                           35,3565   12326 0
 0878   REF   1                 06,2000                     SETLOC CSIPROG
 0879                           06,3672                     BANK

 08795  REF   1                                             COUNT* $$/CSI
 0880                           06,3672   43014 0  CSI/A    CLEAR  SET               INITIALIZE INDICATORS
 0881   REF   1                 06,3673   05660 1                  S32.1F1           OVT1 HAS EXCEEDED MAX INDICATOR
 0882   REF   1                 06,3674   05461 1                  S32.1F2           FIRST PASS FOR NEWTON ITERATION INDICATR
 0883                           06,3675   43014 0           CLEAR  SET
 0884   REF   1                 06,3676   05662 0                  S32.1F3A          00=1ST 2 PASSES 2ND CYCLE 01=FIRST CYCLE
 0885   REF   1                 06,3677   05463 0                  S32.1F3B          10=2ND CYCLE 11=50FPS STAGE 2ND CYCLE
 0886                           06,3700   77745 1           DLOAD
 0887   REF  10  LAST  668      06,3701   11762 1                  ZEROVEC
 0888   REF   2  LAST  133      06,3702   03764 1           STORE  LOOPCT
 0889   REF   4  LAST  661      06,3703   03665 1           STORE  CSIALRM
 0890                           06,3704   77201 1  CSI/B    SETPD  VLOAD
 0891                           06,3705   00001 0                  0D
 0892   REF   3  LAST  662      06,3706   02541 0                  RACT1
 0893                           06,3707   41446 1           ABVAL  PUSH              RA1                        B29 PL02D
 0894                           06,3710   70501 1           NORM   SR1
 0895   REF  11  LAST  612      06,3711   00050 1                  X2                              B29-N2+ B1 PL04D
 0896                           06,3712   51515 1           PDVL   ABVAL
 0897   REF  11  LAST  500      06,3713   03554 0                  RPASS3
 0898                           06,3714   55301 0           NORM   BDDV              RA1/RP3                     B1 PL02D
 0899   REF  18  LAST  653      06,3715   00047 1                  X1
 0900                           06,3716   53664 0           XSU,2  SR*                                         B2
 0901   REF  19  LAST  672      06,3717   00046 0                  X1
 0902                           06,3720   57175 0                  1,2
 0903                           06,3721   41215 1           DAD    DMP               (1+(RA1/RP3))RA1      B29+B2=B31 PL00D
 0904   REF   1                 06,3722   33412 0                  1DPB2
 0905                           06,3723   65301 0           NORM   PDDL                                             PL02D
 0906   REF  20  LAST  672      06,3724   00047 1                  X1
 0907   REF   3  LAST  496      06,3725   03750 0                  RTMU
 0908                           06,3726   56342 1           SR1    DDV                               B38-B31= B7 PL00D
 0909                           06,3727   75457 0           SL*    SQRT                                        B7
 0910                           06,3730   20172 1                  0 -7,1
 0911                           06,3731   53515 0           PDVL   UNIT                                             PL02D
 0912   REF   4  LAST  672      06,3732   02541 0                  RACT1
 0913                           06,3733   47315 0           PDVL   VXV
 0914   REF   5  LAST  500      06,3734   02611 0                  UP1
 0915                           06,3735   77656 1           UNIT                     UNIT(URP1 X UVP1 X URA1) = UH1
 0916                           06,3736   72441 0           DOT    SL1               VA1 . UH1                   B7
 0917   REF   2  LAST  133      06,3737   03504 0                  VACT1
 0918                           06,3740   45421 1           BDSU   STADR                                            PL00D
 0919   REF   2  LAST  133      06,3741   60315 0           STODL  DELVCSI
 0920   REF   1                 06,3742   13300 0                  INITST            10 FPS
 0921   REF   2  LAST  133      06,3743   03464 1           STORE  DELDV
 0922                          06,3744    43345 1  CSI/B1    DLOAD  CAD              IF LOOPCT = 16
 0923   REF    3  LAST   672   06,3745    03764 1                   LOOPCT
 0924   REF    1               06,3746    33432 1                   1DPB28
 0925   REF    4  LAST   673   06,3747    03764 1            STORE  LOOPCT
 0926                          06,3750    77025 0            DSU    AXT,2
 0927   REF    1               06,3751    33417 0                   LOOPMX
 0928                          06,3752    00006 1                   6
 0929                          06,3753    52044 0            BPL    GOTO
 0930   REF    1               06,3754    63566 1                   SCNDSOL
 0931   REF    1               06,3755    24050 1                   CSI/B2

 0932   REF    1               12,2000                       SETLOC CSIPROG2
 0933                          12,2050                       BANK

 09335  REF    1                                             COUNT* $$/CSI
 0934                          12,2050    77601 0  CSI/B2    SETPD
 0935                          12,2051    00001 0                   0D
 0936                          12,2052    51545 1            DLOAD  ABS
 0937   REF    3  LAST   672   12,2053    03462 1                   DELVCSI
 0938                          12,2054    50025 0            DSU    BMN
 0939   REF    1               12,2055    13302 1                   DVMAX1
 0940   REF    1               12,2056    45406 1                   CSI/B23
 0941                          12,2057    43174 1            AXT,2  BON
 0942                          12,2060    00007 0                   7
 0943   REF    2  LAST   672   12,2061    05700 0                   S32.1F1
 0944   REF    2  LAST   673   12,2062    63566 1                   SCNDSOL
 0945                          12,2063    43014 0            BOFF   BON
 0946   REF    2  LAST   672   12,2064    05742 0                   S32.1F3A
 0947   REF    1               12,2065    24070 0                   CSI/B22          FLAG 3 NEQ 3
 0948   REF    2  LAST   672   12,2066    05703 0                   S32.1F3B
 0949   REF    3  LAST   673   12,2067    63566 1                   SCNDSOL
 0950                          12,2070    71214 0  CSI/B22   SET    DLOAD
 0951   REF    3  LAST   673   12,2071    05460 0                   S32.1F1
 0952   REF    1               12,2072    13304 1                   DVMAX2
 0953                          12,2073    77765 0            SIGN
 0954   REF    4  LAST   673   12,2074    03462 1                   DELVCSI
 0955   REF    5  LAST   673   12,2075    37462 0            STCALL DELVCSI
 0956   REF    2  LAST   673   12,2076    45406 1                   CSI/B23

 0957   REF    1               22,2000                       SETLOC CSIPROG3
 0958                          22,3406                       BANK

 09585  REF    1                                             COUNT* $$/CSI
 0959                          22,3406    41575 0  CSI/B23   VLOAD  PUSH
 0960   REF    5  LAST   672   22,3407    02541 0                   RACT1
 0961                          22,3410    63256 0            UNIT   PDVL
 0962   REF    6  LAST   672   22,3411    02611 0                   UP1
 0963                          22,3412    53435 0            VXV    UNIT             UNIT(URP1 X UVP1 X URA1) = UH1
 0964                          22,3413    76561 1            VXSC   VSL1
 0965   REF    6  LAST   673   22,3414    03462 1                   DELVCSI
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0966  REF  5  LAST  670  22,3415  02445 0              STORE   DELVEET1
0967                     22,3416  40055 0              VAD     BOV
0968  REF  3  LAST  672  22,3417  03504 0                      VACT1
0969  REF  1             22,3420  45421 1                      CSI/B23D
0970  REF  2  LAST  133  22,3421  37474 1  CSI/B23D    STCALL  VACT4
0971  REF  2  LAST  655  22,3422  45320 1                      VECSHIFT
0972  REF  7  LAST  655  22,3423  26746 0              STOVL   VVEC
0973                     22,3424  77614 1              SET
0974  REF  4  LAST  655  22,3425  03466 0                      RVSW
0975  REF  5  LAST  655  22,3426  26657 1              STOVL   RVEC
0976  REF  1             22,3427  05545 0                      SN359+
0977  REF  5  LAST  655  22,3430  36732 1              STCALL  SNTH            ALSO CSTH
0978  REF  4  LAST  655  22,3431  25002 1                      TIMETHET
0979                     22,3432  72142 0              SR1     LXA,1
0980  REF 11  LAST  653  22,3433  03745 1                      RTX1
0981  REF  1             22,3434  37472 1              STCALL  HAFPA1
0982  REF  1             22,3435  45204 0                      PERIAPO
0983                     22,3436  77624 1              CALL
0984  REF  4  LAST  646  22,3437  45330 0                      SHIFTR1
0985  REF  2  LAST  133  22,3440  17460 0              STODL   POSTCSI
0986  REF  8  LAST  663  22,3441  03754 1                      CENTANG
0987                     22,3442  52054 1              BZE     GOTO
0988                     22,3443  45445 0                      +2
0989  REF  1             22,3444  47161 1                      CIRCL
0990                     22,3445  77745 1              DLOAD
0991  REF  2  LAST  100  22,3446  02754 0                      ECC
0992                     22,3447  50025 0              DSU     BMN
0993  REF  1             22,3450  33563 1                      ONETHTH
0994  REF  2  LAST  674  22,3451  47161 1                      CIRCL
0995                     22,3452  45145 0              DLOAD   CALL
0996  REF  1             22,3453  00041 1                      R1
0997  REF  5  LAST  674  22,3454  45330 0                      SHIFTR1
0998                     22,3455  60201 1              SETPD   NORM
0999                     22,3456  00003 1                      2D
1000  REF 21  LAST  672  22,3457  00047 1                      X1
1001                     22,3460  50315 0              PDVL    DOT                                    PL04D
1002  REF  6  LAST  673  22,3461  02541 0                      RACT1
1003  REF  3  LAST  674  22,3462  03474 0                      VACT4
1004                     22,3463  56246 1              ABS     DDV
1005                     22,3464  00003 1                      2D              (/RDOTV/)/R1     B36-B29= B7
1006                     22,3465  45257 0              SL*     DSU
1007                     22,3466  20201 0                      0,1
1008  REF  1             22,3467  33557 0                      NICKELDP
1009                     22,3470  71240 1              BMN     DLOAD
1010  REF  3  LAST  674  22,3471  47161 1                      CIRCL
1011  REF  2  LAST  100  22,3472  02742 1                      P
1012                     22,3473  45312 0              SL2     DSU
1013  REF  1             22,3474  15326 1                      1RTEB2            1.B.2
1014                     22,3475  14017 1              STODL   14D
1015  REF  4  LAST  653  22,3476  03752 1                      RTSR1/MU
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  1016                          22,3477    56342 1             SR1     DDV          (1/ROOTMU)/R1       B-16-B29 = B-45 PL02D
  1017                          22,3500    41325 0             PDDL    DMP
  1018    REF   3  LAST  674    22,3501    02742 1                     P
  1019    REF   2  LAST  674    22,3502    00041 1                     R1
  1020                          22,3503    77624 1             CALL
  1021    REF   6  LAST  674    22,3504    45330 0                     SHIFTR1
  1022                          22,3505    72412 0             SL4     SL1
  1023                          22,3506    41366 1             SQRT    DMP          ((P/MU)**.5)/R1    B14+B-45 = B-31 PL02D
  1024                          22,3507    52414 1             BOFF    SL3
  1025    REF  25  LAST  653    22,3510    04343 1                     CMOONFLG
  1026    REF   1               22,3511    45512 0                     CSI/B3
  1027                          22,3512    50315 0   CSI/B3    PDVL    DOT
  1028    REF   7  LAST  674    22,3513    02541 0                     RACT1
  1029    REF   4  LAST  674    22,3514    03474 0                     VACT4
  1030    REF   2  LAST  133    22,3515    03502 0             STORE   RDOTV
  1031                          22,3516    77646 0             ABS
  1032                          22,3517    41301 0             NORM    DMP          ((P/MU)**.5)RDOTV/R1                  PL02D
  1033    REF  12  LAST  672    22,3520    00050 1                     X2
  1034                          22,3521    53660 1             XSU,1   SL*                              B-31+B36-B3= B2
  1035    REF  13  LAST  675    22,3522    00047 1                     X2
  1036                          22,3523    20204 0                     3,1
  1037                          22,3524    14015 0             STODL   12D
  1038    REF  32  LAST  656    22,3525    15336 0                     ZEROVECS
  1039                          22,3526    00021 1             STORE   16D
  1040                          22,3527    53575 0             VLOAD   UNIT
  1041                          22,3530    00015 0                     12D
  1042    REF   6  LAST  674    22,3531    26732 0             STOVL   SNTH         ALSO STORES CSTH AND 0
  1043    REF   8  LAST  675    22,3532    02541 0                     RACT1
  1044                          22,3533    75315 1             PDVL    SIGN
  1045    REF   5  LAST  675    22,3534    03474 0                     VACT4
  1046    REF   3  LAST  675    22,3535    03502 0                     RDOTV
  1047                          22,3536    45076 1             VCOMP   CALL
  1048    REF   3  LAST  674    22,3537    45320 1                     VECSHIFT
  1049    REF   8  LAST  674    22,3540    26746 0             STOVL   VVEC
  1050                          22,3541    77614 1             SETGO
  1051    REF   5  LAST  674    22,3542    03426 1                     RVSW
  1052    REF   1               22,3543    47145 1                     CSINEXT

  1053                          22,3544    77776 1   SN359+    2DEC    -.00008660l
  1053                          22,3545    62460 1
  1054                          22,3546    17777 0   CS359+    2DEC    +.49999992
  1054                          22,3547    37776 0
  1055    REF   1               23,2000                        SETLOC  CSIPROG4
  1056                          23,3145                        BANK

  10565   REF   1                                              COUNT*  $$/CSI
  1057    REF   6  LAST  674    23,3145    36657 0   CSINEXT   STCALL  RVEC
  1058    REF   5  LAST  674    23,3146    25002 1                     TIMETHET
  1059                          23,3147    43206 1             PUSH    DAD
  1060    REF  11  LAST  662    23,3150    02463 1                     TCSI
  1061    REF   2  LAST  217    23,3151    16351 1               STODL   TCSI2            TIME OF NEXT CSI
  1062    REF   4  LAST  675    23,3152    03502 0                       RDOTV
  1063                          23,3153    77644 1               BPL
  1064    REF   1               23,3154    47165 0                       NTP/2
  1065                          23,3155    45345 1               DLOAD   DSU
  1066    REF   2  LAST  674    23,3156    03472 0                       HAFPA1
  1067                          23,3157    52006 0               PUSH    GOTO
  1068    REF   2  LAST  676    23,3160    47165 0                       NTP/2
  1069                          23,3161    71201 1  CIRCL        SETPD   DLOAD
  1070                          23,3162    00001 0                       00D
  1071    REF  33  LAST  675    23,3163    15336 0                       ZEROVECS
  1072                          23,3164    77606 1               PUSH
  10721                         23,3165    72545 0  NTP/2        DLOAD   SL1
  10722   REF   3  LAST  676    23,3166    03472 0                       HAFPA1
  10723                         23,3167    77615 0               DAD
  10724   REF  12  LAST  675    23,3170    02463 1                       TCSI
  10725   REF   3  LAST  676    23,3171    16351 1               STODL   TCSI2
  10726   REF  11  LAST  663    23,3172    03766 0                       NN               COMPUTE NEXT CSI 1 REV AWAY
  10727                         23,3173    45342 0               SR1     DSU
  10728   REF   1               23,3174    07140 0                       HIGH2
  10729                         23,3175    77654 0               BZE                      NN = 4
  107295  REF   1               23,3176    47233 0                       HMCSI
  1073                          23,3177    41345 0  NTP/2A       DLOAD   DMP
  1074    REF  12  LAST  676    23,3200    03766 0                       NN
  1075    REF   4  LAST  676    23,3201    03472 0                       HAFPA1
  1076                          23,3202    45261 0               SL      DSU
  1077                          23,3203    20217 1                       140
  1078                          23,3204    77615 0               DAD
  1079    REF  13  LAST  676    23,3205    02463 1                       TCSI
  1080    REF   8  LAST  668    23,3206    02461 0               STORE   TCDH
  1081                          23,3207    77021 1               BDSU    AXT,2
  1082    REF  17  LAST  668    23,3210    03663 1                       TTPI
  1083                          23,3211    00005 1                       5D
  1084                          23,3212    40240 0               BMN     SETPD
  1085    REF   4  LAST  673    23,3213    63566 1                       SCNDSOL
  1086                          23,3214    00001 0                       0D
  1087                          23,3215    63375 0               VLOAD   PDVL
  1088    REF   6  LAST  675    23,3216    03474 0                       VACT4
  1089    REF   9  LAST  675    23,3217    02541 0                       RACT1
  1090                          23,3220    77624 1               CALL
  1091    REF   1               23,3221    63606 1                       INTINT2C
  1092    REF   4  LAST  667    23,3222    26453 1               STOVL   RACT2
  1093    REF  17  LAST  655    23,3223    00007 0                       VATT
  1094    REF   2  LAST  105    23,3224    26533 0               STOVL   VACT2
  1095    REF   2  LAST  662    23,3225    03512 1                       VPASS1
  1096                          23,3226    63201 1               SETPD   PDVL
  1097                          23,3227    00001 0                       0D
  1098    REF   3  LAST  662    23,3230    03756 0                       RPASS1
  1099                          23,3231    77650 1               GOTO
  1100    REF   1               23,3232    34012 0                       CSINEXT1
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L        P32-P33, P72-P73                                                                          USER'S PAGE NO.  20        E4 S3

 11001                              23,3233    43345 1  HMCSI     DLOAD   DAD                      COMPUTE NEXT CSI 1 + 1/2 REVS AWAY
 11002  REF   5  LAST  676          23,3234    03472 0                    HAFPA1
 11003  REF   4  LAST  676          23,3235    02351 1                    TCSI2
 11004  REF   5  LAST  677          23,3236    36351 0            STCALL  TCSI2
 11005  REF   1                     23,3237    47177 0                    NTP/2A
 1101   REF   1                     16,2000                       SETLOC  CSIPROG5
 1102                               16,2012                       BANK

 11025  REF   1                                                   COUNT*  $$/CSI
 1103                               16,2012    77624 1  CSINEXT1  CALL
 1104   REF   2  LAST  676          16,2013    63606 1                    INTINT2C
 1105   REF   3  LAST  667          16,2014    26625 1            STOVL   RPASS2
 1106   REF  18  LAST  676          16,2015    00007 0                    VATT
 1107   REF   3  LAST  667          16,2016    36617 1            STCALL  VPASS2
 1108   REF   3  LAST  667          16,2017    56674 1                    CDHMVR
 1109                               16,2020    40375 1            VLOAD   SETPD
 1110   REF   5  LAST  676          16,2021    02453 1                    RACT2
 1111                               16,2022    00001 0                    0D
 1112                               16,2023    45115 0            PDVL    CALL
 1113   REF  15  LAST  667          16,2024    03546 0                    VACT3
 1114   REF   3  LAST  646          16,2025    45174 1                    PERIAPO1
 1115                               16,2026    77624 1            CALL
 1116   REF   7  LAST  675          16,2027    45330 0                    SHIFTR1
 1117   REF   3  LAST  133          16,2030    27472 0            STOVL   POSTCDH
 1118   REF  16  LAST  677          16,2031    03546 0                    VACT3
 1119                               16,2032    63201 1            SETPD   PDVL
 1120                               16,2033    00001 0                    0D
 1121   REF   6  LAST  677          16,2034    02453 1                    RACT2
 1122                               16,2035    65325 0            PDDL    PDDL
 1123   REF   9  LAST  676          16,2036    02461 0                    TCDH
 1124   REF  18  LAST  676          16,2037    03663 1                    TTPI
 1125                               16,2040    62525 1            PDDL    SL2
 1126   REF   3  LAST  662          16,2041    33430 0                    2PISC
 1127                               16,2042    45006 0            PUSH    CALL
 1128   REF   4  LAST  662          16,2043    72740 1                    INTINT
 1129                               16,2044    77624 1            CALL
 1130   REF   4  LAST  667          16,2045    45304 1                    ACTIVE
 1131                               16,2046    77745 1            DLOAD
 1132   REF  13  LAST  663          16,2047    03744 0                    ELEV
 1133                               16,2050    73401 0            SETPD   SINE
 1134                               16,2051    00007 0                    6D
 1135                               16,2052    53515 0            PDVL    UNIT
 1136   REF  23  LAST  657          16,2053    03540 0                    RACT3
 1137                               16,2054    00001 0            STORE   0D                       URA3 AT 0D
 1138                               16,2055    47315 0            PDVL    VXV                      PL14D,PL 6D
 1139   REF   7  LAST  673          16,2056    02611 0                    UP1
 1140                               16,2057    77656 1            UNIT
 1141                               16,2060    71525 0            PDDL    COSINE                   UNIT(URA3XUVA3XURA3) = UH3      B1 PL14D
 1142   REF  14  LAST  677          16,2061    03744 0                    ELEV
 1143                               16,2062    45561 1            VXSC    STADR                    (COSLOS)(UH3)                   B2 PL06D
 1144                          16,2063   43754 0            STCALL 18D                          PLUS
 1145   REF   1                16,2064   16440 0                   CSINEXT2

 1146   REF   1                07,2000                      SETLOC CSIPROG6
 1147                          07,2440                      BANK

 11475  REF   1                                             COUNT* $$/CSI
 1148                          07,2440   74345 0  CSINEXT2  DLOAD  VXSC       (SINCOS)(URA3) = U                     B2 PL00D
 1149                          07,2441   76455 1            VAD    VSL1
 1150                          07,2442   00023 0                   18D                                               B1
 1151                          07,2443   50206 0            PUSH   DOT                                                   PL06D
 1152   REF  24  LAST  677     07,2444   03540 0                   RACT3      (U . RA3) = TEMP1         B1 +B29=B30
 1153                          07,2445   41552 0            SL1    PUSH                                             B29 PL08D
 1154                          07,2446   72316 0            DSQ    TLOAD      TEMP1**2                              B58
 1155   REF 260  LAST  661     07,2447   00155 0                   MPAC
 1156                          07,2450   50315 0            PDVL   DOT                                                   PL11D
 1157   REF  25  LAST  678     07,2451   03540 0                   RACT3
 1158   REF  26  LAST  678     07,2452   03540 0                   RACT3
 1159                          07,2453   57551 1            TLOAD  DCOMP      RA3.RA3
 1160   REF 261  LAST  678     07,2454   00155 0                   MPAC
 1161                          07,2455   50315 0            PDVL   DOT        RP3.RP3                               B58 PL14D
 1162   REF  12  LAST  672     07,2456   03554 0                   RPASS3
 1163   REF  13  LAST  678     07,2457   03554 0                   RPASS3                                                PL11D
 1164                          07,2460   76371 0            TAD    TAD        TEMP1**2+RA3.RA3+RP3.RP3=TEMP2             PL08D
 1165                          07,2461   71244 0            BPL    DLOAD
 1166   REF   1                07,2462   16500 0                   K1ORK2
 1167   REF   5  LAST  673     07,2463   03764 1                   LOOPCT
 1168                          07,2464   77025 0            DSU    AXT,2
 1169   REF   2  LAST  673     07,2465   33432 1                   1DPB28
 1170                          07,2466   00001 0                   1D
 1171                          07,2467   77654 0            BZE
 1172   REF   1                07,2470   11407 1                   ALMXITA
 1173                          07,2471   70545 1            DLOAD  SR1
 1174   REF   3  LAST  672     07,2472   03464 1                   DELDV
 1175   REF   4  LAST  673     07,2473   03464 1            STORE  DELDV
 1176                          07,2474   77621 1            BDSU
 1177   REF   2  LAST  133     07,2475   03470 1                   DVPREV
 1178   REF   7  LAST  673     07,2476   37462 0            STCALL DELVCSI
 1179   REF   1                07,2477   15744 1                   CSI/B1
 1180                          07,2500   41566 1  K1ORK2    SQRT   PUSH       TEMP3 = TEMP2**.5                     B29 PL10D
 1181                          07,2501   45276 0            DCOMP  DSU
 1182                          07,2502   00007 0                   06D        -TEMP1-TEMP3 =K2 AT 10D
 1183                          07,2503   14013 0            STODL  10D                                                   PL08D
 1184                          07,2504   45425 0            DSU    STADR                                                 PL06D
 1185                          07,2505   77762 1            STORE  12D        -TEMP1+TEMP3 =K1 AT 12D
 1186                          07,2506   77646 0            ABS
 1187                          07,2507   14017 1            STODL  14D
 1188                          07,2510   00013 0                   10D
 1189                          07,2511   45246 0            ABS    DSU
 1190                          07,2512   00017 1                   14D
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  1191                               07,2513   71240 1            BMN     DLOAD
  1192     REF    1                  07,2514   50123 1                    K2.
  1193                               07,2515   00015 0                    12D
  1194                               07,2516   34013 1            STCALL  10D                K EQUALS KI
  1195     REF    2  LAST   679      07,2517   50123 1                    K2.

  1196     REF    1                  24,2000                      SETLOC  CSIPROG7
  1197                               24,2123                      BANK

  11975    REF    1                                               COUNT*  $$/CSI
  1198                               24,2123   77745 1  K2.       DLOAD
  1199                               24,2124   00013 0                    10D
  1200                               24,2125   76561 1            VXSC    VSL1
  1201                               24,2126   53455 0            VAD     UNIT               V=RA3+KU   UNIT              B1
  1202     REF   27  LAST   678      24,2127   03540 0                    RACT3
  1203                               24,2130   53515 0            PDVL    UNIT                                            PL06D
  1204     REF   14  LAST   678      24,2131   03554 0                    RPASS3
  1205                               24,2132   53515 0            PDVL    UNIT                                            PL12D
  1206     REF   12  LAST   500      24,2133   03562 0                    VPASS3
  1207                               24,2134   63235 0            VXV     PDVL               UVP3 X URP3                  PL18D
  1208                               24,2135   00007 0                    06D
  1209                               24,2136   00007 0                    06D
  1210                               24,2137   50235 0            VXV     DOT
  1211                               24,2140   00001 0                    00D
  1212                               24,2141   77626 0            STADR                                                   PL12D
  1213                               24,2142   53762 1            STOVL   12D                (URP3XV).(UVP3XURP3)=TEMP    PL06D
  1214                               24,2143   72441 0            DOT     SL1                                             PL00D
  1215                               24,2144   75326 1            ARCCOS  SIGN
  1216                               24,2145   00015 0                    12D                                          B0
  1217                               24,2146   41542 1            SR1     PUSH               GAMMA=SIGN(TEMP)ARCOS(UNITV.URP3)  PL02D
  1218                               24,2147   71214 0            BON     DLOAD
  1219     REF    2  LAST   672      24,2150   05701 1                    S32.1F2
  1220     REF    1                  24,2151   50206 0                    FRSTPAS
  1221                               24,2152   00001 0                    00D                NOT THE FIRST PASS OF A CYCLE
  1222                               24,2153   65225 1            DSU     PDDL               GAMMA-GAMPREV                B1 PL04D
  1223     REF    2  LAST   133      24,2154   03466 0                    GAMPREV
  1224     REF    6  LAST   678      24,2155   03462 1                    DELVCSI
  1225                               24,2156   60225 1            DSU     NORM                                         B7
  1226     REF    3  LAST   678      24,2157   03470 1                    DVPREV
  1227     REF   22  LAST   674      24,2160   00047 1                    X1
  1228                               24,2161   65265 0            BDDV    PDDL               (GAM-GAMPREV)/(DV-DVPREV)   B-6+N1 PL06D
  1229                               24,2162   00003 1                    02D                      = SLOPE
  1230     REF    9  LAST   679      24,2163   03462 1                    DELVCSI
  1231     REF    4  LAST   679      24,2164   03470 1            STORE   DVPREV
  1232                               24,2165   43014 0            BOFF    BOFF
  1233     REF    3  LAST   673      24,2166   05742 0                    S32.1F3A
  1234     REF    1                  24,2167   20323 1                    THROCHX
  1235     REF    3  LAST   673      24,2170   05743 1                    S32.1F3B
  1236     REF    2  LAST   679      24,2171   20323 1                    THROCHK
  1237                               24,2172   41345 0            DLOAD   DMP
  1238                       24,2173   00003 1                   02D
  1239   REF   3  LAST  679  24,2174   03466 0                   GAMPREV
  1240                       24,2175   71244 0            BPL    DLOAD
  1241   REF   1             24,2176   20330 0                   FIFTYFPS
  1242   REF   1             24,2177   33561 0                   INITSTI
  1243                       24,2200   77765 0            SIGN
  1244   REF   5  LAST  678  24,2201   03464 1                   DELDV
  1245   REF   6  LAST  680  24,2202   03464 1            STORE  DELDV
  1246                       24,2203   43014 0            SET    CLEAR
  1247   REF   4  LAST  679  24,2204   05462 1                   S32.1F3A
  1248   REF   4  LAST  679  24,2205   05663 1                   S32.1F3B
  1249                       24,2206   77745 1  FRSTPAS   DLOAD
  1250                       24,2207   00001 0                   00D
  1251   REF   4  LAST  680  24,2210   17466 0            STODL  GAMPREV
  1252   REF  10  LAST  679  24,2211   03462 1                   DELVCSI
  1253   REF   5  LAST  679  24,2212   37470 0            STCALL DVPREV
  1254   REF   1             24,2213   20316 1                   CSINEXT3

  1255   REF   1             10,2000                      SETLOC CSIPROG8
  1256                       10,2316                      BANK

  12565  REF   1                                          COUNT* $$/CSI
  1257                       10,2316   43025 1  CSINEXT3 DSU    CLEAR
  1258   REF   7  LAST  680  10,2317   03464 1                   DELDV
  1259   REF   3  LAST  679  10,2320   05661 0                   S32.1F2
  1260   REF  11  LAST  680  10,2321   37462 0            STCALL DELVCSI
  1261   REF   2  LAST  678  10,2322   15744 1                   CSI/B1
  1262                       10,2323   43014 0  THRDCHK   BON    BON
  1263   REF   5  LAST  680  10,2324   05702 1                   S32.1F3A
  1264   REF   1             10,2325   20347 0                   NEWTN
  1265   REF   5  LAST  680  10,2326   05703 0                   S32.1F3B
  1266   REF   2  LAST  680  10,2327   20347 0                   NEWTN
  1267                       10,2330   75345 1  FIFTYFPS DLOAD  SIGN
  1268   REF   1             10,2331   13310 1                   FIFPSDP
  1269                       10,2332   00005 1                   04D
  1270                       10,2333   77765 0            SIGN
  1271   REF   5  LAST  680  10,2334   03466 0                   GAMPREV
  1272   REF   8  LAST  680  10,2335   03464 1            STORE  DELDV
  1273                       10,2336   43276 0            DCOMP  DAD
  1274   REF  12  LAST  680  10,2337   03462 1                   DELVCSI
  1275   REF  13  LAST  680  10,2340   17462 1            STODL  DELVCSI
  1276                       10,2341   00001 0                   00D
  1277                       10,2342   43014 0            SET    SET
  1278   REF   6  LAST  680  10,2343   05463 0                   S32.1F3B
  1279   REF   6  LAST  680  10,2344   05462 1                   S32.1F3A
  1280   REF   6  LAST  680  10,2345   37466 1            STCALL GAMPREV
  1281   REF   2  LAST  673  10,2346   24050 1                   CSI/B2
  1282                       10,2347   60345 0  NEWTN     DLOAD  NORM
  1283                       10,2350   00005 1                   04D
  1284   REF  14  LAST  675  10,2351   00050 1                   X2
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 1285                          10,2352   54065 0                BDDV    XSU,1
 1286                          10,2353   00001 0                        0,D
 1287   REF  15  LAST  680     10,2354   00047 1                        X2
 1288                          10,2355   77657 0                SR*
 1289                          10,2356   20601 1                        0,1
 1290   REF   9  LAST  680     10,2357   17464 1                STODL   DELDV
 1291                          10,2360   00001 0                        0,D
 1292   REF   7  LAST  680     10,2361   03466 0                STORE   GAMPREV
 1293                          10,2362   51545 1                DLOAD   ABS
 1294   REF  10  LAST  681     10,2363   03464 1                        DELDV
 1295                          10,2364   45206 1                PUSH    DSU                                 PL08D
 1296   REF   1                10,2365   13306 0                        EPSILN1
 1297                          10,2366   71240 1                BMN     DLOAD
 1298   REF   1                10,2367   20404 0                        CSI/SOL
 1299                          10,2370   50025 0                DSU     BMN
 1300   REF   1                10,2371   13312 0                        DELMAX1
 1301   REF   1                10,2372   20377 0                        CSISTEP
 1302                          10,2373   75345 1                DLOAD   SIGN
 1303   REF   2  LAST  681     10,2374   13312 0                        DELMAX1
 1304   REF  11  LAST  681     10,2375   03464 1                        DELDV
 1305   REF  12  LAST  681     10,2376   03464 1                STORE   DELDV
 1306                          10,2377   45345 1   CSISTEP      DLOAD   DSU
 1307   REF  14  LAST  680     10,2400   03462 1                        DELVCSI
 1308   REF  13  LAST  681     10,2401   03464 1                        DELDV
 1309   REF  15  LAST  681     10,2402   37462 0                STCALL  DELVCSI
 1310   REF   3  LAST  680     10,2403   15744 1                        CSI/B1
 1311                          10,2404   77145 1   CSI/SOL      DLOAD   AXT,2
 1312   REF   3  LAST  674     10,2405   03460 0                        POSTCSI
 1313                          10,2406   00002 0                        2
 1314                          10,2407   52150 1                LXA,1   GOTO
 1315   REF  12  LAST  674     10,2410   03745 1                        RTX1
 1316   REF   1                10,2411   63535 1                        CSINEXT4

 1317   REF   1                31,2000                          SETLOC  CSIPROG9
 1318                          31,3535                          BANK

 13185  REF   1                                                 COUNT*  $$/CSI
 1319                          31,3535   50023 0   CSINEXT4     DSU*    BMN
 1320   REF   1                31,3536   33553 1                        PMINE -2,1
 1321   REF   5  LAST  676     31,3537   63566 1                        SCNDSOL
 1322                          31,3540   71374 1                AXT,2   DLOAD
 1323                          31,3541   00003 1                        3
 1324   REF   4  LAST  677     31,3542   03472 0                        POSTCDH
 1325                          31,3543   50023 0                DSU*    BMN
 1326   REF   2  LAST  681     31,3544   33553 1                        PMINE -2,1
 1327   REF   6  LAST  681     31,3545   63566 1                        SCNDSOL
 1328                          31,3546   45345 1                DLOAD   DSU
 1329   REF  10  LAST  677     31,3547   02461 0                        TCDH
 1330   REF  14  LAST  676     31,3550   02463 1                        TCSI
 1331   REF   6  LAST  668     31,3551   02547 0                STORE   T1TOT2
 1332                        31,3552   45374 0              AXT,2   DSU
 1333                        31,3553   00004 0                      4
 1334   REF   3  LAST  461   31,3554   36161 1                      600SEC
 1335                        31,3555   77040 0              BMN     AXT,2
 1336   REF   7  LAST  681   31,3556   63566 1                      SCNDSOL
 1337                        31,3557   00005 1                      5
 1338                        31,3560   45345 1              DLOAD   DSU
 1339   REF  19  LAST  677   31,3561   03663 1                      TTPI
 1340   REF  11  LAST  681   31,3562   02461 0                      TCDH
 1341                        31,3563   51025 1              DSU     BPL
 1342   REF   4  LAST  682   31,3564   36161 1                      600SEC
 1343   REF   1              31,3565   11463 0                      P32/P72C
 1344                        31,3566   43014 0   SCNDSOL    BON     BCFF
 1345   REF   7  LAST  680   31,3567   05702 1                      S32.1F3A
 1346   REF   1              31,3570   11411 0                      ALMXIT
 1347   REF   7  LAST  680   31,3571   05743 1                      S32.1F3B
 1348   REF   2  LAST  682   31,3572   11411 0                      ALMXIT
 1349                        31,3573   71334 0              SXA,2   DLOAD
 1350   REF   5  LAST  672   31,3574   03664 0                      CSIALRM
 1351   REF  34  LAST  676   31,3575   15336 0                      ZEROVECS
 1352                        31,3576   43014 0              CLEAR   SET
 1353   REF   4  LAST  673   31,3577   05660 1                      S32.1F1
 1354   REF   4  LAST  680   31,3600   05461 1                      S32.1F2
 1355                        31,3601   43014 0              CLEAR   CLEAR
 1356   REF   8  LAST  682   31,3602   05662 0                      S32.1F3A
 1357   REF   8  LAST  682   31,3603   05663 1                      S32.1F3B
 1358   REF   6  LAST  678   31,3604   37764 0              STCALL  LOOPCT
 1359   REF   1              31,3605   15704 0                      CSI/8
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P1360    ***** ADVANCE   *****

R1361    SUBROUTINES USED

R1362           PRECSET
R1363           ROTATE

 1364    REF   2  LAST  670   37,2000                           SETLOC CDHTAG3
 1365                         37,2560                           BANK

 13655   REF   1                                                COUNT* $$/CDH
 1366                         37,2560   77620 0   ADVANCE       STQ
 1367    REF  22  LAST  671   37,2561   02360 0                        SUBEXIT
 1369    REF  26  LAST  657   37,2562   34041 0                 STCALL TDEC1
 1370    REF   4  LAST  657   37,2563   45236 1                        PRECSET
 1371                         37,2564   77214 0                 SET    VLOAD
 1372    REF   4  LAST  655   37,2565   01067 1                        XDELVFLG
 1373    REF  13  LAST  679   37,2566   03562 0                        VPASS3
 1374    REF   4  LAST  677   37,2567   02617 0                 STORE  VPASS2
 1375    REF   3  LAST  676   37,2570   27512 1                 STOVL  VPASS1
 1376    REF  15  LAST  679   37,2571   03554 0                        RPASS3
 1377    REF   4  LAST  677   37,2572   02625 1                 STORE  RPASS2
 1378    REF   4  LAST  676   37,2573   27756 0                 STOVL  RPASS1
 1379    REF  28  LAST  679   37,2574   03540 0                        RACT3
 1380    REF   5  LAST  657   37,2575   37632 1                 STCALL RTIG
 1381    REF   1              37,2576   16520 1                        ROTATE
 1382    REF   7  LAST  677   37,2577   02453 1                 STORE  RACT2
 1383    REF  10  LAST  676   37,2600   26541 0                 STOVL  RACT1
 1384    REF  17  LAST  677   37,2601   03546 0                        VACT3
 1385    REF   7  LAST  657   37,2602   37640 1                 STCALL VTIG
 1386    REF   2  LAST  683   37,2603   16520 1                        ROTATE
 1387    REF   3  LAST  676   37,2604   02533 0                 STORE  VACT2
 1388    REF   4  LAST  674   37,2605   37504 1                 STCALL VACT1
 1389    REF  23  LAST  683   37,2606   02360 0                        SUBEXIT
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P1390     ..... ROTATE     .....

  1391    REF   2  LAST  678   07,2000                             SETLOC CSIPROG6
  1392                         07,2520                             BANK

  13925   REF   2 LAST  678 TO  679:     48     48*                COUNT* $$/CSI
  1393                         07,2520    41406 0  ROTATE          PUSH    PUSH
  1394                         07,2521    74241 0                  DOT     VXSC
  1395    REF   8  LAST  677   07,2522    02611 0                          UP1
  1396    REF   9  LAST  684   07,2523    02611 0                          UP1
  1397                         07,2524    51352 1                  VSL2    BVSU
  1398                         07,2525    63256 0                  UNIT    PDVL
  1399                         07,2526    74246 1                  ABVAL   VXSC
  1400                         07,2527    43572 0                  VSL1    RVQ
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P1401    .... DISPN90 .....
 14011   REF   2  LAST  672   06,2000                         SETLOC CSIPROG
 14012                        06,3756                         BANK
 14015   REF   2 LAST  672 TO 673:      52      52*           COUNT* $$/CSI
 1402                         06,3756    77620 0   DISPN90    STQ
 1403    REF   1              06,3757    02356 0                     ANEXIT
 1411                         06,3760    57575 1              VLOAD  VCOMP
 14115   REF   3  LAST  500   06,3761    02601 1                     AUTDY
 1412    REF   3  LAST  294   06,3762    15756 1              STODL  YCSM            COMPLEMENT VALUES FOR N90 DISPLAYS.
 1413    REF   4  LAST  500   06,3763    02603 0                     CMYDOT
 1414    REF  21  LAST  670   06,3764    03407 1              STORE  DELVLVC +2
 14141                        06,3765    51414 1              BOFF   ABS
 14142   REF   7  LAST  655   06,3766    05356 1                     PCFLAG
 14143   REF   1              06,3767    45550 0                     CKN81           NOT IN P36
 14144                        06,3770    51025 1              DSU    BPL             IS YDOT LESS THAN .1 FPS
 14145   REF   1              06,3771    13306 0                     1/10FPS
 14146   REF   2  LAST  685   06,3772    45550 0                     CKN81           NO
 14147                        06,3773    77775 1              VLOAD                  YES - FORCE DSKY DISPLAY TO BE
 14148   REF  11  LAST  672   06,3774    11762 1                     ZEROVEC
 14149   REF  22  LAST  685   06,3775    37405 1              STCALL DELVLVC
 141491  REF   3  LAST  685   06,3776    45550 0                     CKN81

 141492  REF   2  LAST  673   22,2000                         SETLOC CSIPROG3
 141493                       22,3550                         BANK

 141494  REF   2 LAST  673 TO 675:      98      98*           COUNT* $$/CSI
 1415                         22,3550    77776 1   CKN81      EXIT
 1416    REF   1              22,3551  3 5037 0               CA     V06N90
 1417    REF  32  LAST  668   22,3552  0 5535 1               TC     VNFLASH

 1418    REF   3  LAST  644   22,3553  3 4535 0               CAF    V06N81
 14185   REF  33  LAST  685   22,3554  0 5535 1               TC     VNFLASH

 1419    REF 142  LAST  668   22,3555  0 6006 1               TC     INTPRET
 1420                         22,3556    77650 1              GOTO
 1421    REF   2  LAST  685   22,3557    02356 0                     ANEXIT

 14211   REF   2  LAST  681   05,3305              1/10FPS    =      EPSILN1         .1 FPS
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P1422    ***** INTINTNA *****

 1423    REF   1                   31,2000                      SETLOC  CDHTAG2
 1424                              31,3606                      BANK

 14245   REF   1                                                COUNT*  $$/CDH
 1425                              31,3606   65325 0  INTINT2C  PDDL    PDDL
 1426    REF  15  LAST  681        31,3607   02463 1                    TCSI
 1427    REF  12  LAST  682        31,3610   02461 0                    TCDH
 1428                              31,3611   41525 0            PDDL    PUSH
 1429    REF   3  LAST  479        31,3612   33143 1                    TWOPI
 1430                              31,3613   77650 1            GOTO
 1431    REF   5  LAST  677        31,3614   72740 1                    INTINT
 1432                              31,3615   65325 0  INTINT3P  PDDL    PDDL
 1433    REF  13  LAST  686        31,3616   02461 0                    TCDH
 1434    REF  20  LAST  682        31,3617   03663 1                    TTPI
 1435                              31,3620   41525 0            PDDL    PUSH
 1436    REF   4  LAST  686        31,3621   33143 1                    TWOPI          FOR CONIC INTEGRATION
 1437                              31,3622   77650 1            GOTO
 1438    REF   6  LAST  686        31,3623   72740 1                    INTINT
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P 1439   ..... S32/33.X  .....

 1440    REF   1                  15,2000                             SETLOC CDHTAGS
 1441                             15,2050                             BANK

 14415   REF   1                                                      COUNT* $$/CDH
 1442                             15,2050    77201 1   S32/33.X SETPD  VLOAD
 1443                             15,2051    00007 0                          6D
 1444    REF  10   LAST   684     15,2052    02611 0                          UP1
 1445                             15,2053    63276 1            VCOMP  PDVL
 1446    REF  11   LAST   683     15,2054    02541 0                          RACT1
 1447                             15,2055    57456 1            UNIT   VCOMP
 1448                             15,2056    47206 0            PUSH   VXV
 1449    REF  11   LAST   687     15,2057    02611 0                          UP1
 1450                             15,2060    77772 0            VSL1
 1451                             15,2061    00001 0            STORE  0D
 1452                             15,2062    77616 0            RVQ
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L         P32-P33, P72-P73                                                                                USER'S PAGE NO.  31      E4 S3

P1453     ***** CDHMVR    *****

R1454     SUBROUTINES USED

R1455              VECSHIFT
R1456              TIMETHET
R1457              SHIFTR1

  1458    REF   1                   27,2000                         SETLOC CDHTAG
  1459                              27,2674                         BANK

  14595   REF   1                                                   COUNT* $$/CDH
  1460                              27,2674    77220 1  CDHMVR      STQ     VLOAD
  1461    REF  24  LAST  683        27,2675    02360 0                      SUBEXIT
  1462    REF   8  LAST  683        27,2676    02453 1                      RACT2
  1463                              27,2677    53406 0              PUSH    UNIT
  1464    REF   1                   27,2700    27546 0              STOVL   UNVEC               UR SUB A
  1465    REF   5  LAST  683        27,2701    02625 1                      RPASS2
  1466                              27,2702    50256 0              UNIT    DOT
  1467    REF   2  LAST  688        27,2703    03546 0                      UNVEC
  1468                              27,2704    72406 0              PUSH    SL1
  1469    REF   5  LAST  655        27,2705    16734 0              STODL   CSTH
  1470                              27,2706    65316 0              DSQ     PDDL
  1471    REF   7  LAST  623        27,2707    15326 1                      DP1/4TH
  1472                              27,2710    45302 1              SR2     DSU
  1473                              27,2711    72566 1              SQRT    SL1
  1474                              27,2712    57515 1              PDVL    VCOMP
  1475                              27,2713    77635 1              VXV
  1476    REF   6  LAST  686        27,2714    02625 1                      RPASS2
  1477                              27,2715    65241 0              DOT     PDDL
  1478    REF  12  LAST  687        27,2716    02611 0                      DP1
  1479                              27,2717    45565 0              SIGN    STADR
  1480    REF   7  LAST  675        27,2720    51045 1              STOVL   SNTH
  1481    REF   7  LAST  688        27,2721    02625 1                      RPASS2
  1482                              27,2722    45115 0              PDVL    CALL
  1483    REF   5  LAST  683        27,2723    02617 0                      VPASS2
  1484    REF   4  LAST  675        27,2724    45320 1                      VECSHIFT
  1485    REF   9  LAST  675        27,2725    26746 0              STOVL   VVEC
  1486                              27,2726    77614 1              CLEAR
  1487    REF   6  LAST  675        27,2727    03666 1                      RVSW
  1488    REF   7  LAST  675        27,2730    36657 0              STCALL  RVEC
  1489    REF   6  LAST  675        27,2731    25002 1                      TIMETHET
  1490                              27,2732    53754 1              LXA,2   VSL*
  1491    REF  12  LAST  644        27,2733    03746 1                      RTX2
  1492                              27,2734    57576 1                      0,2
  1493                              27,2735    00023 0              STORE   18D
  1494                              27,2736    76441 1              DOT     SL1R
  1495    REF   3  LAST  688        27,2737    03546 0                      UNVEC
  1496                              27,2740    51515 1              PDVL    ABVAL            DD = V SUB PV
  1497                              27,2741    63257 1              SL*     PDVL
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 1498                              27,2742   57576 1                  0,2
 1499   REF   9  LAST   683        27,2743   02453 1                  RACT2
 1500                              27,2744   65246 1         ABVAL    PDDL        2D = LENGTH OF R SUB A
 1501                              27,2745   77625 0         DSU
 1502                              27,2746   00003 1                  02D
 1503   REF   4  LAST   654        27,2747   16633 0         STODL    DIFFALT     DELTA H IN METERS             B+29
 1504   REF   2  LAST   100        27,2750   02744 1                  R1A
 1505                              27,2751   65301 0         NORM     PDDL        2 - R V**/MU                               04D
 1506   REF  23  LAST   679        27,2752   00047 1                  X1
 1507   REF   3  LAST   675        27,2753   00041 1                  R1
 1508                              27,2754   77624 1         CALL
 1509   REF   8  LAST   677        27,2755   45330 0                  SHIFTR1
 1510                              27,2756   56362 0         SR1R     DDV
 1511                              27,2757   41457 1         SL*      PUSH
 1512                              27,2760   20174 1                  0 -5,1
 1513                              27,2761   65225 1         DSU      PDDL        A SUB A                       B+29       04D
 1514   REF   5  LAST   689        27,2762   02633 0                  DIFFALT
 1515                              27,2763   56302 0         SR2      DDV         A SUB P                      B+31
 1516                              27,2764   00005 1                  04D                                      B+2
 1517                              27,2765   75406 1         PUSH     SQRT           A SUB P/A SUB A            06D
 1518                              27,2766   41275 1         DMPR     DMP
 1519                              27,2767   00007 0                  06D
 1520                              27,2770   00001 0                  00D
 1521                              27,2771   65272 0         SL3R     PDDL        V SUB AV METERS/CS            B+7        08D
 1522                              27,2772   00003 1                  02D         R SUB A MAGNITUDE   B+29
 1523                              27,2773   65301 0         NORM     PDDL
 1524   REF  24  LAST   689        27,2774   00047 1                  X1
 1525   REF   4  LAST   672        27,2775   03750 0                  RTMU
 1526                              27,2776   56342 1         SR1      DDV         2MU  B+38
 1527                              27,2777   65257 1         SL*      PDDL          2 MU/R SUBAA      B+14      10D
 1528                              27,3000   20174 1                  0 -5,1
 1529                              27,3001   00005 1                  04D         ASUBA                        B+29
 1530                              27,3002   65301 0         NORM     PDDL
 1531   REF  16  LAST   681        27,3003   00050 1                  X2
 1532   REF   5  LAST   689        27,3004   03750 0                  RTMU
 1533                              27,3005   56342 1         SR1      DDV
 1534                              27,3006   44257 1         SL*      BDSU
 1535                              27,3007   57604 1                  0 -6,2        2U/R - U/A   B+14 (METERS/CS)SQ
 1536                              27,3010   63525 0         PDDL     DSQ                                                   10D
 1537                              27,3011   00011 1                  08D
 1538                              27,3012   75421 1         BDSU     SQRT
 1539                              27,3013   47315 0         PDVL     VXV           SQRT(MU(2/R SUB A-1/A SUB A)-VSUBA2)10D
 1540   REF  13  LAST   688        27,3014   02611 0                  UP1
 1541   REF   4  LAST   688        27,3015   03546 0                  UNVEC
 1542                              27,3016   74256 0         UNIT     VXSC
 1543                              27,3017   00013 0                  10D
 1544                              27,3020   74315 0         PDVL     VXSC
 1545   REF   5  LAST   689        27,3021   03546 0                  UNVEC
 1546                              27,3022   00011 1                  08D
 1547                              27,3023   76455 1         VAD      VSL1
 1548                          27,3024   77626 0          STADR
 1549   REF  18  LAST  683     27,3025   74231 1          STORE   VACT3
 1550                          27,3026   77651 0          VSU
 1551   REF   4  LAST  683     27,3027   02533 0                  VACT2
 1552   REF   5  LAST  663     27,3030   37667 1          STCALL  DELVEET2          DELTA VCDH - REFERENCE COORDINATES
 1553   REF  25  LAST  688     27,3031   02360 0                  SUBEXIT
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L        P40-P47                                                            USER'S PAGE NO.   1      E0 S3

P1293    NAME           P40 - TVC (SPS BURN)
R12932                  MOD BY ALBERT, BEALS, AND DEMERY TO REORGANIZE
R12934                  AND REDUCE CODING 15AUG69
R1294    FUNCTION       TO CONTROL THE SEQUENCE OF THE CMC DURING THE COUNTDOWN
R1295                   AND THRUSTING MANEUVER OF AN SPS BURN

R12952                      CLOKTASK  COMPUTE TIME-TO-GO TO IGNITION(FOR N35/40),
R12954                                RECALL CLOKTASK, AND AFTER S40.6 COMPLETION
R12956                                CALL CLOCKJOB TO DISPLAY V06N40

R1296                       R02BOTH   CHECK STATUS OF IMU

R1297                       S40.1     COMPUTE: INTIAL THRUST DIRECTION AND
R1298                                          INTIAL VALUE OF VELOCITY-TO-BE-
R1299                                          GAINED VECTOR (VGTIG)

R1300                       S40.2,3   COMPUTE: GIMBAL ANGLES IF THRUSTING WILL
R1301                                          OCCUR WITH PRESENT IMU ORIENTATION,
R1302                                          XAXIS OF ENGINE BELL,
R1303                                          PREFERRED IMU ORIENTATION, AND
R1304                                          DESIRED THRUST DIRECTION IN SM COORDS

R1305                       R60CSM    PERFORM ATTITUDE MANEUVER

R1306                       S40.6     HANDLE GIMBAL TEST AND TRIM OR TRIM ONLY

R1307                       MIDTOAV1  EXTRAPOLATE CSM STATE VECTOR TO TIG-29.96 SECS

R1311                       TIGBLNK   BLANK DSKY AT TIG-35 SECS AND
R1312                                 WAITLIST TIGAVEG IN 5 SECS

R1313                       TIGAVEG   UNBLANK DSKY,
R1314                                 WAITLIST TIG-5 IN 24.96 SECS, AND
R1315                                 START SERVICER

R1316                       TIG-5     DISPLAY FLASHING V99N40:
R1317                                 ENGINE IGNITION ENABLE,
R1318                                 WAITLIST TIG-0 IN 5 SECS, AND
R1319                                 FINDVAC S40.13 TO DETERMINE IF THIS IS
R1320                                 AN IMPULSIVE OR STEERING BURN

R1321                       TIG-0     CHECK IF ASTRONAUT HAS O.K.ED IGNITION (PRIOR
R1322                                 PROCEED TO V99N40) - IF NOT, IGNITION WILL BE
R1323                                 ENTERED BY CLOCKJOB IN RESPONSE TO V99N40

R1324                       CLOCKJOB  (CALLED EVERY SEC)
R1325                                 DISPLAY V06N40 EXCEPT WHEN SIGNALED BY TIG-5
R1326                                 TO FLASH V99N40 AND
R1327                                 CALL IGNITION WHEN PROCEED RESPONSE TO V99N40
R1328                                 HAS OCCURRED AND TIG HAS PASSED
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R1329                  IGNITION  TURN ON ENGINE,
R1330                            CHECK IF IMPULSIVE BURN, AND IF SO
R1331                            SET UP ENGINOFF COMMAND

R1332                  S40.8     UPDATE VELOCITY TO-BE-GAINED VECTOR,
R1333                            GENERATE ANGULAR RATE STEERING COMMANDS
R1334                            FOR AUTO PILOT,
R13345                           UPDATE CSMMASS,
R1335                            ESTABLISH ENGINE CUT-OFF SIGNAL AT
R1336                            APPROPRIATE TIME, AND
R1337                            INITIATE R40, IF THRUST FAILS

R1338                  S40.9     (AIMPOINT MANEUVERS ONLY)
R1339                            GENERATE REQUIRED VEL-TO-BE-GAINED VECTOR AND
R1340                            UPDATE B-VECTOR WHICH IS USED IN FINAL
R1341                            CALCULATION OF EXTRAPOLATING THE VG VECTOR

R1342                  ENGINOFF  WIPE OUT TVC,
R1343                            TURN OFF CLOKTASK,
R1344                            SHUT DOWN ENGINE,
R1345                            ADJUST VEHICLE MASS PROPERTIES,
R1346                            TURN ON RCS DAP, AND
R1347                            UPDATE ENGINE TRIMS

R1348                  POSTBURN  DISPLAY FLASHING V16N40,
R1349                            CLEAN UP AFTER ENGINE CUT-OFF, AND
R1350                            MAINTAIN VG COMP FOR POSSIBLE RCS TRIM

R1351                  ***********************************************
R1352                  PROVIDE RESTART PROTECTION AT ALL CRITICAL POINTS
R1353                  ***********************************************

R1354   INPUT      XDELVFLG = 1 EXTERNAL DELTA V

R1355                  DELVSIN   CHANGE OF VELOCITY (VECTOR)
R1357                  RTIG      CSM POSITION AT TIG
R1358                  VTIG      CSM VELOCITY AT TIG
R1359                  TIG       IGNITION TIME
R1360                  CSTEER =  0

R1361              XDELVFLG = 0 LAMBERT(AIMPOINT)

R1362                  RTARG     AIMPOINT POSITION VECTOR
R1363                  TPASS4    TIME OF ARRIVAL AT AIMPOINT
R1364                  TIG       IGNITION TIME
R1365                  CSTEER =  1

R1366   ALARMS     1407          VG INCREASING
R1367              1703          INSUFFICIENT TIME FOR INTEGRATION
R1368                            TIG WAS SLIPPED
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P1369
  1370   REF  16  LAST  292   E6,1465                         EBANK= DAPDATR1
  1371   REF   1              24,2000                         SETLOC P40S
  1372                        24,2214                         BANK
  1373   REF   1                                              COUNT* $$/P40
  1376   REF 143  LAST  685   24,2214  0 6006 1  P40CSM       TC      INTPRET
  1377                        24,2215   67214 1               CLEAR   SLOAD
  1378   REF   1              24,2216   00664 0                       ENG2FLAG
  1379   REF   4  LAST  652   24,2217   03425 1                       ECSTEER
  1380                        24,2220   71214 0               BOFF    DLOAD
  1381   REF   5  LAST  683   24,2221   01347 0                       XDELVFLG        EXTERNAL DELTA V ?
  1382   REF   1              24,2222   50224 0                       P40S/C          NO CSTEER = ECSTEER
  1383   REF  12  LAST  648   24,2223   15336 0                       HI6ZEROS        YES CSTEER = ZERO
  1384   REF   3  LAST  180   24,2224   17703 0  P40S/C       STODL   CSTEER
  1385   REF   1              24,2225   11532 0                       FENG            SET UP THRUST FOR S40.1
  1386   REF   2  LAST  128   24,2226   17727 0  P40S/F       STODL   F               P41 ENTERS HERE
  1387   REF  51  LAST  667   24,2227   03413 1                       TIG             ORIGINAL TIG MAY BE SLIPPED BY P40S/SV
  1388   REF   5  LAST  513   24,2230   17450 0               STODL   NOMTIG          SET ORIGINAL TIME OF IGNITION FOR S40.9
  13882  REF   1              24,2231   11530 1                       SEC29.96
  13884  REF   5  LAST  531   24,2232   03460 0               STORE   AVEGDT          START AVERAGEG AT TIG-29.96
  1389                        24,2233   77414 0               CLEAR   EXIT
  13891  REF   3  LAST  220   24,2234   05265 0                       BURNFLAG

  13892  REF  41  LAST  642   24,2235  0 4655 0  TFIGINIT     TC      POSTJUMP        START CLOKTASK TO
  13894  REF   1              24,2236   73566 0               CADR    STARTTGO        CALCULATE TFI FOR N35/40
  1390   REF 141  LAST  667   24,2237  0 4636 0     +2        TC      BANKCALL
  1391   REF   5  LAST  626   24,2240   03731 1               CADR    R02BOTH         IMU STATUS CHECK
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P1392     NAME      S40.1
R1393     FUNCTIONAL DESCRIPTION
R1394               COMPUTE INITIAL THRUST DIRECTION(UT) AND INITIAL VALUE OF VG
R1395               VECTOR(VGTIG).
R1396     SUBROUTINES CALLED
R1397               CSMPREC
R1398               INITVEL
R1399               CALCGRAV
R1400               MIDGIM
R1401     ERASABLE INITIALIZATION REQUIRED
R1402               WEIGHT/G   ANTICIPATED MAG. OF VEHICLE MASS      SP B16KGM
R1403               XDELVFLG       1=DELTA-V MANEUVER,0=AIMPT STEER
R1404            IF DELTA-V MANEUVER
R1405               DELVSIN    SPECIFIED DELTA-V REQUIRED IN
R1406                          INERTIAL COORDS. OF ACTIVE VEHICLE
R1407                          AT TIME OF IGNITION                  VECTOR B7M/CS
R1409               RTIG       POSITION AT TIME OF IGNITION        VECTOR B29M
R1410               VTIG       VELOCITY AT TIME OF IGNITION        VECTOR B7M/CS
R1411               CSTEER = 0                DP
R1412            IF AIMPOINT   STEERING
R1413               TIG        TIME OF IGNITION                     DP      B28CS
R1414               RTARG      POSITION TARGET TIME                VECTOR B29M
R1415               TPASS4     TIME OF ARRIVAL AT AIMPOINT
R1416               CSTEER =   ECSTEER(GR 0) DP B1
R1417     OUTPUT
R1418               UT     1/2 UNIT VECTOR ALIGNED WITH THRUST DIRECTION IN REF COOR
R1419               VGTIG      INITIAL VALUE OF VELOCITY
R1420                          TO BE GAINED (INERT. COORD.)         VECTOR B7M/CS
R1421               DELVLVC    VGTIG IN LOC. VERT. COORDS.
R1422               F          NOMINAL THRUST FOR ENGINE                 DP B7 M-NEWT
R1423               BDT        V REQUIRED AT TIG -V REQUIRED AT (TIG-2SEC)
R1424               -GDT       FOR S40.13                                  VECT  B7M/CS
R1425               RTIG       CALC IN S40.1B(AIMPT) FOR S40.2,3    VECTOR B29M
R1426                          POSITION AT TIME OF IGNITION

 14269   REF   1                                              COUNT* $$/S40.1
 1427    REF 144  LAST  693   24,2241  0 6006 1  S40.1    TC      INTPRET
 1428                         24,2242   77214 0           SET     VLOAD
 1429    REF   1              24,2243   01070 1                   FIRSTFLG
 1430    REF  13  LAST  693   24,2244   15336 0                   HI6ZEROS
 1431    REF   2  LAST  128   24,2245   03705 0           STORE   BDT
 1432                         24,2246   77614 1           BOFF
 1433    REF   6  LAST  693   24,2247   01347 0                   XDELVFLG
 1434    REF   1              24,2250   34065 0                   S40.1B          LAMBERT
 1435                         24,2251   51575 1           VLOAD   ABVAL           EXTERNAL DELTA-V
 1436    REF   9  LAST  670   24,2252   03646 0                   DELVSIN
 1437    REF   2  LAST  127   24,2253   27654 0           STOVL   DELVSAB
 1438    REF   8  LAST  683   24,2254   03640 0                   VTIG
 1439    REF   9  LAST  495   24,2255   03576 0           STORE   VINIT
 1440                         24,2256   53435 0           VXV     UNIT
 1441     REF   6  LAST  683    24,2257    03632 0                        RTIG
 1442     REF   2  LAST  128    24,2260    27713 1             STOVL      UT              UP IN UT
 1443     REF   7  LAST  695    24,2261    03632 0                        RTIG
 1444     REF  10  LAST  495    24,2262    03570 0             STORE      RINIT
 1445                           24,2263    65236 0             VSQ        PDDL
 1446                           24,2264    00045 0                        36D
 1447                           24,2265    56275 1             DMPR       DDV
 1448     REF   1               24,2266    17051 0                        THETACON
 1449                           24,2267    41205 0             DMP        DMP
 1450     REF   3  LAST  694    24,2270    03654 0                        DELVSAB
 1451     REF   1               24,2271    03076 0                        WEIGHT/G
 1452                           24,2272    77671 1             DDV
 1453     REF   3  LAST  693    24,2273    03727 0                        F
 1454                           24,2274    24017 1             STOVL      14D
 1455     REF  10  LAST  694    24,2275    03646 0                        DELVSIN
 1456                           24,2276    74241 0             DOT        VXSC
 1457     REF   3  LAST  695    24,2277    03713 1                        UT
 1458     REF   4  LAST  695    24,2300    03713 1                        UT
 1459                           24,2301    41552 0             VSL2       PUSH            (DELTAV.UP)UP SCALED AT 2(+7) P.D.L. 0
 1460                           24,2302    65245 1             BVSU       PDDL            DELTA VP SCALED AT 2(+7) P.D.L. 6
 1461     REF  11  LAST  695    24,2303    03646 0                        DELVSIN
 1462                           24,2304    00017 1                        14D
 1463                           24,2305    63356 1             SIN        PDVL
 1464                           24,2306    00007 0                        6D
 1465                           24,2307    53435 0             VXV        UNIT
 1466     REF   5  LAST  695    24,2310    03713 1                        UT
 1467                           24,2311    45561 1             VXSC       STADR
 1468     REF   7  LAST  133    24,2312    50056 1             STOVL      VGTIG           UNIT(VPXUP)SIN(THETAT)IN VGTIG
 1469                           24,2313    65256 0             UNIT       PDDL            UNIT(DELTA VP) IN P.D.L. 6
 1470                           24,2314    00017 1                        14D
 1471                           24,2315    74346 0             COS        VXSC
 1472                           24,2316    74255 0             VAD        VXSC
 1473     REF   8  LAST  695    24,2317    03721 0                        VGTIG
 1474                           24,2320    00045 0                        36D
 1475                           24,2321    53352 0             VSL2       VAD
 1476                           24,2322    77626 0             STADR
 1477     REF   9  LAST  695    24,2323    74056 1             STORE      VGTIG           VG IGNITION SCALED AT 2(+7)M/CS
 1478                           24,2324    77656 1             UNIT
 1479     REF   6  LAST  695    24,2325    27713 1             STOVL      UT              THRUST DIRECTION SCALED AT 2(+1)
 1480     REF  10  LAST  695    24,2326    03721 0                        VGTIG
 1481                           24,2327    45006 0             PUSH       CALL
 1484     REF   1               24,2330    11200 0                        GET.LVC         VGTIG IN LV COOR AT 2(+7)M/CS IN DELVLVC
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P1485   NAME      S40.2,3
R1486   FUNCTIONAL DESCRIPTION
R1487             COMPUTE GIMBAL ANGLES IF THRUSTING OCCURRED WITH PRESENT IMU
R1488             ORIENTATION, WINGS LEVEL SPACECRAFT,HEADS UP
R1489             COMPUTE X AXIS OF ENGINE BELL
R1490             COMPUTE PREFERRED IMU ORIENTATION(XSCREF)
R1491             FOR THIS CALCULATION,ASSUME X AXIS OF SC ALONG UT INITIALLY,
R1492             YSC=UNIT(XXR),ZSC=UNIT(XX(XXR)) AND ROTATE ENGINE BELL ALONG UT
R1493             NEW SC AXES WILL BE APPROX. WINGS LEVEL AND NEW SC AXES IN REF.
R1494             COORDS. WILL BE PREFERRED IMU ORIENTATION.
R1495             COMPUTE DESIRED THRUST DIRECTION IN SM COORDS.
R1496   SUBROUTINES CALLED
R1497             CALCGA
R1498   ERASABLE INITIALIZATION REQUIRED
R1499             PACTOFF      TOTAL PITCH TRIM ANGLE      SP  AT 1.0795111 REV.
R1500             YACTOFF      TOTAL YAW   TRIM ANGLE      SP  AT 1.0795111 REV.
R1501             UT           DESIRED THRUST DIRECTION           VECT.B2M/(CS.CS)
R1502             RTIG         POSITION AT TIME OF IGNITION       VECT,    B29M
R1503             ENG2FLAG     ON=RCS OFF=SPS
R1504   OUTPUT
R1505             SCAXIS       UNIT VECT. ALIGNED WITH ENG BELL IN SC COOR B1
R1506             XSCREF       UNIT VECTORS ALIGNED WITH PREFERRED IMU      B1
R1507             YSCREF
R1508             ZSCREF
R1509             GIMBAL ANGLES IN THETAD
R1510             POINTVSM     UNIT VECT ALONG DESIRED THRUST DIRECTION IN SM B1

  15109 REF    1                                             COUNT*  $$/S40.2
  1511                          24,2331   64375 1  S40.2,3  VLOAD   MXV
  1512  REF    7  LAST  695     24,2332   03713 1                   UT
  1513  REF   25  LAST  632     24,2333   01734 0                   REFSMMAT
  1514                          24,2334   40372 0           VSL1    SETPD
  1515                          24,2335   00001 0                   0D
  1516  REF   15  LAST  632     24,2336   17357 0           STODL   POINTVSM
  1517  REF   14  LAST  694     24,2337   15336 0                   HI6ZEROS
  1518                          24,2340   41414 0           BON     PUSH
  1519  REF    2  LAST  693     24,2341   00704 1                   ENG2FLAG
  1520  REF    1                24,2342   34157 0                   S40.2,3B
  1521                          24,2343   41335 1           SLOAD   DMP
  1522  REF    4  LAST  292     24,2344   03025 0                   YACTOFF
  1523  REF    1                24,2345   11542 1                   TRIMSCAL
  1524                          24,2346   43352 1           SL1     DAD
  1525  REF    1                24,2347   11544 1                   YBIAS
  1526                          24,2350   71406 0           PUSH    COS
  1527                          24,2351   73525 1           PDDL    SIN
  1528                          24,2352   67206 1           PUSH    SLOAD
  1529  REF   11  LAST  292     24,2353   03024 1                   PACTOFF
  1530                          24,2354   72405 0           DMP     SL1
  1531  REF    2  LAST  696     24,2355   11542 1                   TRIMSCAL
  1532                          24,2356   41415 1           DAD     PUSH
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 1533  REF   1              24,2357  11546 0             PBIAS
 1534                         24,2360  65346 0    COS      PDDL            COS(P +P0) PDL 6
 1535                         24,2361  41556 1    SIN      PUSH            SIN(P +P0) PDL 8D
 1536  REF   1                24,2362  14323 0    STODL    ZSCREF          SIN(P+P0)
 1537                         24,2363  00007 0             6
 1538                         24,2364  72405 0    DMP      SL1
 1539                         24,2365  00005 1             4
 1540                         24,2366  65276 1    DCOMP    PDDL            -SIN(Y+Y0)COS(P+P0) PDL 10
 1541                         24,2367  00007 0             6
 1542                         24,2370  72405 0    DMP      SL1
 1543                         24,2371  00003 1             2
 1544                         24,2372  77666 1    VDEF
 1545  REF   1                24,2373  14307 0    STODL    XSCREF           PD POINTER AT 6 NEW SC X AXIS SCALED AT
 1546  REF   2  LAST  697     24,2374  00323 0             ZSCREF
 1547                         24,2375  72405 0    DMP      SL1
 1548                         24,2376  00005 1             4
 1549                         24,2377  41325 0    PDDL     DMP
 1550  REF   3  LAST  697     24,2400  00323 0             ZSCREF
 1551                         24,2401  00003 1             2
 1552                         24,2402  57552 1    SL1      DCOMP
 1553                         24,2403  77666 1    VDEF
 1554  REF   4  LAST  697     24,2404  14323 0    STODL    ZSCREF          PD POINTER AT 4 NEW SCZ AXIS SCALED AT 2
 1555                         24,2405  77666 1    VDEF
 1556  REF   1                24,2406  14315 0    STODL    YSCREF          PD POINTER AT0 NEW SC Y AXIS SCALED AT 2
 1557  REF   5  LAST  697     24,2407  00323 0             ZSCREF
 1558                         24,2410  65325 0    PDDL     PDDL
 1559  REF   2  LAST  697     24,2411  00315 0             YSCREF
 1560  REF   2  LAST  697     24,2412  00307 0             XSCREF
 1561                         24,2413  77666 1    VDEF
 1562  REF  20  LAST  632     24,2414  27351 0    STOVL    SCAXIS          ENGINE BELL SCALED AT 2
 1563  REF   8  LAST  696     24,2415  03713 1             UT
 1564                         24,2416  53515 0    PDVL     UNIT
 1565  REF   8  LAST  695     24,2417  03632 0             RTIG
 1566                         24,2420  57435 1    VXV      VCOMP
 1567                         24,2421  00001 0             0
 1568                         24,2422  41456 0    UNIT     PUSH
 1569                         24,2423  77624 1    CALL
 1570  REF   1                24,2424  61702 0             TSTRXUT
 1571                         24,2425  57435 1    VXV      VCOMP
 1572                         24,2426  00001 0             0
 1573                         24,2427  63372 1    VSL1     PDVL            2 RF/SC  IN PDL  120
 1574  REF   3  LAST  697     24,2430  00307 0             XSCREF
 1575                         24,2431  76505 0    VXM      VSL1
 1576                         24,2432  00001 0             0
 1577  REF   4  LAST  697     24,2433  24307 0    STOVL    XSCREF          X OF PREF IMU,X OF SC IN REF COOR. AT 2
 1578  REF   3  LAST  697     24,2434  00315 0             YSCREF
 1579                         24,2435  76505 0    VXM      VSL1
 1580                         24,2436  00001 0             0
 1581  REF   4  LAST  697     24,2437  24315 0    STOVL    YSCREF          Y OF PREF.IMU,Y OF SC IN REF COOR. AT 2
 1582  REF   6  LAST  697     24,2440  00323 0             ZSCREF
 1583                           24,2441   76505 0            VXM     VSL1
 1584                           24,2442   00001 0                    0
 1585    REF   7  LAST  697     24,2443   00323 0            STORE   ZSCREF        Z OF PREF. IMU,Z OF SC IN REF COOR. AT 2
 15855   REF   2 LAST  693 TO  694:       21     21*         COUNT*  $$/P40

 1586                           24,2444   77414 0  P40SXTY   SET     EXIT
 1587    REF   1                24,2445   01073 1                    PFRATFLG
 1588    REF   3  LAST  559     24,2446 0 3202 1             TCR     SETMINDB -1   NARROW DEADBAND FOR MANEUVER (EBANK6)
 1589    REF  47  LAST  652     24,2447 0 5561 0             TC      DOWNFLAG
 15895   REF   9  LAST  632     24,2450   00124 0            ADRES   3AXISFLG
 1590    REF 142  LAST  693     24,2451 0 4636 0             TC      BANKCALL
 1591    REF   5  LAST  632     24,2452   56074 1            CADR    R60CSM        ATTITUDE MANEUVER
 15912   REF  47  LAST  633     24,2453 0 5402 1             TC      PHASCHNG      COMPTGO DESTROYS
 15914                          24,2454   00014 1            OCT     00014         4.1 RESTART SETUP
 1592    REF  68  LAST  645     24,2455 4 4770 1             CS      ONE           FOR UPDATEVG
 1593    REF   2  LAST  110     24,2456  55'724 0            TS      NBRCYCLS
 1594    REF 145  LAST  694     24,2457 0 6006 1             TC      INTPRET
 1595                           24,2460   77614 1            BON
 1597    REF   3  LAST  696     24,2461   00704 1                    ENG2FLAG      P40 OR P41 ?
 1598    REF   1                24,2462   51626 1                    P41/DSP
 1599                           24,2463   51575 1            VLOAD   ABVAL         FOR R2
 1600    REF  11  LAST  695     24,2464   03721 0                    VGTIG
 1601    REF   5  LAST  644     24,2465   17763 0            STODL   VGDISP
 1602    REF  15  LAST  696     24,2466   15336 0                    HI6ZEROS
 1603    REF   8  LAST  537     24,2467   17426 1            STODL   DVTOTAL
 1604    REF   1                24,2470   11560 1                    S40.8ADS
 1605    REF   4  LAST  528     24,2471   01062 1            STORE   AVEGEXIT
 1606                           24,2472   77776 1            EXIT
 1607    REF   1                24,2473 3 3517 1   P40GMB    CAF     P40CKLS2      (4.1 PROTECTION)
 1608    REF 143  LAST  698     24,2474 0 4636 0             TC      BANKCALL
 1609    REF   4  LAST  629     24,2475   21067 0            CADR    GOPERF1
 1610    REF   1                24,2476 1 3403 1             TCF     POST41        V34
 1611    REF   1                24,2477 1 2560 1             TCF     TST,TRIM      V33
 1612    REF  32  LAST  564     24,2500 4 4770 1   TRIMONLY  CS      BIT1          SET MRKRTEMP FOR GIMBAL TRIM  (-1)
 1613    REF   1                24,2501  55'444 0    +1      TS      MRKRTMP       ENTRY FROM TST,TRIM
 1614    REF 124  LAST  645     24,2502 3 4772 1             CAF     ZERO          SET CNTR  +0 FOR RESTART LOGIC IN S40.6
 1615    REF   2  LAST  200     24,2503  55'446 1            TS      CNTR                +0 SAYS NORMAL ENTRY.
A1616                                                                                    +1 (PRE40.6) SAYS RESTART ENTRY
 1617    REF  69  LAST  698     24,2504 3 4770 0             CAF     ONE
 1618    REF  18  LAST  645     24,2505 0 5233 0             TC      WAITLIST
 1619    REF  17  LAST  693     E6,1465                      EBANK=  DAPDATR1
 1620    REF   1                24,2506   02366 0            2CADR   S40.6
 1620    REF   1                24,2507   40066 0
 1621    REF   2  LAST  698     24,2510  11'444 0            CCS     MRKRTMP       TEST TO FIND TIME TO WAIT FOR GIMBALTEST
 1622    REF   1                24,2511 3 3523 0             CAF     18SEC          PLUS, DELAY FOR 18 SECONDS
 1623                           24,2512 1 2514 1             TCF     +2            HOLE
 1624    REF   1                24,2513 3 3525 0             CAF     5SEC          DELAY FOR TRIM ONLY TASK
 1625    REF 144  LAST  698     24,2514 0 4636 0             TC      BANKCALL
 1626    REF   8  LAST  589     24,2515   01731 0            CADR    DELAYJOB
 16262   REF   1                24,2516 3 3514 1             CAF     V06N40
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L         P40-P47                                                                                USER'S PAGE NO.   9      E6 S3

 16264  REF   4  LAST  645   24,2517  54 777 1                TS       NVWORD1             FORCE CLOCKJOB
 1627   REF  18  LAST  645   24,2520  0 5362 0                TC       2PHSCHNG
 1628                        24,2521   00026 0                OCT      00026               6.2 = PRE40.6(-0CS), CLOKTASK(100CS)
 1629                        24,2522   00234 1                OCT      00234               4.23 = P40S/SV (PRIO12)
 1630   REF   1              01,2154                4P23SPT1 =        4.23SPOT
 1631   REF   2  LAST  230   01,2317                6P2SPT1  =        6.2SPOT
 1635   REF   7  LAST  652   24,2523  0 4606 0      P40S/SV  TCR      E7SETTER             JOB, 4.23 PROTECTS, PRIO12
 1636   REF  52  LAST  693   E7,1412                         EBANK=   TIG
 1637   REF 146  LAST  698   24,2524  0 6006 1                TC       INTPRET
 1638                        24,2525   45345 1                DLOAD    DSU
 1639   REF  53  LAST  699   24,2526   03413 1                         TIG
 1640   REF   6  LAST  693   24,2527   03460 0                         AVEGDT              29.96 SEC (P40) 100.00 SEC (P15)
 1641   REF  27  LAST  683   24,2530   00041 1                STORE    TDEC1
 1642                        24,2531   77624 1                CALRB                        RETURN IN BASIC
 1643   REF   1              24,2532   27576 0                         MIDTUAV1
 1644   REF   1              24,2533  0 2542 0                TC       P40SET              P15 INTEGRATION ALWAYS RETURNS HERE
 1645                        24,2534  0 0006 1      P40SNEWM EXTEND                        INTEGRATION TIME GREATER THAN ALLOWED
 1646   REF   5  LAST  317   24,2535  3 1105 1                DCA      PIPTIME1
 1647   REF  54  LAST  699   24,2536  53'413 1                DXCH     TIG
 1648                        24,2537  0 0006 1                EXTEND
 1649   REF   2  LAST  693   24,2540  3 3530 1                DCA      SEC29.96
 1650   REF  55  LAST  699   24,2541  21'413 1                DAS      TIG                 SET NEW TIG FOR V06N40
 1651                        24,2542  0 0006 1      P40SET   EXTEND
 1652   REF 262  LAST  678   24,2543  3 0155 0                DCA      MPAC                DELTA TIME TO PREREAD
 1653   REF  12  LAST  527   24,2544  53'673 0                DXCH     P40TMP
 1654                        24,2545  0 0006 1                EXTEND
 1655   REF   1              24,2546  4 3525 1                DCS      5SECDP              FOR TIGBLNK
 16555  REF  13  LAST  699   24,2547  21'673 0                DAS      P40TMP
 1656                        24,2550  0 0006 1                EXTEND
 1657   REF  14  LAST  699   24,2551  3 1673 1                DCA      P40TMP
 1658   REF   3  LAST  527   24,2552  0 5332 0                TC       LONGCALL
 1659   REF  56  LAST  699   E7,1412                          EBANK=   TIG
 1660   REF   3  LAST  233   24,2553   02565 0                2CADR    TIGBLNK
 1660                        24,2554   50067 0
 1661   REF  48  LAST  698   24,2555  0 5402 1                TC       PHASCHNG
 1662                        24,2556   20214 1                OCT      20214               4.21 = TIGBLNK (P40TMP CS)
 16625  REF   1              01,2151                4P21SPT1 =        4.21SPOT
 1663   REF  68  LAST  632   24,2557  1 5205 1                TCF      ENDOFJOB

 1664   REF  33  LAST  698   24,2560  3 4770 0      TST,TRIM CAF      BIT1                SET UP FOR GIMB DRIVE TEST AND TRIM (+1)
 1665   REF   1              24,2561  1 2501 0                TCF      TRIMONLY +1

 1666   REF 145  LAST  698   24,2562  0 4636 0      P40BLNKR TC       BANKCALL
 1667   REF   3  LAST  537   24,2563   20715 0                CADR     CLEANDSP            REMOVE RESIDUE
 1668   REF  69  LAST  699   24,2564  1 5205 1                TCF      ENDOFJOB
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P1669
 1670    REF   2  LAST  698     24,2565  3 3525 0  TIGBLNK  CAF     5SEC             CALL TIGAVEG IN 5 SEC AT TIG - AVEGDT
 1671    REF   9  LAST  531     24,2566  0 5223 1           TC      TWIDDLE
 1672    REF   2  LAST  234     24,2567   02602 1           ADRES   TIGAVEG
 1673    REF 125  LAST  698     24,2570  3 4772 1           CAF     ZERO             DISABLE HERE, NOT IN P40BLNKR
 1674    REF   5  LAST  699     24,2571  54 777 1           TS      NVWORD1
 1675    REF   4  LAST  555     24,2572  3 5053 1           CAF     PRIO14
 1676    REF  11  LAST  585     24,2573  0 5121 0           TC      NOVAC
 1677    REF  57  LAST  699     E7,1412                     EBANK=  TIG
 1678    REF   1                24,2574   02562 1           2CADR   P40BLNKR         DONT PROTECT-RESTARTS BLANK DSKY
 1678    REF   1                24,2575   50067 0
 1679    REF   3  LAST  243     24,2576  4 4342 1           CS      OCT37            4.37 = TIGAVEG (500CS)
 1680    REF   2  LAST  438     24,2577  0 4126 0  P40TSK   TC      NEWPHASE
 1681                           24,2600   00004 0           OCT     4
 16815   REF   1                01,2176            4P37SPT1 =       4.37SPOT
 1682    REF  27  LAST  557     24,2601  0 5314 1           TC      TASKOVER

 1683    REF  58  LAST  700     E7,1412                     EBANK=  TIG
 16841   REF  13  LAST  521     24,2602  31'214 1  TIGAVEG  CAE     MODREG           TASK (4.37 PROTECTS)
 16842   REF  27  LAST  579     24,2603  7 4763 0           MASK    BIT6
 16843                          24,2604  0 0006 1           EXTEND                   P15 OR P40/P41 ?
 16844   REF   1                24,2605  1 2631 0           BZF     P15AVEG          P15
 16845   REF   1                24,2606  4 4765 0           CS      PFRATBIT         P40/P41
 16846   REF  12  LAST  589     24,2607  7 0076 1           MASK    FLAGWRD2
 16847   REF  13  LAST  700     24,2610  54 076 1           TS      FLAGWRD2
 1685    REF  28  LAST  597     24,2611  30 075 0           CAE     FLAGWRD1
 1686    REF   1                24,2612  7 4756 0           MASK    ENG2BIT
 1687    REF 161  LAST  599     24,2613  10 000 0           CCS     A                P40 OR P41 ?
 1688    REF   1                24,2614  1 3642 0           TCF     P41REDSP
 1689    REF   2  LAST  698     24,2615  3 3514 1           CAF     V06N40           UNBLANK DISPLAY
 1690    REF   6  LAST  700     24,2616  54 777 1           TS      NVWORD1
 1691    REF   1                24,2617  3 3522 1           CAF     SEC24.96
 1692    REF  10  LAST  700     24,2620  0 5223 1           TC      TWIDDLE
 1693    REF   2  LAST  232     24,2621   02634 1           ADRES   TIG-5
 1694    REF  19  LAST  630     24,2622  4 6211 1           CS      SIX              4.6 = TIG-5 (2496CS), PRECHECK (-0CS)
 1695    REF   3  LAST  700     24,2623  0 4126 0  TTGPHS   TC      NEWPHASE         ENTRY FROM P41REDSP (P41) WITH A=-4, OR
 1696                           24,2624   00004 0           OCT     4                       FROM TIGON    (P47) WITH A=-2
 16962   REF   2  LAST  230     01,2102            4P25PT1  =       4.25POT
 16964   REF   1                01,2110            4P4SPT1  =       4.4SPOT
 16966   REF   1                01,2116            4P6SPT1  =       4.6SPOT
 1697    REF   2  LAST  540     24,2625  11'166 0  PRECHECK CCS     PHASE5           HAS SERVICER BEEN RESTARTED
 1698    REF  28  LAST  700     24,2626  1 5314 0           TCF     TASKOVER         YES, DONT START ANOTHER ONE
 1699    REF  42  LAST  693     24,2627  0 4655 0           TC      POSTJUMP
 1700    REF   2  LAST  235     24,2630   76607 1           CADR    PREREAD

 17001   REF   1                24,2631  3 3513 0  P15AVEG  CAF     V06N958
 17002   REF   7  LAST  700     24,2632  54 777 1           TS      NVWORD1          UNBLANK DISPLAY
 17006   REF   4  LAST  232     24,2633  1 2625 0           TCF     PRECHECK
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L         P40-P47                                                                                     USER'S PAGE NO.  11       E7 S3

P1701
  1702    REF  59  LAST  700    E7,1412                               EBANK=  TIG
  1703    REF   3  LAST  700    24,2634  3 3525 0   TIG-5             CAF     5SEC
  1704    REF  19  LAST  698    24,2635  0 5233 0                     TC      WAITLIST
  1705    REF  18  LAST  698    E6,1465                               EBANK=  DAPDATR1
  1706    REF   3  LAST  233    24,2636   02651 1                     2CADR   TIG-0
  1706                          24,2637   50066 1
  1707    REF  19  LAST  550    24,2640  4 4760 0                     CS      BIT9                WILL CAUSE V99 FLASH
  1708    REF   8  LAST  700    24,2641  54 777 1                     TS      NVWORD1
  1709    REF  19  LAST  699    24,2642  0 5362 0                     TC      2PHSCHNG
  1710                          24,2643   40074 0                     OCT     40074               A, 4.7 = TIG-0 (500CS)
  1711                          24,2644   00033 1                     OCT     00033               A, 3.3 = S40.13 (PRIO20)
  17119   REF   2  LAST  230    01,2060             3P3SPT1   =       3.3SPOT
  1712    REF   1               01,2132             4P7SPT1   =       4.7SPOT
  1713    REF   1               24,2645  0 5134 1                     TC      FINVAC20
  1714    REF   7  LAST  234    E7,1427                               EBANK=  TGO
  1715    REF   2  LAST  231    24,2646   02534 1                     2CADR   S40.13
  1715                          24,2647   34067 1
  1716    REF  29  LAST  700    24,2650  1 5314 0                     TCF     TASKOVER
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P1717
 1718     REF  19  LAST  701   E6,1465                             EBANK= DAPDATR1      TASK, 4.7 PHASE OR 4.11 (-0 CS IN R40)
 1719     REF   4  LAST  531   24,2651  4 0103 1  TIG-0      CS     FLAGWRD7      SET IGN FLAG
 1720     REF   1              24,2652  7 4754 1             MASK   IGNFLBIT
 1721     REF   5  LAST  702   24,2653  26 103 1             ADS    FLAGWRD7
 1722     REF   6  LAST  702   24,2654  30 103 0             CAE    FLAGWRD7      CHECK ASTN FLAG FOR V99 RESPONSE
 1723     REF  24  LAST  558   24,2655  7 4755 0             MASK   BIT12
 1724                          24,2656  0 0006 1             EXTEND
 1725     REF  30  LAST  701   24,2657  1 5314 0             BZF    TASKOVER      WAIT FOR V99P
 1726     REF   3  LAST  700   24,2660  3 3514 1             CAF    V06N40        CLEAR THE V99 (IN CASE OF A RESTART
 1727     REF   9  LAST  701   24,2661  54 777 1             TS     NVWORD1             DURING THE V99 SEQUENCE)
 1728     REF  49  LAST  699   24,2662  0 5402 1             TC     PHASCHNG      V99P HAS COME ALREADY, DO IGNITION NOW
 1729                          24,2663   00274 0             OCT    00274         A, 4.27 = IGNITION (-0CS) TBASE OLD
 17295    REF   1              01,2162            4P27SPT1 =      4.27SPOT
 1730     REF  13  LAST  596   24,2664  30 032 0  IGNITION CAE    CDUX          SAVE FOR ROLL DAP REFERENCE OGAD
 1731     REF   1              24,2665  55'447 0             TS     OGAD                V99PJOB (CLOCKJOB) SETS UP IGNITION
 1732                          24,2666  0 0006 1             EXTEND                     TASK (4.61 PROTECTION)
 1733     REF  24  LAST  579   24,2667  3 0025 0             DCA    TIME2               FOR RESTARTS
 1734     REF   7  LAST  531   24,2670  53'022 1             DXCH   TEVENT
 1735     REF  10  LAST  448   24,2671  4 0101 0             CS     FLAGWRD5      SET ENGONFLG
 1736     REF   4  LAST  209   24,2672  7 4762 1             MASK   ENGONBIT
 1737     REF  11  LAST  702   24,2673  26 101 0             ADS    FLAGWRD5
 1738     REF  25  LAST  652   24,2674  3 4754 0  SPSON      CAF    BIT13         TURN ON SPS ENGINE
 1739                          24,2675  0 0006 1             EXTEND
 1740     REF  20  LAST  597   24,2676  05 011 1             WOR    DSALMOUT
 17401    REF  14  LAST  555   24,2677  4 0106 1             CS     FLGWRD10      SET BURNFLAG TO INDICATE
 17402    REF   1              24,2700  7 4757 1             MASK   BURNBIT       THAT THEN CSM DID THE BURN
 17403    REF  15  LAST  702   24,2701  26 106 1             ADS    FLGWRD10

 1741     REF   1              24,2702  3 4760 1  IMPULCHK CAF    IMPULBIT      CHECK FOR IMPULSIVE BURN
 1742     REF  14  LAST  700   24,2703  7 0076 1             MASK   FLAGWRD2
 1743     REF 162  LAST  700   24,2704  10 000 0             CCS    A
 1744     REF   1              24,2705  1 2773 1             TCF    IMPLBURN      IMPULSIVE
 1745     REF  12  LAST  543   24,2706  4 0102 0             CS     FLAGWRD6      NON-IMPULSIVE, SET STRULLSW FOR STEERULL
 1746     REF   1              24,2707  7 4754 1             MASK   STRULBIT
 1747     REF  13  LAST  702   24,2710  26 102 0             ADS    FLAGWRD6
 1748     REF  10  LAST  543   24,2711  4 4076 0  PREPTVC  CS     DPCONFIG      RESET T5 BITS
 1749     REF  14  LAST  702   24,2712  7 0102 0             MASK   FLAGWRD6
 1750     REF  15  LAST  702   24,2713  54 102 0             TS     FLAGWRD6
 1751                          24,2714  0 0006 1             EXTEND               KILL RCS
 1752     REF   1              24,2715  3 3550 1             DCA    T5IDL24
 1753     REF   8  LAST  550   24,2716  52 113 0             DXCH   T5LOC
 1754     REF  24  LAST  572   24,2717  4 6214 1             CS     THREE         4.3 = DOTVCON (40CS)
 1755     REF   4  LAST  700   24,2720  0 4126 0             TC     NEWPHASE
 1756                          24,2721   00004 0             OCT    4
 17565    REF   2  LAST  230   01,2124            4P3SPT1  =      4.3SPOT
 1757     REF   2  LAST  531   24,2722  0 5255 0             TC     FIXDELAY
 1758                          24,2723   00050 1             DEC    40            0.4 SECOND DELAY FOR THRUST BUILDUP
 1759     REF  34  LAST  699   24,2724  4 4770 1  DOTVCON  CS     BIT1          SET TVCPHASE = TVCDAPON CALL (FRESHDAP)
 1760     REF   2  LAST  109   24,2725  55'635 1             TS     TVCPHASE
 1761    REF 126  LAST  700   24,2726  3 4772 1               CAF     ZERO           SET TVCEXECUTIVE PHASE
 1762    REF   2  LAST  110   24,2727  55'644 1               TS      TVCEXPHS
 1763    REF  11  LAST  702   24,2730  4 4076 0               CS      DPCONFIG       SET T5 BITS TO INDICATE TVC TAKEOVER....
 1764    REF  16  LAST  702   24,2731  7 0102 0               MASK    FLAGWRD6            BITS 15,14  =  10
 1765    REF   1              24,2732  6 4752 0               AD      CAP1BIT
 1766    REF  17  LAST  703   24,2733  54 102 0               TS      FLAGWRD6
 1767    REF  25  LAST  702   24,2734  3 6214 0               CAF     THREE          6.3 = CLOKTASK (100CS), DROPPING PRE40.6
 1768    REF  73  LAST  631   24,2735  54 001 1               TS      L                   WHICH IS HANDLED NOW BY REDOTVC
 1769                         24,2736  4 0000 0               COM
 1770    REF   2  LAST  197   24,2737  53'170 1               DXCH    -PHASE6
 17705   REF   4  LAST  645   01,2325           6P35PT2       =       6.35POT
 1771                         24,2740  0 0006 1               EXTEND                 STORE RCS ATTITUDE ERRORS FOR USE IN
 1772    REF   7  LAST  188   24,2741  4 1571 1               DCS     ERRGRY         INITIALIZING TVC ATTITUDE ERRORS
 1773    REF   2  LAST  110   24,2742  53'665 1               DXCH    ERRBTMP
 1774    REF  14  LAST  568   24,2743  4 4773 1               CS      FIVE           4.5 = DOSTRULL  ( 160 CS )
 1775    REF   5  LAST  702   24,2744  0 4126 0               TC      NEWPHASE
 1776                         24,2745   00004 0               OCT     4
 17765   REF   1              01,2127           4P5SPT1       =       4.5SPOT
 1777    REF  14  LAST  589   24,2746  3 4750 1               CAF     POSMAX         SET TIME5 FOR STARTING RIGHT AWAY
 1778    REF   6  LAST  550   24,2747  54 030 0               TS      TIME5
 1779                         24,2750  0 0006 1               EXTEND
 1780    REF   1              24,2751  3 3562 0               DCA     TVCON2C        (TVCDAPON)
 1781    REF   9  LAST  702   24,2752  52 113 0               DXCH    T5LOC          (KILLS RCS DAP)
 1782    REF   3  LAST  702   24,2753  0 5255 0               TC      FIXDELAY       0.4 + 1.6 = 2.0 SEC FOR ULLAGE-OFF AND
 1783                         24,2754   00240 1               DEC     160                 STEERING (IF NON-IMPULSIVE)
 1784    REF  18  LAST  703   24,2755  4 0102 0 DOSTRULL      CS      FLAGWRD6       CHECK STRULLSW FOR IMPULSIVE BURN
 1785    REF   2  LAST  702   24,2756  7 4754 1               MASK    STRULBIT
 1786    REF 163  LAST  702   24,2757  10 000 0               CCS     A
 1787    REF   1              24,2760  0 2764 0               TC      ULAGEOFF       ULLAGE OFF
 1788    REF  15  LAST  702   24,2761  4 0076 1 STEERULL      CS      FLAGWRD2       SET STEERSW
 1789    REF   1              24,2762  7 4756 0               MASK    STEERBIT
 1790    REF  16  LAST  703   24,2763  26 076 1               ADS     FLAGWRD2
 1791    REF 127  LAST  703   24,2764  3 4772 1 ULAGEOFF      CAF     ZERO
 1792                         24,2765  0 0006 1               EXTEND
 1793    REF   2  LAST  194   24,2766  01 005 0               WRITE   CHAN5          ZERO CHANNEL 5
 1794                         24,2767  0 0006 1               EXTEND
 1795    REF  14  LAST  214   24,2770  3 4772 1               DCA     NEG0           KILL GROUP 4 (DP NEG0 = -0, +0)
 1796    REF   3  LAST  214   24,2771  53'164 1               DXCH    -PHASE4
 1797    REF  31  LAST  702   24,2772  1 5314 0 ENDIGN        TCF     TASKOVER

 1798    REF   3  LAST  703   24,2773  4 4754 1 IMPLBURN      CS      STRULBIT       RESET STRULLSW (COULD BE AN IMPULSIVE
 1799    REF  19  LAST  703   24,2774  7 0102 0               MASK    FLAGWRD6            ENGINE FAIL)
 1800    REF  20  LAST  703   24,2775  54 102 0               TS      FLAGWRD6
 1801    REF   8  LAST  699   24,2776  0 4606 0               TCR     E7SETTER
 1802    REF  60  LAST  701   E7,1412                         EBANK=  TIG
 1803                         24,2777  0 0006 1               EXTEND                 PREPARE FOR R1 OF V06N40 (CLOCKTASK)
 1804    REF   8  LAST  701   24,3000  3 1430 1               DCA     TGO
 1805    REF  61  LAST  703   24,3001  53'413 1               DXCH    TIG
 1806                         24,3002  0 0006 1               EXTEND
 1807    REF  25  LAST  702   24,3003  3 0025 0               DCA     TIME2
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L         P40-P47                                                                                USER'S PAGE NO.  14       E7 S3

 1808    REF  62  LAST  703   24,3004  21'413 1            DAS     TIG
 1809    REF  20  LAST  701   24,3005  0 5362 0            TC      2PHSCHNG
 1810                         24,3006   40053 0            OCT     40053              A,3.5 = ENGINOFF (TGO+1)....NOTE GROUP
 1811                         24,3007   07014 0            OCT     07014              C, DELTAT AND 2CADR FOLLOW FOR TASK BELO
 18115   REF   1              01,2063           3P5SPT1    =       3.5SPOT
 1812                         24,3010   77777 0            DEC     -0                 -0 CS
 1813    REF  20  LAST  702   E6,1465                      EBANK=  DAPDATR1
 1814    REF   1              24,3011   03016 0            2CADR   IMPLCONT
 1814    REF   1              24,3012   50066 1
 1815    REF   9  LAST  703   24,3013  31'430 1            CAE     TGO +1             (TPAGREE IN S40.13, LESS THAN 600CS)
 1816    REF  11  LAST  700   24,3014  0 5223 1            TC      TWIDDLE
 1817    REF   2  LAST  231   24,3015   03023 0            ADRES   ENGINOFF
 1818    REF   2  LAST  702   24,3016  4 4760 0  IMPLCONT  CS      IMPULBIT           RESET IMPULSW, ENGINOFF IS NOW SET UP
 1819    REF  17  LAST  703   24,3017  7 0076 1            MASK    FLAGWRD2
 1820    REF  18  LAST  704   24,3020  54 076 1            TS      FLAGWRD2
 1821    REF   9  LAST  632   24,3021  0 4611 0            TCR     E6SETTER
 1822    REF  21  LAST  704   E6,1465                      EBANK=  DAPDATR1
 1823    REF   1              24,3022  1 2711 0            TCF     PREPTVC

 1824    REF  10  LAST  704   E7,1427                      EBANK=  TGO                E7 FORCED BY 3.15SPOT VARIABLE DELTA-T
 1825    REF  10  LAST  704   24,3023  0 4611 0  ENGINOFF  TCR     E6SETTER           TASK, 3.15 PHASE (TGO+1 CS)        GET E6
 1826    REF  22  LAST  704   E6,1465                      EBANK=  DAPDATR1
 1827    REF   2  LAST  209   24,3024  0 3045 0  DOSPSOFF  TCR     SPSOFF             SHUT DOWN SPS
 1828    REF   4  LAST  703   24,3025  0 5255 0            TC      FIXDELAY           2.5 SECOND DELAY FOR SPS TAILOFF
 1829                         24,3026   00372 1            DEC     250                RESTART MAY DOUBLE THE DELAY, HIT TEVENT
 1830    REF   3  LAST  559   24,3027  0 3217 0  COTVCRCS  TCR     SETMAXDB           WIDE DEADBAND FOR CUTOFF TRANSIENT
 1831    REF  24  LAST  551   24,3030  0 4714 1            TC      IBNKCALL           SET UP RCS DAP (KILLS TVCDAPS, SETS T5
 1832    REF   3  LAST  262   24,3031   42042 1            CADR    RCSDAPON                BITS, WAITS 0.6SEC FOR TVCEXEC DIE)
 1833    REF  25  LAST  704   24,3032  0 4714 1            TC      IBNKCALL           UPDATE WEIGHT/G AND MASS-PROPERTIES FOR
 1834    REF   3  LAST  266   24,3033   13313 1            CADR    MASSPROP                RCS DAP STARTUP IN 0.6 SECONDS
 1835    REF   2  LAST  209   24,3034  0 3161 1            TCR     TVCZAP             WIPE OUT TVC, TURN OFF CLOKTASK
 1836    REF  21  LAST  704   24,3035  0 5362 0            TC      2PHSCHNG
 1837                         24,3036   00003 1            OCT     00003              KILL GROUP 3 PROTECTION OF ENGINOFF
 1838                         24,3037   00354 0            OCT     00354              A, 4.35 = POSTBURN (NOVAC, PRIO12)
 18385   REF   1              01,2173           4P35SPT1   =       4.35SPOT
 1839    REF   4  LAST  531   24,3040  3 4664 1            CAF     PRIO12             SET UP POSTBURN V16N40 JOB
 1840    REF  12  LAST  700   24,3041  0 5121 0            TC      NOVAC
 1841    REF  23  LAST  704   E6,1465                      EBANK=  DAPDATR1           (SETMAXDB IN POST41)
 1842    REF   2  LAST  233   24,3042   03174 0            2CADR   POSTBURN
 1842                         24,3043   50066 1
 1843    REF  32  LAST  703   24,3044  1 5314 0            TCF     TASKOVER

 1844    REF  24  LAST  704   E6,1465                      EBANK=  DAPDATR1
 18445                        24,3045  0 0004 0  SPSOFF    INHINT
 1845                         24,3046  0 0006 1            EXTEND                     ESTABLISH SPSOFF TEVENT
 1846    REF  26  LAST  703   24,3047  3 0025 0            DCA     TIME2
 1847    REF   8  LAST  702   24,3050  53'022 1            DXCH    TEVENT
 1848    REF   5  LAST  702   24,3051  4 4762 1            CS      ENGONBIT           RESET ENGONFLG
 1849    REF  12  LAST  702   24,3052  7 0101 0            MASK    FLAGWRD5
 1850    REF  13  LAST  704   24,3053  54 101 0            TS      FLAGWRD5           (RESTARTS WILL SHUT DOWN SPS NOW)
 1851   REF  26  LAST  702   24,3054  4 4754 1            CS      BIT13              SHUT DOWN SPS ENGINE
 1852                        24,3055  0 0006 1            EXTEND
 1853   REF  21  LAST  702   24,3056  03 011 1            WAND    OSALMOUT
 1854   REF  31  LAST  563   24,3057  3 4753 1            CAF     BIT14              ISSUE SIV CUTOFF COMMAND
 1855                        24,3060  0 0006 1            EXTEND                     FOR POSSIBLE BACK-UP USE
 1856   REF  34  LAST  550   24,3061  05 012 1            WOR     CHAN12
 1857   REF   3  LAST  702   24,3062  3 1635 0            CA      TVCPHASE           CHECK IF OK FOR TRIM UPDATE
 1858   REF  70  LAST  698   24,3063  6 4770 0            AD      ONE                       THESE CHECKS ARE ONLY NEEDED
 1859                        24,3064  0 0006 1            EXTEND                            FOR A LESS THAN 0.4 SEC BURN
 1860   REF   1              24,3065  1 3101 0            BZF     BTRIMR             NO, INITIALIZATION NOT COMPLETE
 1861   REF  21  LAST  703   24,3066  4 0102 0            CS      FLAGWRD6           YES, CHECK IF TVC
 1862   REF  12  LAST  703   24,3067  7 4076 0            MASK    DPCONFIG
 1863                        24,3070  0 0006 1            EXTEND
 1864   REF   2  LAST  705   24,3071  6 3101 1            BZMF    BTRIMR             NO, NOT TVC YET
 1865   REF   2  LAST  109   24,3072  31'633 0            CAE     REPFRAC            NO TRIM UPDATES IF R40 (ENGFAIL) ACTIVE
 1866                        24,3073  0 0006 1            EXTEND                         (LOTHRUST SETS REPFRAC = 77777)
 1867   REF   3  LAST  705   24,3074  1 3101 0            BZF     BTRIMR
 1868   REF   2  LAST  109   24,3075  31'601 1  BESTTRIM  CAE     DELPBAR            UPDATE TRIMS WITH DELFILTER VALUES
 1869   REF  12  LAST  696   24,3076  55'423 1            TS      PACTOFF
 1870   REF   2  LAST  109   24,3077  31'603 0            CAE     DELYBAR
 1871   REF   5  LAST  696   24,3100  55'424 0            TS      YACTOFF
 1872   REF 130  LAST  592   24,3101  0 0002 0  BTRIMR    TC      Q
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P1873
 18735  REF   1                                      COUNT* $$/S40.8
 1874   REF   3  LAST  698  E6,1446                  EBANK= CNTR
 1875                       24,3102   77775 1 S40.81   VLOAD                TGO LESS THAN 4 SECONDS
 1877   REF  16  LAST  698  24,3103   15336 0                 HI6ZEROS
 1878   REF  11  LAST  182  24,3104   03126 1 RATEZRO  STORE  OMEGAC        TVC TO ATTITUDE HOLD
 1879                       24,3105   77776 1          EXIT
 1880   REF  15  LAST  703  24,3106 3 4750 1           CAF    POSMAX        INHIBIT SWITCHOVER/TVC EG TRACKING
 1881   REF   4  LAST  706  24,3107 55'446 1           TS     CNTR
 1887   REF   9  LAST  703  24,3110 0 4606 0           TCR    E7SETTER
 1888   REF  63  LAST  704  E7,1412                    EBANK= TIG
 1889                       24,3111 0 0004 0           INHINT
 1890                       24,3112 0 0006 1           EXTEND
 1891   REF  64  LAST  706  24,3113 3 1413 0           DCA    TIG
 1892   REF 263  LAST  699  24,3114 52 155 1           DXCH   MPAC
 1893                       24,3115 0 0006 1           EXTEND
 1894   REF  27  LAST  704  24,3116 4 0025 1           DCS    TIME2
 1895   REF 264  LAST  706  24,3117 20 155 1           DAS    MPAC
 1896   REF   6  LAST  557  24,3120 0 7224 1           TCR    DPAGREE
 1897   REF 265  LAST  706  24,3121 30 155 0           CAE    MPAC +1       (LESS THAN 6 (OR 4) SECONDS TO GO)
 1898                       24,3122 0 0006 1           EXTEND
 1899                       24,3123 6 3125 1           BZMF   +2
 1900                       24,3124 1 3126 0           TCF    +2
 1901   REF  71  LAST  705  24,3125 3 4770 0           CAF    ONE
 1902   REF  11  LAST  704  24,3126 55'430 0           TS     TGO +1
 1907   REF  12  LAST  704  24,3127 0 5223 1           TC     TWIDDLE
 1908   REF   3  LAST  704  24,3130   03023 0          ADRES  ENGINOFF
 1909   REF  22  LAST  704  24,3131 0 5362 0           TC     2PHSCHNG
 1910                       24,3132   40053 0          OCT    40053         A,3.5 = ENGINOFF (TGO+1)....NOTE GROUP
 1911                       24,3133   10035 0          OCT    10035         B, 5.3 = REREADAC, AND START BELOW
 19112  REF   2  LAST  704  01,2063           3P5SPT2  =      3.5SPOT
 19114  REF   4  LAST  541  01,2250           5P3SPT2  =      5.3SPOT
 1912   REF  48  LAST  698  24,3134 0 5561 0 CLEARSTR TC     DOWNFLAG      CLEAR IMPULSW, ENGINOFF IS NOW SET UP
 1913   REF   3  LAST  530  24,3135   00042 1          ADRES  STEERSW       RESTARTS OK
 1914   REF   1             24,3136 1 3614 0           TCF    SERVXT

 1915                       24,3137   77776 1 INCRSVG  EXIT                 ALARM INDICATING THAT THRUST IS POINTING
 1916   REF  24  LAST  667  24,3140 0 5671 1           TC     ALARM         IN WRONG DIRECTION.
 1917                       24,3141   01407 0          OCT    01407
 1918   REF   2  LAST  706  24,3142 1 3614 0           TCF    SERVXT

 19185  REF   1                                      COUNT* $$/R40
 1919                       24,3143   77614 1 LOTHRUST BOFF
 1920   REF   4  LAST  706  24,3144   01344 0                 STEERSW
 1921   REF   2  LAST  531  24,3145   51603 0                 SERVXTI       NO STEERING. EXIT
 1922                       24,3146   77214 0 R40CHECK BON    VLOAD         THRUST FAILURE (LO-OR-NO) INDICATED
 1923   REF   1             24,3147   00711 0                 IDLEFAIL      SET BY V97P. ALLOWS 1 BYPASS IN CASE OF
 1924   REF   3  LAST  706  24,3150   51603 0                 SERVXTI       UNFAVORABLE STEERING SYNCH
 1925   REF  17  LAST  706  24,3151   15336 0 R40START        HI6ZEROS      START OF ENGINE-FAIL (R40) OPERATIONS
 1926   REF  12  LAST  706  24,3152   03126 1          STORE  OMEGAC        PUT TVC IN ATTITUDE HOLD
 1927                          24,3153   77776 1          EXIT
 1928   REF  25  LAST  704    E6,1465                     EBANK=  DAPDATR1
 1929   REF 128  LAST  703    24,3154   4 4772 0          CS      ZERO
 1930   REF   3  LAST  705    24,3155   55'633 1          TS      REPFRAC             KILL TVCDAP CG TRIM TRACKING
 1931   REF  10  LAST  702    24,3156   54 777 1          TS      NVWORD1             SET UP ENGINE-FAIL V97FLASH (CLOCKJOB)
 1932   REF   2  LAST  531    24,3157   1 3134 0          TCF     CLEARSTR
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P1933
 19335  REF   3 LAST  698 TO  706:    286    307*           COUNT* $$/P40
 1934                          24,3160  0 0004 0     -1     INHINT
 1935   REF   1                24,3161  4 3520 1  TVCZAP    CS       OCT02202       DISABLE TVC AND OPT ERR CNTRS, REENGAGE
 1936                          24,3162  0 0006 1            EXTEND                        OPTICS DAC
 1937   REF  35  LAST  705     24,3163  03 012 1            WAND     CHAN12
 1938   REF  35  LAST  702     24,3164  4 4770 1            CS       BIT1           ENABLE T4RUPT OPTICS MONITOR....PERMIT
 1939   REF  21  LAST  452     24,3165  55'323 0            TS       OPTIND               OPTICS-ZERO BUT NOT OPTICS-DRIVE
 1940   REF 129  LAST  707     24,3166  3 4772 1            CAF      ZERO           CLEAR NVWORD1 IN CASE CLOCKJOB WAITING
 1941   REF  11  LAST  707     24,3167  54 777 1            TS       NVWORD1
 1942   REF   2  LAST  531     24,3170  4 4756 0            CS       TIMRBIT        CLEAR TIMRFLAG TO STOP CLOKTASK
 1943   REF   7  LAST  702     24,3171  7 0103 1            MASK     FLAGWRD7
 1944   REF   8  LAST  708     24,3172  54 103 1            TS       FLAGWRD7
 1945   REF 131  LAST  705     24,3173  0 0002 0            TC       Q

 1946   REF  26  LAST  707     E6,1465                      EBANK=   DAPDATR1
 1947   REF   1                24,3174  3 3515 0  POSTBURN  CAF      V16N40         NOVAC, PRIO 12
 1948   REF 146  LAST  699     24,3175  0 4636 0            TC       BANKCALL
 1949   REF   1                24,3176   20716 0            CADR     REFLASH
 1950   REF   2  LAST  698     24,3177  1 3403 1            TCF      POST41         V34 GO FINISH
 1951   REF   1                24,3200  1 3441 1            TCF      P40RCS         PROCEED
 1952   REF   3  LAST  704     24,3201  1 3174 1            TCF      POSTBURN       RECYCLE

 1953   REF  27  LAST  708     E6,1465                      EBANK=   DAPDATR1
 1954                          24,3202  0 0004 0     -1     INHINT
 1955   REF  14  LAST  702     24,3203  3 0032 0  SETMINDB  CA       CDUX           ROUTINE FOR SETTING
 1956   REF  11  LAST  599     24,3204  55'572 1            TS       THETADX        THE MINIMUM DEADBAND
 1957                          24,3205  0 0006 1            EXTEND                  IN AUTOPILOT
 1958   REF   6  LAST  570     24,3206  3 0034 0            DCA      CDUY
 1959   REF   9  LAST  599     24,3207  53'574 1            DXCH     THETADY
 1960   REF   3  LAST  571     24,3210  3 5007 0            CA       MINDB          SHOULD BE CALLED UNDER
 1961   REF   7  LAST  571     24,3211  55'655 1            TS       ADB            INTERRUPT INHIBITED
 1962   REF  25  LAST  592     24,3212  4 4765 0            CS       BIT4           EBANK = E6
 1963   REF  28  LAST  708     24,3213  7 1465 0            MASK     DAPDATR1
 1964   REF  29  LAST  708     24,3214  55'465 0            TS       DAPDATR1
 1965   REF 132  LAST  708     24,3215  0 0002 0            TC       Q

 1966   REF  30  LAST  708     E6,1465                      EBANK=   DAPDATR1
 1967                          24,3216  0 0004 0     -1     INHINT
 1968   REF   1                24,3217  3 3521 1  SETMAXDB  CA       MAXDB          ROUTINE FOR SETTING
 1969   REF   8  LAST  708     24,3220  55'655 1            TS       ADB            THE MAXIMUM DEADBAND IN AUTOPILOT
 1970   REF  31  LAST  708     24,3221  4 1465 0            CS       DAPDATR1
 1971   REF  26  LAST  708     24,3222  7 4765 0            MASK     BIT4           SHOULD BE CALLED UNDER
 1972   REF  32  LAST  708     24,3223  27'465 0            ADS      DAPDATR1       INTERRUPT INHIBITED
 1973   REF 133  LAST  708     24,3224  0 0002 0            TC       Q              EBANK = E6
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P 1974
  1975   REF  65  LAST  706   E7,1412                          EBANK= TIG
  1976   REF   3  LAST  708   24,3225  3 4756 1  CLOKTASK CAF    TIMRBIT         IS TIMRFLAG SET
  1977   REF   9  LAST  708   24,3226  7 0103 1           MASK   FLAGWRD7
  1978   REF 164  LAST  703   24,3227  10 000 0           CCS    A
  1979   REF   1              24,3230  1 3234 0           TCF    CLOCKON
  1980   REF  50  LAST  702   24,3231  0 5402 1           TC     PHASCHNG
  1981                        24,3232   00006 1           OCT    00006           KILL RESTART
  1982   REF  33  LAST  704   24,3233  0 5314 1           TC     TASKOVER
  1983                        24,3234  0 0006 1  CLOCKON  EXTEND
  1984   REF  28  LAST  706   24,3235  3 0025 0           DCA    TIME2
  1985   REF   9  LAST  530   24,3236  53'661 0           DXCH   TTOGO
  1986                        24,3237  0 0006 1           EXTEND
  1987   REF  66  LAST  709   24,3240  4 1413 1           DCS    TIG
  1988   REF  10  LAST  709   24,3241  21'661 0           DAS    TTOGO
  1989   REF  11  LAST  520   24,3242  3 5016 0  SETCLOCK CAF    1SEC
  1990   REF  13  LAST  706   24,3243  0 5223 1           TC     TWIDDLE
  1991   REF   5  LAST  645   24,3244   03225 1           ADRES  CLOKTASK
  1992   REF  12  LAST  708   24,3245  10 777 1           CCS    NVWORD1
  1993                        24,3246  1 3251 0           TCF    +3
  1994   REF   1              24,3247  1 3261 0           TCF    SETTB6
  1995                        24,3250  1 3251 0           TCF    +1
  1996   REF   1              24,3251  4 3511 0           CS     V06N85B         CHECK FOR V06N85B (P41)
  1997   REF  13  LAST  709   24,3252  6 0777 0           AD     NVWORD1
  1998                        24,3253  0 0006 1           EXTEND
  1999   REF   1              24,3254  1 3264 0           BZF    SETUPDYN        V06N85, SO UPDATE N85 FOR DYNAMIC DISP
  2000   REF   3  LAST  585   24,3255  3 7651 1           CAF    PRIO27
  2001   REF  13  LAST  704   24,3256  0 5121 0           TC     NOVAC
  2002   REF  33  LAST  708   E6,1465                     EBANK= CAPDATR1
  2003   REF   1              24,3257   03276 1           2CADR  CLOCKJOB
  2003   REF   1              24,3260   50066 1
  2004   REF  16  LAST  543   24,3261  4 0025 1  SETTB6   CS     TIME1           SET GROUP6 TIMEBASE
  2005   REF   1              24,3262  55'271 0           TS     TBASE6
  2006   REF  34  LAST  709   24,3263  1 5314 0           TCF    TASKOVER

  2007   REF   4  LAST  709   24,3264  3 7651 1  SETUPDYN CAF    PRIO27          SET UP A JOB TO UPDATE N85 (FOR P41=V06)
  2008   REF  30  LAST  590   24,3265  0 5135 0           TC     FINDVAC
  2009   REF  34  LAST  709   E6,1465                     EBANK= CAPDATR1
  2010   REF   1              24,3266   03271 0           2CADR  DYNDISP
  2010   REF   1              24,3267   50066 1
  2011   REF   2  LAST  709   24,3270  1 3261 0           TCF    SETTB6          CLOSE OUT CLOCKTASK

  2012   REF 147  LAST  699   24,3271  0 6006 1  DYNDISP  TC     INTPRET         UPDATE N85 FOR A DYNAMIC V06N85 IN P41,
  2013                        24,3272   77624 1           CALL                       PRIOR TO BLANKING AND AVEG (V16N85)
  2014   REF   1              24,3273   51651 1                  P40CNV85
  2015                        24,3274   77776 1           EXIT
  2016   REF   1              24,3275  1 3306 0           TCF    CKNVWRD1
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P2017
  2018    REF  35  LAST  709   E6,1465                       EBANK=  DAPDATR1
  2019    REF  15  LAST  708   24,3276  30 032 0  CLOCKJOB CAE     CDUX                NOVAC, PRIO 27
  2020    REF   1              24,3277  55'175 1           TS      CDUSPOTX
  2021    REF   7  LAST  708   24,3300  3 0033 1           CA      CDUY
  2022    REF   1              24,3301  55'171 0           TS      CDUSPOTY
  2023    REF  10  LAST  570   24,3302  3 0034 0           CA      CDUZ
  2024    REF   1              24,3303  55'173 1           TS      CDUSPOTZ
  2025    REF 147  LAST  708   24,3304  0 4636 0           TC      BANKCALL
  2026    REF   1              24,3305   47602 0           CADR    QUICTRIG
  2027                         24,3306  0 0004 0  CKNVWRD1 INHINT
  2028    REF  14  LAST  709   24,3307  10 777 1           CCS     NVWORD1             DETERMINE FUNCTION, INDICATED BY NVWORD1
  2029    REF   1              24,3310  1 3466 1           TCF     NOFLASH
  2030    REF  70  LAST  699   24,3311  1 5205 1           TCF     ENDOFJOB
  2031    REF   1              24,3312  1 3427 1           TCF     ENGREQST
  20315   REF   2 LAST  706 TO  708:    13      13*        COUNT*  $$/R40
  2032    REF   4  LAST  702   24,3313  3 3514 1  FAILDSP  CAF     V06N40              SPS ENGINE FAILED - FLASH V97
  2033    REF 148  LAST  710   24,3314  0 4636 0           TC      BANKCALL
  2034    REF   1              24,3315   20727 1           CADR    CLOCPLAY
  2035    REF   1              24,3316  1 3363 0           TCF     V97T                TERMINATE
  2036    REF   1              24,3317  1 3407 0           TCF     V97P                PROCEED
  2037    REF  51  LAST  709   24,3320  0 5402 1  V97E     TC      PHASCHNG            ENTER
  2038                         24,3321   00534 0           OCT     00534               A, 4.53 = V97EJOB (PRIO 30 NOVAC)
  20385   REF   1              01,2220            4P53SPT1 =       4.53SPOT
 A2039                                                                                 IF RESTART,FORCE V97EJOB BEFORE CLOCKJOB
  2040    REF   5  LAST  710   24,3322  3 3514 1  V97EJOB  CAF     V06N40              REDISPLAY V06N40
  2041    REF  15  LAST  710   24,3323  54 777 1           TS      NVWORD1
  2042    REF  10  LAST  706   24,3324  0 4606 0           TCR     E7SETTER
  2043    REF  67  LAST  709   E7,1412                     EBANK=  TIG
  2044    REF   7  LAST  553   24,3325  4 4124 0           CS      OCT24               FORCE R1 OF V06N40 TO READ  59X59
  2045    REF  68  LAST  710   24,3326  55'412 0           TS      TIG
  2046    REF  11  LAST  704   24,3327  0 4611 0           TCR     E6SETTER
  2047    REF   7  LAST  292   E6,1473                     EBANK=  CSMMASS
  2048    REF   3  LAST  704   24,3330  0 3045 0  SPSOFF97 TCR     SPSOFF
  2049    REF   1              24,3331  3 3526 0           CAF     SEC2.5              DELAY 2.5 SECS FOR POSSIBLE TAILOFF
  2050    REF 149  LAST  710   24,3332  0 4636 0           TC      BANKCALL
  2051    REF   9  LAST  698   24,3333   01731 0           CADR    DELAYJOB            **** RESTART CAN DOUBLE DELAY ****
 A2052                                                                                 **** RESTART WILL ALTER TEVENT ****
  2053    REF  36  LAST  708   24,3334  3 4770 0  V97E40.6 CAF     BIT1
  2054    REF  20  LAST  701   24,3335  0 5233 0           TC      WAITLIST
  2055    REF   5  LAST  706   E6,1446                     EBANK=  CNTR
  2056    REF   2  LAST  236   24,3336   02355 0           2CADR   PRE40.6             USE S40.6 RESTART ENTRY TO TRIM ENGINE
  2056                         24,3337   40066 0
  2057    REF  26  LAST  704   24,3340  0 4714 1           TC      IBNKCALL            RCS DAP IN 0.6SEC, SETTING T5 BITS TO
  2058    REF   4  LAST  704   24,3341   42042 1           CADR    RCSDAPON                 KILL TVCEXEC/TVCROLLDAP STARTS.
 A2059                                                                                      LEAVE NARROW DEADBAND FOR REIGNITE
  2060    REF  23  LAST  706   24,3342  0 5362 0           TC      2PHSCHNG
  2061                         24,3343   00026 0           OCT     00026               A, 6.2 = PRE40.6 (-0CS), CLOKTASK (1SEC)
  2062                         24,3344   05024 1           OCT     05024               NOVAC BELOW, PRIO NEXT
  2063                         24,3345   50777 0           OCT     50777               PRIO 27 NOVAC
 20635  REF   3  LAST  699   01,2317             6P2SPT2   =        6.2SPOT
 2064   REF  49  LAST  706   24,3346  0 5561 0   QUICKIGN  TC       DOWNFLAG         CLEAR ASTNFLAG
 2065   REF   1              24,3347   00154 1             ADRES    ASTNFLAG
 2066   REF  57  LAST  655   24,3350  0 5547 1             TC       UPFLAG           AND SET IGNFLAG
 2067   REF   1              24,3351   00153 0             ADRES    IGNFLAG          FOR IMMEDIATE V99 RESPONSE
 2068   REF  20  LAST  701   24,3352  4 4760 0   V99FLASH  CS       BIT9             CAUSE V99 TO FLASH
 2069   REF  16  LAST  710   24,3353  54 777 1             TS       NVWORD1
 2070   REF  24  LAST  710   24,3354  0 5362 0             TC       2PHSCHNG
 2071                        24,3355   40114 1             OCT      40114            A, 4.11 = TIG-0 (-0CS) TBASE FOR PREPTVC
 2072                        24,3356   00033 1             OCT      00033            A, 3.3 = S40.13 (PRIO 20)
 20725  REF   3  LAST  701   01,2060             3P3SPT2   =        3.3SPOT
 2073   REF   1              01,2135             4P11SPT1  =        4.11SPOT
 2074   REF   2  LAST  701   24,3357  0 5134 1             TC       FINVAC20         SET UP TIMEBURN
 2075   REF  12  LAST  706   E7,1427                       EBANK=   TGO
 2076   REF   3  LAST  701   24,3360   02534 1             2CADR    S40.13
 2076                        24,3361   34067 1
 2077   REF  71  LAST  710   24,3362  1 5205 1   ENDV97E   TCF      ENDOFJOB         WAIT FOR CLOCKJOB (IMMEDIATE) REACTION

 2078   REF   8  LAST  710   E6,1473                       EBANK=   CSMMASS
 2079   REF  52  LAST  710   24,3363  0 5402 1   V97T      TC       PHASCHNG         KILL CLOKTASK
 2080                        24,3364   00076 0             OCT      00076            A, 6.7  = V97TJOB (PRIO 27 NOVAC)
 20805  REF   1              01,2333             6P7SPT1   =        6.7SPOT
 2081   REF 130  LAST  708   24,3365  3 4772 1   V97TJOB   CAF      ZERO             DISABLE CLOCKJOB
 2082   REF  17  LAST  711   24,3366  54 777 1             TS       NVWORD1
 2083   REF   4  LAST  710   24,3367  0 3045 0             TCR      SPSOFF           SHUTDOWN SPS ENGINE
 2084   REF   2  LAST  710   24,3370  3 3526 0             CAF      SEC2.5           DELAY 2.5 SECS FOR POSSIBLE TAILOFF :
 2085   REF 150  LAST  710   24,3371  0 4636 0             TC       BANKCALL         FALSE THRUST LOSS
 2086   REF  10  LAST  710   24,3372   01731 0             CADR     DELAYJOB         **** RESTART CAN DOUBLE DELAY ****
A2087                                                                                **** RESTART WILL ALTER TEVENT ****
 2088                        24,3373  0 0004 0             INHINT
 2089   REF  27  LAST  710   24,3374  0 4714 1   V97TRCS   TC       IBNKCALL         RCS DAP IN 0.6SEC, SETTING T5 BITS TO
 2090   REF   5  LAST  710   24,3375   42042 1             CADR     RCSDAPON               KILL TVCEXEC/TVCROLLDAP STARTS
 2091   REF  25  LAST  711   24,3376  0 5362 0   V99T      TC       2PHSCHNG         (ENTRY FROM V97T FLOW TOO)
 2092                        24,3377   00006 1             OCT      00006            KILL PRE40.6/CLOKTASK PROTECTION
 2093                        24,3400   05024 1             OCT      05024            C, PRIORITY NEXT, JOB BELOW
 2094                        24,3401   50777 0             OCT      50777            PRIO 27 NOVAC
 2095   REF   3  LAST  704   24,3402  0 3160 0   V99TJOB   TCR      TVCZAP -1        WIPE OUT TVC, CLOKTASK
 2096                        24,3403  0 0006 1   POST41    EXTEND
 2097   REF   1              24,3404  3 3554 0             DCA      SERVCADR
 2098   REF   5  LAST  698   24,3405  53'062 0             DXCH     AVEGEXIT
 2099   REF  30  LAST  668   24,3406  1 4103 0             TCF      GOTOPOOH

 2100   REF   9  LAST  711   E6,1473                       EBANK=   CSMMASS
 2101   REF  53  LAST  711   24,3407  0 5402 1   V97P      TC       PHASCHNG
 2102                        24,3410   00134 1             OCT      00134            A, 4.13 = V97PJOB (PRIO 30 NOVAC)
 21025  REF   1              01,2140             4P13SPT1  =        4.13SPOT
A2103                                                                                IF RESTART,FORCE V97PJOB BEFORE CLOCKJOB
 2104   REF   6  LAST  710   24,3411  3 3514 1   V97PJOB   CAF      V06N40           REDISPLAY V06N40
 2105   REF  18  LAST  711   24,3412  54 777 1             TS       NVWORD1
 2106   REF  58  LAST  711   24,3413  0 5547 1             TC       UPFLAG           SET IDLEFAIL TO ALLOW R40-BYPASS, IN
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  2107  REF   2  LAST  706   24,3414   00030 1            ADRES   IDLEFAIL              CASE OF UNFAVORABLE STEERING SYNCH
  2108  REF  59  LAST  711   24,3415  0 5547 1            TC      UPFLAG            SET STEERSW TO RE-ENABLE STEERING
  2109  REF   5  LAST  706   24,3416   00042 1            ADRES   STEERSW
  2110  REF   2  LAST  540   24,3417  3 5017 1            CAF     2SECS
  2111  REF 151  LAST  711   24,3420  0 4636 0            TC      BANKCALL
  2112  REF  11  LAST  711   24,3421   01731 0            CADR    DELAYJOB          WAIT 2 SECONDS
 A2113                                                                              **** RESTART CAN DOUBLE DELAY ****
 A2114                                                                              **** RESTART WILL ALTER TEVENT ****
  2115  REF  50  LAST  711   24,3422  0 5561 0  R40ENABL  TC      DOWNFLAG          THEN RE-ENABLE R40 BY CLEARING IDLEFLAIL
  2116  REF   3  LAST  712   24,3423   00030 1            ADRES   IDLEFAIL
  2117  REF  54  LAST  711   24,3424  0 5402 1            TC      PHASCHNG
  2118                       24,3425   00004 0            OCT     00004             KILL GROUP 4
  2119  REF  72  LAST  711   24,3426  1 5205 1  ENDV97P   TCF     ENDOFJOB


  2120  REF   7  LAST  711   24,3427  3 3514 1  ENGREQST  CAF     V06N40
  2121  REF 152  LAST  712   24,3430  0 4636 0            TC      BANKCALL
  2122  REF   2  LAST  710   24,3431   20727 1            CADR    CLOCPLAY
  2123  REF   1              24,3432  1 3376 1            TCF     V99T              TERMINATE
  2124  REF   1              24,3433  1 3471 1            TCF     V99P              PROCEED
  2125  REF  26  LAST  711   24,3434  0 5362 0  V99E      TC      2PHSCHNG          ENTER
  2126                       24,3435   00006 1            OCT     00006             KILL PRE40.67/CLOKTASK PROTECTION
  2127                       24,3436   05024 1            OCT     05024             C, PRIORITY NEXT, JOB BELOW
  2128                       24,3437   50777 0            OCT     50777             PRIO 27 NOVAC
  2129  REF   4  LAST  711   24,3440  0 3160 0  V99EJOB   TCR     TVCZAP -1         WIPE OUT TVC, CLOKTASK
  2130                       24,3441  0 0006 1  P40RCS    EXTEND                    V16N40 ENTERS HERE
  2131  REF   1              24,3442  3 3556 1            DCA     ACADN85
  2132  REF   6  LAST  711   24,3443  53'062 0            DXCH    AVEGEXIT
  2133  REF   3  LAST  712   24,3444  3 5017 1            CAF     2SECS
  2134  REF 153  LAST  712   24,3445  0 4636 0            TC      BANKCALL
  2135  REF  12  LAST  712   24,3446   01731 0            CADR    DELAYJOB
  2136  REF   4  LAST  698   24,3447  0 3202 1  P40MINDB  TCR     SETMINDB -1
  2137                       24,3450  0 0003 1            RELINT
  2138  REF  55  LAST  712   24,3451  0 5402 1  TIGNOW    TC      PHASCHNG
  2139                       24,3452   05024 1            OCT     05024             TYPE C GROUP 4 BELOW FOR NOUN 85
  2140                       24,3453   57777 1            OCT     57777             PRIO 20 NOVAC
  2141  REF   1              24,3454  3 3512 1            CAF     V16N85B
  2142  REF 154  LAST  712   24,3455  0 4636 0            TC      BANKCALL
  2143  REF   2  LAST  708   24,3456   20716 0            CADR    REFLASH
  2144  REF   3  LAST  708   24,3457  1 3403 1            TCF     POST41            FINISH P40/41
  2145  REF   1              24,3460  1 3462 0            TCF     MNKPST41
  2146  REF   1              24,3461  1 3451 0            TCF     TIGNOW            V32 NOT GSOP RESPONSE BUT REDISPLAY N85

 21463                       24,3462  0 0006 1  MNKPST41  EXTEND
 21465  REF   2  LAST  711   24,3463  3 3554 0            DCA     SERVCADR
 21467  REF   7  LAST  712   24,3464  53'062 0            DXCH    AVEGEXIT
 21469  REF   3  LAST  515   24,3465  1 4105 0            TCF     MNKGOPOO

  2147  REF  19  LAST  711   24,3466  30 777 0  NOFLASH   CAE     NVWORD1           DISPLAY NVWORD1 NORMALLY
  2148  REF 155  LAST  712   24,3467  0 4636 0            TC      BANKCALL
 2149   REF   2  LAST  541   24,3470   20721 1             CADR     REGODSP

 21495  REF   4  LAST  669      4000                        SETLOC  FFTAG12
 21496                          4606                        BANK

 21498  REF   1                                             COUNT*  $$/R40
 2150   REF   3  LAST  537      4606  3 5046 0  E7SETTER CAF      EBANK7
 2151   REF  19  LAST  652      4607  56 003 1              XCH      EBANK
 2152   REF  69  LAST  710   E7,1412                        EBANK=  TIG
 2153   REF 134  LAST  708      4610  0 0002 0              TC       Q

 2154   REF   2  LAST  155      4611  3 5045 0  E6SETTER CAF      EBANK6       SET UP EBANK6
 2155   REF  20  LAST  713      4612  56 003 1              XCH      EBANK
 2156   REF  36  LAST  710   E6,1465                        EBANK=  DAPDATR1
 2157   REF 135  LAST  713      4613  0 0002 0              TC       Q

 21575  REF   2  LAST  693   24,2000                        SETLOC  P40S
 21576                       24,3471                        BANK

 21578  REF   3 LAST  710 TO  713:   110   123*             COUNT*  $$/R40
 2158   REF  37  LAST  713   E6,1465                        EBANK=  DAPDATR1
 2159                        24,3471  0 0004 0  V99P        INHINT
 2160   REF  10  LAST  709   24,3472  30 103 0              CAE      FLAGWRD7     CHECK ASTN FLAG FOR PRIOR V99P
 2161   REF   1              24,3473  7 4755 0              MASK     ASTNBIT
 2162   REF 165  LAST  709   24,3474  10 000 0              CCS      A
 2163   REF   1              24,3475  1 3506 0              TCF      V99P/TIG     YES, THIS MUST BE A RESTART ENTRY

 2164   REF   2  LAST  713   24,3476  3 4755 1  ASTNV99P CAF      ASTNBIT      SET ASTNFLAG
 2165   REF  11  LAST  713   24,3477  26 103 1              ADS      FLAGWRD7
 2166   REF  12  LAST  713   24,3500  30 103 0              CAE      FLAGWRD7     CHECK IGN FLAG FOR TIG-0 ARRIVAL
 2167   REF   2  LAST  702   24,3501  7 4754 1              MASK     IGNFLBIT
 2168                        24,3502  0 0006 1              EXTEND
 2169   REF   2  LAST  713   24,3503  1 3506 0              BZF      V99P/TIG     NO, CLEAR THE V99 AND WAIT FOR TIG-0

 2170   REF   2  LAST  365   24,3504  0 5222 0  ENDV99P1 TC       TWIDBIT1     TIG-0 HAS COME ALREADY SET UP IGNTN HERE
 2171   REF   2  LAST  233   24,3505   02664 1              ADRES    IGNITION
 2173   REF   8  LAST  712   24,3506  3 3514 1  V99P/TIG CAF      V06N40       CLEAR THE V99 FLASH AND WAIT FOR TIG-0
 2174   REF  20  LAST  712   24,3507  54 777 1              TS       NVWORD1
 2175   REF  73  LAST  712   24,3510  1 5205 1  ENDV99P  TCF      ENDOFJOB

 21755  REF   4 LAST  708 TO  710:    91   398*             COUNT*  $$/P40
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P2176
 2177                          24,3511   01525 1  V06N85B   VN       0685
 2178                          24,3512   04125 0  V16N85B   VN       1685
 21785                         24,3513   01537 1  V06N95B   VN       0695
 2179                          24,3514   01450 1  V06N40    VN       0640
 2180                          24,3515   04050 0  V16N40    VN       1640
 2181                          24,3516   04123 0  V1683     VN       1683
 2182  REF   4  LAST  390         4355             OCT12     =        TEN
 2184                          24,3517   00204 1  P40CKLS2  OCT      204
 2186  REF   2  LAST  353         4615             OCT27724  =        V8SP3LO
 2189                          24,3520   02202 0  OCT02202  OCT      02202            BITS 2,8,11 FOR CHANNEL 12 TVC/OPTICS
A2192                                             MINDB     DEC      46
 2193                          24,3521   00707 1  MAXDB     DEC      455
 2194                          24,3522   04700 1  SEC24.96  DEC      2496
 2195                          24,3523   03410 1  18SEC     DEC      1800
 2196                          24,3524   00000 1  5SECDP    DEC      0                MAKE DP 5SEC
 2197                          24,3525   00764 1  5SEC      DEC      500
 2199                          24,3526   00372 1  SEC2.5    DEC      250
 2200                          24,3527   00000 1  SEC29.96  2DEC     2996
 2200                          24,3530   05664 0
 2201                          24,3531   02217 1  FENG      2DEC     9.1188544 B-7    SPS THRUST (20500 LBS), SC.AT B+7 NEWT/E4
 2201                          24,3532   06650 1
 2202                          24,3533   00013 0  FRCS2     2DEC     .087437837 B-7   RCS ULLAGE (199.6COS10 LBS), SC.AT
 2202                          24,3534   06112 0
A2203                                                                                       B+7 NEWTONS/E+4
 2205                          24,3535   04000 0  EP4(45)H  2DEC     .125
 2205                          24,3536   00000 1
 2206                          24,3537   00707 1  EP4(10)H  2DEC     .027777777
 2206                          24,3540   03434 1
 2207                          24,3541   21215 1  TRIMSCAL  2DEC     1.07975111 B-1
 2207                          24,3542   12215 1
 2208                          24,3543   00053 1  YBIAS     2DEC     +.00263888889    YAW   MECH BIAS (+0.95 DEG, THRUST ON)
 2208                          24,3544   07423 0
 2209                          24,3545   77636 1  PBIAS     2DEC     -.00597222222    PITCH MECH BIAS (-2.15 DEG, THRUST ON)
 2209                          24,3546   44653 1
A2210                                                                               REFERENCE, TRW 68.6520.3.3-40 27FEB,1968
 2215  REF  38  LAST  713      E6,1465                      EBANK=   DAPDATR1
 2216  REF   3  LAST  271      24,3547   03226 1  T5IDL24   2CADR    T5IDLOC
 2216                          24,3550   12066 1
 2217  REF  70  LAST  713      E7,1412                      EBANK=   TIG
 2218  REF   1                 24,3551   03706 0  ACADN83   2CADR    CALCN83
 2218  REF   1                 24,3552   50067 0
 2219  REF  71  LAST  714      E7,1412                      EBANK=   TIG
 2220  REF   1                 24,3553   03143 1  SERVCADR  2CADR    SERVEXIT
 2220  REF   1                 24,3554   76067 1
 2221  REF  39  LAST  714      E6,1465                      EBANK=   DAPDATR1
 2222  REF   1                 24,3555   03576 0  ACADN85   2CADR    CALCN85
 2222  REF   1                 24,3556   50066 1
 2223  REF  40  LAST  714      E6,1465                      EBANK=   DAPDATR1
 2224  REF   1                 24,3557   02176 0  S40.8ADS  2CADR    S40.8
 2224  REF   1                 24,3560   34066 0
 2225   REF  41  LAST  714   E6,1465                        EBANK= DAPDATR1
 2226   REF   1              24,3561   02163 1  TVCON2C  2CADR  TVCDAPON
 2226   REF   1              24,3562   36066 1
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P2227
  2228    REF   1                   30,2000                        SETLOC P40S3
  2229                              30,3650                        BANK
  2230    REF   1                                                  COUNT* $$/P40
  2231                              30,3650    45020 1   AGAIN     STQ    CALL
  2232    REF   1                   30,3651    03730 0                    QTEMP1
  2233    REF   4  LAST   644       30,3652    27145 1                    THISPREC
  2234                              30,3653    66134 1             SXA,2  SXA,1
  2235    REF  13  LAST   688       30,3654    03746 1                    RTX2
  2236    REF  13  LAST   681       30,3655    03745 1                    RTX1
  2237                              30,3656    40375 1             VLOAD  SETPD
  2238    REF  19  LAST   655       30,3657    00001 0                    RATT
  2239                              30,3660    00001 0                    0D
  2240    REF   9  LAST   697       30,3661    03632 0             STORE  RTIG
  2241    REF  11  LAST   695       30,3662    27570 0             STOVL  RINIT
  2242    REF  19  LAST   677       30,3663    00007 0                    VATT
  2243    REF   9  LAST   694       30,3664    03640 0             STORE  VTIG
  2244    REF  10  LAST   694       30,3665    03576 0             STORE  VINIT
  2245                              30,3666    65335 1             SLOAD  PDDL
  2246    REF  18  LAST   706       30,3667    15336 0                    HI6ZEROS
  2247    REF   1                   30,3670    11536 1                    EP4(45)H
  2248                              30,3671    71214 0             BON    DLOAD
  2249    REF   3  LAST   491       30,3672    03705 0                    NORMSW
  2250                              30,3673    61675 1                    +2
  2251    REF   1                   30,3674    11540 0                    EP4(10)H
  2252                              30,3675    45006 0             PUSH   CALL
  2253    REF   2  LAST   480       30,3676    22000 1                    INITVEL
  2254                              30,3677    52001 1             SETPD  GOTO
  2255                              30,3700    00001 0                    0
  2256    REF   2  LAST   716       30,3701    03730 0                    QTEMP1

  2257                              30,3702    46145 0   TSTRXUT   DLOAD  BHIZ
  2258                              30,3703    00045 0                    36D
  2259    REF   1                   30,3704    61707 0                    BADVCTOR
  2260                              30,3705    43575 1             VLOAD  RVQ
  2261                              30,3706    00007 0                    6D
  2262                              30,3707    53575 0   BADVCTOR  VLOAD  UNIT
  2263    REF  10  LAST   716       30,3710    03632 0                    RTIG
  2264                              30,3711    53515 0             PDVL   UNIT
  2265    REF  10  LAST   716       30,3712    03640 0                    VTIG
  2266                              30,3713    53322 1             VSR3   VAD
  2267                              30,3714    53435 0             VXV    UNIT
  2268    REF   9  LAST   697       30,3715    03713 1                    UT
  2269                              30,3716    77676 0             VCOMP
  2270                              30,3717    00007 0             STORE  6D
  2271                              30,3720    77616 0             RVQ
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P2272
  2273                               30,3721   67214 1  SETUP.9  BON     SLOAD
  2274    REF   2  LAST  694         30,3722   01310 1                   FIRSTFLG
  2275    REF   1                    30,3723   61736 1                   SURELY.9
  2276    REF   2  LAST  110         30,3724   03326 0                   NBRCYCLP
  2277                               30,3725   74301 0           NORM    VXSC          (NORM  HANDLES ZERO PROPERLY)
  2278    REF  25  LAST  689         30,3726   00047 1                   X1
  2279    REF   3  LAST  694         30,3727   03705 0                   BDT
  2280                               30,3730   53257 1           VSR*    VAD
  2281                               30,3731   20563 0                   0 -14D,1
  2282    REF   1                    30,3732   03646 0                   VGTEMP
  2283                               30,3733   77651 0           VSU
  2284    REF   2  LAST  110         30,3734   03327 1                   DELVSUM
  2285    REF   1                    30,3735   03721 0           STORE   VGPREV
  2286                               30,3736   77776 1  SURELY.9 EXIT
  2287    REF   7  LAST  592         30,3737  3 4754 0           CAF     PRIO10
  2288    REF  31  LAST  709         30,3740  0 5135 0           TC      FINDVAC
  2289    REF  42  LAST  715         E6,1465                     EBANK=  CAPDATR1
  2290    REF   1                    30,3741   02400 1           2CADR   S40.9
  2290    REF   1                    30,3742   34066 0
  2291    REF  27  LAST  712         30,3743  0 5362 0           TC      2PHSCHNG
  2292                               30,3744   00051 0           OCT     00051         A, 1.5 = REDO40.9, PRIO 10
  2293                               30,3745   10035 0           OCT     10035
  22932   REF   1                    01,2017            1P5SPT1  =       1.5SPOT
  22934   REF   5  LAST  706         01,2250            5P3SPT3  =       5.3SPOT
  2294    REF 148  LAST  709         30,3746  0 6006 1           TC      INTPRET
  2295                               30,3747   77775 1           VLOAD
  2296    REF   8  LAST  547         30,3750   01030 0                   RN            ACTIVE VEHICLE RADIUS VECTOR AT TI
  2297    REF  12  LAST  716         30,3751   27570 0           STOVL   RINIT
  2298    REF   9  LAST  547         30,3752   01036 0                   VN            ACTIVE VEHICLE VELOCITY VECTOR AT TI
  2299    REF  11  LAST  716         30,3753   17576 0           STODL   VINIT
  2300    REF   7  LAST  647         30,3754   01044 0                   PIPTIME
  2301    REF   2  LAST  126         30,3755   03474 0           STORE   TNIT
  2302                               30,3756   77621 1           BDSU
  2303    REF   8  LAST  481         30,3757   03656 1                   TPASS4
  2304    REF   7  LAST  493         30,3760   27423 1           STOVL   DELLT4
  2305    REF  19  LAST  716         30,3761   15336 0                   HI6ZEROS
  2306    REF   3  LAST  717         30,3762   17327 1           STODL   DELVSUM
  2307    REF  20  LAST  717         30,3763   15336 0                   HI6ZEROS
  2308    REF   3  LAST  698         30,3764   03325 0           STORE   NBRCYCLS
  2309                               30,3765   77650 1           GOTO
  23095   REF   1                    30,3766   34360 0                   VGCORP
```

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P2310    NAME      S40.6  GIMBAL DRIVE TEST AND/OR GIMBAL TRIM
R2311    FUNCTIONAL DESCRIPTION
R2312          GIMBAL DRIVE TEST.....0,+2,-2,0  DEGREE ENGINE COMMANDS, AT 2 SECOND
R2313              INTERVALS, FIRST IN PITCH, THEN IN YAW. ASTRONAUT VERIFICATION
R2314              OF GIMBAL MOTION ON GPI
R2315          GIMBAL TRIM....AFTER A 4 SECOND DELAY,ENGINE COMMANDED TO
R2316              PRE-COMPUTED TRIM POSITION. ASTRONAUT VERIFICATION ON GPI.
R2317          PRE40.6.....RESTART ENTRY TO RE-DO S40.6, ONLY IF RCS IS ON - IF TVC
R2318               IS NOT ON - PRIMARILY TO GET ACTUATORS TRIMMED FOR IGNITION.
R2319               BYPASS 4 SEC DELAY.  SPEED IS CRITICAL NEAR IGNITION.
R2320               IF TVC IS ON (TVCDAPON OR LATER)  THEN REDOTVC WILL TAKE CARE
R2321               OF RESTARTING ACTUATORS.
R2322    CALLING SEQUENCE....
R2323          WAITLIST,  WITH 2CADR FOR S40.6 (OR PRE40.6),  WITH EBANK= CNTR
R2324    NORMAL EXIT MODE - FIXDELAY, TASKOVER
R2325    SUBROUTINES CALLED....
R2326          FIXDELAY
R2327    ERASEABLE INITIALIZATION REQUIRED
R2328          CNTR = +0,  NORMALLY SET BY THE P40 CALL AT TST,TRIM
R2329          MRKRTMP...POSITIVE FOR GIMBAL DRIVE TEST AND GIMBAL TRIM (BOTH)
R2330                    NEGATIVE FOR GIMBAL TRIM ONLY
R2331          PACTOFF, YACTOFF SC.AT 85.41 ARCSEC/BIT  (V48N48 P,YTRIM)
R2332          ..SC CONT.. SWITCH AT ..CMC.. (A/P CONTROL SWITCH AT ..GNC..)
R2333          ACTIVE SPS GIMBAL MOTOR POWER(S),  PITCH, YAW
R2334    OUTPUT
R2335          TVCYAW, TVCPITCH (BITS RELEASED)
R2336          TVC ENABLE  AND  OPTICS ERROR COUNTER ENABLE

  2337   REF   1              20,2000                         SETLOC DAPS6
  2338                        20,2355                         BANK
  2339   REF   6  LAST  710   E6,1446                         EBANK= CNTR
  2340   REF   1                                              COUNT* $$/S40.6
  2341   REF  22  LAST  705   20,2355  4 0102 0  PRE40.6  CS     FLAGWRD6      RESTART ENTRY TO S40.6 (DO NOT PERMIT
  2342   REF  13  LAST  705   20,2356  7 4076 0           MASK   DPCONFIG      IF TVC, BITS 15,14 = 1,0)
  2343                        20,2357  0 0006 1           EXTEND
  2344                        20,2360  6 2362 1           BZMF   +2
  2345   REF  35  LAST  709   20,2361  1 5314 0           TCF    TASKOVER      TVC, REDOTVC WILL REESTABLISH INTERFACE
  2346   REF  37  LAST  710   20,2362  4 4770 1           CS     BIT1          RCS, SO DO S40.6,  GIMTRIM ONLY
  2347   REF   3  LAST  698   20,2363  55'444 0           TS     MRKRTMP
  2348   REF  38  LAST  718   20,2364  3 4770 0           CAF    BIT1          FOR REVISED S40.6 TIMING FOR RESTARTS...
  2349   REF   7  LAST  718   20,2365  55'446 1           TS     CNTR          TO INDICATE A RESTART ENTRY (CNTR IS
 A2350                                                                              NORMALLY +0, BY S40.6)
  2351   REF   8  LAST  718   E6,1446                         EBANK= CNTR
  2352   REF 131  LAST  711   20,2366  4 4772 0  S40.6    CS     ZERO          INHIBIT OPTICS ACTIVITY
  2353   REF  22  LAST  708   20,2367  55'323 0           TS     OPTIND
  2354   REF  24  LAST  590   20,2370  4 4767 1           CS     BIT2          DISABLE OPTICS ERROR COUNTERS
  2355                        20,2371  0 0006 1           EXTEND
  2356   REF  36  LAST  708   20,2372  03 012 1           WAND   CHAN12

  2357   REF   1              20,2373  3 2460 1           CAF    OCT02200      TVC ENABLE (SPS SERVO AMPS SEE DAC
 2358                          20,2374  0 0006 1           EXTEND                   VOLTAGES) AND DISENGAGE OPTICS/DAC
 2359   REF  37  LAST  718     20,2375  05 012 1           WOR      CHAN12
 2360   REF   5  LAST  704     20,2376  0 5255 0           TC       FIXDELAY      60MS PROCEDURAL DELAY (40MS MINIMUM) FOR
 2361                          20,2377   00006 1           DEC      6                  RELAY LATCHING
 2362   REF  25  LAST  718     20,2400  3 4767 0           CAF      BIT2          ENABLE OPTICS ERROR COUNTERS
 2363                          20,2401  0 0006 1           EXTEND
 2364   REF  38  LAST  719     20,2402  05 012 1           WOR      CHAN12
 2365   REF   6  LAST  719     20,2403  0 5255 0           TC       FIXDELAY      20MS PROCEDURAL DELAY (4MS MINIMUM) FOR
 2366                          20,2404   00002 0           DEC      2                  RELAY LATCHING
 2367   REF   9  LAST  718     20,2405  11'446 1  RSTRTST  CCS      CNTR          CHECK FOR RESTART ENTRY (PRE40.6)
 2368   REF   1                20,2406  1 2446 1           TCF      GIMTRIM +2    RESTART ENTRY....BYPASS 4 SECOND DELAY
A2369                                                                                  TST,TRIM SETS +0 ON NORMAL ENTRY
 2370   REF   4  LAST  718     20,2407  31'444 1           CAE      MRKRTMP       CHECK FOR TEST/TRIM OR TRIM ONLY
 2371   REF  10  LAST  719     20,2410  55'446 1           TS       CNTR               MRKRTMP SAVES CNTR FOR RESTARTS
 2372                          20,2411  0 0006 1           EXTEND
 2373   REF   2  LAST  719     20,2412  6 2444 1           BZMF     GIMTRIM       (TRIM ONLY)
 2374   REF 132  LAST  718     20,2413  4 4772 0  GDTSETUP CS       ZERO          GIMBAL DRIVE TEST SETUP, FOR PITCH
 2375   REF  11  LAST  719     20,2414  55'446 1           TS       CNTR
 2376   REF   1                20,2415  3 2462 0  GIMDTEST CAF      +2ACTDEG      GIMBAL DRIVE TEST, 1ST INCREMENT
 2377   REF   1                20,2416  0 2431 0           TC       OUTPUT             (LEAVES GIMBAL AT +2 DEG)
 2378   REF   1                20,2417  3 2461 0           CAF      -4ACTDEG      2ND INCREMENT (LEAVES GIMBAL AT -2)
 2379   REF   2  LAST  719     20,2420  0 2431 0           TC       OUTPUT
 2380   REF   2  LAST  719     20,2421  3 2462 0           CAF      +2ACTDEG      3RD INCREMENT (LEAVES GIMBAL AT -0)
 2381   REF   3  LAST  719     20,2422  0 2431 0           TC       OUTPUT
 2382   REF  12  LAST  719     20,2423  4 1446 1           CS       CNTR          CHECK FOR COMPLETION OF YAW TEST
 2383   REF 166  LAST  713     20,2424  10 000 0           CCS      A
 2384   REF   3  LAST  719     20,2425  1 2444 0           TCF      GIMTRIM       COMPLETED, GO TO GIMBAL TRIM ROUTINE
 2385   REF  39  LAST  718     20,2426  4 4770 1           CS       BIT1          SET UP YAW TEST
 2386   REF  13  LAST  719     20,2427  55'446 1           TS       CNTR
 2387   REF   1                20,2430  1 2415 1           TCF      GIMDTEST      FOR YAW TEST
 2388                          20,2431  0 0006 1  OUTPUT   EXTEND                 OUTPUT THE INCREMENT....SAVE Q
 2389   REF   4  LAST  395     20,2432  23'004 1           QXCH     TEMPR60
 2390   REF  14  LAST  719     20,2433  51'446 0           INDEX    CNTR
 2391   REF   1                20,2434  54 054 1           TS       TVCPITCH
 2392   REF  15  LAST  719     20,2435  51'446 0           INDEX    CNTR
 2393   REF  19  LAST  426     20,2436  3 4756 1           CAF      BIT11
 2394                          20,2437  0 0006 1           EXTEND
 2395   REF   5  LAST  195     20,2440  05 014 1           WOR      CHAN14
 2396   REF   7  LAST  719     20,2441  0 5255 0           TC       FIXDELAY      WAIT 2SEC, WHILE ASTRONAUT VERIFIES
 2397                          20,2442   00310 0           DEC      200                GIMBAL MOTION ON GPI
 2398   REF   5  LAST  719     20,2443  0 1004 1           TC       TEMPR60
 2399   REF   8  LAST  719     20,2444  0 5255 0  GIMTRIM  TC       FIXDELAY      WAIT 4 SECONDS BEFORE GIMBAL TRIM
 2400                          20,2445   00620 0           DEC      400
 2401   REF 133  LAST  719     20,2446  4 4772 0     +2    CS       ZERO          PICK UP TRIM VALUES AND OUTPUT THEM
 2402   REF  13  LAST  705     20,2447  6 1423 0           AD       PACTOFF            (AVOID +0) ENTRY POINT FROM RSTRTST
 2403   REF   2  LAST  719     20,2450  54 054 1           TS       TVCPITCH           ON A RESTART, TO AVOID 4SEC DELAY
 2404   REF 134  LAST  719     20,2451  4 4772 0           CS       ZERO
 2405   REF   6  LAST  705     20,2452  6 1424 1           AD       YACTOFF
 2406   REF   1                20,2453  54 053 0           TS       TVCYAW
 2407   REF   2  LAST  178     20,2454  3 5050 1           CAF      PRIO6         RELEASE THE COUNTERS, BITS 11,12
 2408                           20,2455  0 0006 1           EXTEND
 2409   REF   6  LAST  719      20,2456  05 014 1           WOR      CHAN14
 2410   REF  36  LAST  718      20,2457  1 5314 0 ENDS40.6  TCF      TASKOVER

 2411                           20,2460   02200 1 OCT02200  OCT      02200                 BITS 8,11 FOR CHANNEL 12 TVC/OPTICS
 2412                           20,2461   77527 1 -4ACTDEG  DEC      -168                  -2(+2ACTDEG), WHOLE BITS, NO ROUNDUP
 2413                           20,2462   00124 0 +2ACTDEG  DEC      +84                   +2 DEG, SC.AT 85.41 ARCSEC/BIT (+840)


 2414   REF   1                 27,2000                     SETLOC   P40S5
 2415                           27,3032                     BANK
 2416   REF   1                                             COUNT*   $$/S41.1
 2417                           27,3032   45020 1 S41.1     STQ      CALL
 2418   REF   4  LAST  646      27,3033   03657 0                    QTEMP
 2419   REF   5  LAST  598      27,3034   47530 1                    CDUTRIG
 2420                           27,3035   77775 1           VLOAD
 2421                           27,3036   45121 1           MXV      CALL
 2422   REF  26  LAST  696      27,3037   01734 0                    REFSMMAT
 2423   REF   3  LAST  599      27,3040   47633 1                    *SMNB*
 2424                           27,3041   74321 1           MXV      VXSC
 2425   REF   4  LAST  558      27,3042   05014 1                    QUADROT
 2426   REF   1                 27,3043   17047 1                    TENBNK14              VG IN CONTROL COORD IN MPAC SCALED AT
 2427                           27,3044   52072 0           VSL5     GOTO                  VG IN CONTROL COORDS. IN MPAC AT 2(+7)
 2428   REF   5  LAST  720      27,3045   03657 0                    QTEMP
 2429                           27,3046   24000 1 TENBNK14  2DEC     10. B-4
 2429                           27,3047   00000 1
 24291                          27,3050   00024 1 THETACON  2DEC     .31830989 B-8
 24291                          27,3051   13714 1

R2430   CALLED BY ..DONOUN46.. (VERB 48), OR DIRECTLY BY ..FRESHDAP.. (RCS DAP)

 2431   REF   2  LAST  718      20,2000                     SETLOC   DAPS6
 2432                           20,2463                     BANK                           VIA IBNKCALL
 2434   REF   1                                             COUNT*   $$/S41.2
 2435   REF  43  LAST  717      20,2463  3 1465 1 S41.2     CA       DAPDATR1
 2436   REF  26  LAST  703      20,2464  7 6214 1           MASK     THREE
 2437   REF 167  LAST  719      20,2465  6 0000 1           AD       A
 2438   REF   3  LAST  420      20,2466  54 774 1           TS       RATEINDX
 2439                           20,2467  0 0004 0           INHINT
 2440   REF  44  LAST  720      20,2470  3 1465 1           CAE      DAPDATR1              IS LEM ATTACHED (BITS 14,13 OF DAPDATR1
                                                                                                            =10)
 2441   REF   7  LAST  266      20,2471  7 4346 0           MASK     PRIO30
 2442   REF   1                 20,2472  6 4751 0           AD       -BIT14                (OCT57777)
 2443                           20,2473  0 0006 1           EXTEND
 2444   REF   1                 20,2474  1 2501 0           BZF      TOGETHER              YES
 2445   REF   1                 20,2475  4 4767 1           CS       ATTCHBIT              NO, UNSET FLAG
 2446   REF  13  LAST  713      20,2476  7 0103 1           MASK     FLAGWRD7
 2447   REF  14  LAST  720      20,2477  54 103 1           TS       FLAGWRD7
 2448                           20,2500  1 2504 0           TCF      +4
 2449   REF  15  LAST  720      20,2501  4 0103 1 TOGETHER  CS       FLAGWRD7              ATTACHED, SET FLAG FOR INTEGRATION
 2450   REF   2  LAST  720      20,2502  7 4767 1           MASK     ATTCHBIT
 2451    REF  16  LAST  720    20,2503   26 103 1          ADS      FLAGWRD7
 2452                          20,2504   0 0003 1          RELINT
 2453    REF  45  LAST  720    20,2505   3 1465 1          CA       DAPDATR1
 2454    REF  27  LAST  708    20,2506   7 4765 0          MASK     BIT4
 2455                          20,2507   0 0006 1          EXTEND
 2456                          20,2510   6 2512 0          BZMF     +2                DEC 46 MEANS NARROW DB
 2457    REF   1               20,2511   3 2612 0          CA       DEC409
 2458    REF   1               20,2512   6 2613 1          AD       DEC46             DEC 455 MEANS WIDE DB
 2459    REF   9  LAST  708    20,2513   55'655 1          TS       ADB
 2460    REF  46  LAST  721    20,2514   3 1465 1          CA       DAPDATR1
 2461    REF  23  LAST  447    20,2515   7 4762 1          MASK     BIT7              QUAD BD
 2462                          20,2516   0 0006 1          EXTEND
 2463                          20,2517   6 2521 0          BZMF     +2
 2464    REF  72  LAST  706    20,2520   3 4770 0          CA       ONE
 2465    REF   2  LAST  113    20,2521   55'631 0          TS       XTRANS
 2466    REF  47  LAST  721    20,2522   3 1465 1          CA       DAPDATR1
 2467    REF  22  LAST  543    20,2523   7 4757 1          MASK     BIT10             QUAD AC
 2468                          20,2524   0 0006 1          EXTEND
 2469                          20,2525   6 2527 0          BZMF     +2
 2470    REF  73  LAST  721    20,2526   4 4770 1          CS       ONE
 2471    REF   3  LAST  721    20,2527   27'631 0          ADS      XTRANS
 2472                          20,2530   0 0004 0          INHINT
 2473                          20,2531   0 0006 1          EXTEND
 2474                          20,2532   1 2537 0          BZF      +5                CLEAR NJETSFLG (4 JETS, OR NO JETS)
 2475    REF  29  LAST  700    20,2533   4 0075 1          CS       FLAGWRD1          SET NJETSFLG   (2 JETS, AC OR BD QUADS)
 2476    REF   1               20,2534   7 4752 1          MASK     NJETSBIT          NJETSFLG=1 FOR 2 JET ULLAGE (AC OR BD)
 2477    REF  30  LAST  721    20,2535   26 075 1          ADS      FLAGWRD1
 2478                          20,2536   1 2542 1          TCF      +4
 2479    REF   2  LAST  721    20,2537   4 4752 1          CS       NJETSBIT          NJETSFLG=0 FOR 4 JET (OR 0 JET) ULLAGE
 2480    REF  31  LAST  721    20,2540   7 0075 1          MASK     FLAGWRD1
 2481    REF  32  LAST  721    20,2541   54 075 1          TS       FLAGWRD1
 2482                          20,2542   0 0003 1          RELINT
 2483    REF   4  LAST  292    20,2543   3 1466 1          CA       DAPDATR2
 2484    REF  27  LAST  705    20,2544   7 4754 1          MASK     BIT13
 2485                          20,2545   0 0006 1          EXTEND
 2486                          20,2546   6 2550 0          BZMF     +2
 2487                          20,2547   1 2551 0          TCF      +2
 2488    REF  74  LAST  721    20,2550   4 4770 1          CS       ONE
 2489                          20,2551   4 0000 0          COM
 2490    REF   2  LAST  113    20,2552   55'630 1          TS       ACORBD            MINUS FOR A-C,PLUS FOR B-D
 2491    REF   5  LAST  721    20,2553   3 1466 1          CA       DAPDATR2
 2492    REF  23  LAST  721    20,2554   7 4757 1          MASK     BIT10
 2493    REF 168  LAST  720    20,2555   10 0000 0         CCS      A
 2494                          20,2556   1 2562 0          TCF      +4
 2495    REF  75  LAST  721    20,2557   3 4770 0          CA       ONE
 2496    REF   2  LAST  113    20,2560   55'626 0          TS       RACFAIL
 2497    REF   1               20,2561   1 2572 1          TCF      BDFAIL
 2498    REF 135  LAST  719    20,2562   3 4772 1          CA       ZERO
 2499    REF   3  LAST  721    20,2563   55'626 0          TS       RACFAIL
 2500    REF   6  LAST  721    20,2564   3 1466 1          CA       DAPDATR2
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  2501   REF  28  LAST  721   20,2565  7 4765 0               MASK    BIT4
  2502   REF 169  LAST  721   20,2566  10 000 0               CCS     A
  2503   REF   2  LAST  721   20,2567  1 2572 1               TCF     BDFAIL
  2504   REF  76  LAST  721   20,2570  4 4770 1               CS      ONE
  2505   REF   4  LAST  721   20,2571  55'626 0               TS      RACFAIL
  2506   REF   7  LAST  721   20,2572  3 1466 1   BDFAIL      CA      DAPDATR2
  2507   REF  24  LAST  721   20,2573  7 4762 1               MASK    BIT7
  2508   REF 170  LAST  722   20,2574  10 000 0               CCS     A
  2509                        20,2575  1 2601 0               TCF     +4
  2510   REF  77  LAST  722   20,2576  3 4770 0               CA      ONE
  2511   REF   2  LAST  113   20,2577  55'627 1               TS      RBDFAIL
  2512   REF 136  LAST  713   20,2600  0 0002 0               TC      Q
  2513   REF 136  LAST  721   20,2601  3 4772 1               CA      ZERO
  2514   REF   3  LAST  722   20,2602  55'627 1               TS      RBDFAIL
  2515   REF   8  LAST  722   20,2603  3 1466 1               CA      DAPDATR2
  2516   REF  40  LAST  719   20,2604  7 4770 1               MASK    BIT1
  2517   REF 171  LAST  722   20,2605  10 000 0               CCS     A
  2518   REF 137  LAST  722   20,2606  0 0002 0               TC      Q
  2519   REF  78  LAST  722   20,2607  4 4770 1               CS      ONE
  2520   REF   4  LAST  722   20,2610  55'627 1               TS      RBDFAIL
  2521   REF 138  LAST  722   20,2611  0 0002 0               TC      Q
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P2522
  2523    REF    1                  16,2000                          SETLOC P40S1
  2524                              16,2065                          BANK
  2525    REF    4  LAST   717      E6,1724                          EBANK= NBRCYCLS
  25255   REF    1                                                   COUNT* $$/S40.1
  2526                              16,2065   45345 1  S40.1B        DLOAD  DSU               LAMBERT
  2527    REF   72  LAST   714      16,2066   03413 1                       TIG
  2528    REF    1                  16,2067   34531 1                       TWODT
  2529    REF   28  LAST   699      16,2070   14041 1                STODL  TDEC1
  2530    REF    9  LAST   717      16,2071   03656 1                       TPASS4
  2531                              16,2072   77625 0                DSU
  2532    REF   29  LAST   723      16,2073   00041 1                       TDEC1
  2533    REF    8  LAST   717      16,2074   37423 0                STCALL DELLT4
  2534    REF    1                  16,2075   61650 0                       AGAIN
  2535                              16,2076   77775 1                VLOAD
  2536    REF    9  LAST   494      16,2077   03612 1                       VIPRIME
  2537    REF   10  LAST   716      16,2100   17713 1                STODL  UT
  2538    REF   73  LAST   723      16,2101   03413 1                       TIG
  2539    REF   30  LAST   723      16,2102   00041 1                STORE  TDEC1
  2540                              16,2103   77621 1                BDSU
  2541    REF   10  LAST   723      16,2104   03656 1                       TPASS4
  2542    REF    9  LAST   723      16,2105   37423 0                STCALL DELLT4
  2543    REF    2  LAST   723      16,2106   61650 0                       AGAIN
  2544                              16,2107   41575 0                VLOAD  PUSH
  2545    REF   12  LAST   494      16,2110   03646 0                       DELVEET3
  2546    REF   12  LAST   698      16,2111   37721 1                STCALL VGTIG
  2549    REF    2  LAST   695      16,2112   11200 0                       GET.LVC
  2550                              16,2113   77601 0                SETPD
  2551                              16,2114   00001 0                       00D
  2552                              16,2115   45175 0  CALCUT        VLOAD  CALL
  2553    REF   11  LAST   716      16,2116   03632 0                       RTIG
  2554    REF    1                  16,2117   77270 1                       CALCGRAV          GDELTAT IN MPAC AT 2(+7)M/CS
  2555                              16,2120   70372 0                VSL1   V/SC
  2556    REF    1                  16,2121   34523 1                       200CS             G AT 2(-5) M/CS.CS
  2557                              16,2122   52315 1                PDVL   VSU
  2558    REF   10  LAST   723      16,2123   03612 1                       VIPRIME
  2559    REF   11  LAST   723      16,2124   03713 1                       UT
  2560                              16,2125   52341 0                V/SC   VSU
  2561    REF    2  LAST   723      16,2126   34523 1                       200CS
  2562                              16,2127   72561 0                VXSC   VSL2
  2563    REF    4  LAST   693      16,2130   03703 0                       CSTEER
  2564                              16,2131   24015 0                STOVL  12D               B.C SCALED AT 2(-5) PDL 12D
  2565    REF   13  LAST   723      16,2132   03721 0                       VGTIG
  2566                              16,2133   41456 0                UNIT   PUSH              UG PDL 0 SCALED AT 2(+1)
  2567                              16,2134   74241 0                DOT    VXSC
  2568                              16,2135   00015 0                       12D
  2569                              16,2136   00001 0                       0
  2570                              16,2137   51352 1                VSL2   BVSU
  2571                              16,2140   00015 0                       12D
  2572                              16,2141   14015 0                STODL  12D               Q PDL 12D SCALED AT 2(-5)
  2573   REF   4  LAST  695   16,2142   03727 0                      F
  2574                        16,2143   56261 1            SRR       DDV
  2575                        16,2144   21605 1                      4
  2576   REF   2  LAST  695   16,2145   03076 0                      WEIGHT/G
  2577                        16,2146   63316 0            DSQ       PDVL          F/MASS SQUARED PDL 6 AT 2(-10)M/(CS.CS)
  2578                        16,2147   00015 0                      12D
  2579                        16,2150   77636 1            VSQ
  2580                        16,2151   75421 1            BDSU      SQRT
  2581                        16,2152   76561 1            VXSC      VSL1
  2582                        16,2153   53455 0            VAD       UNIT
  2583                        16,2154   00015 0                      12D
  2584   REF  12  LAST  723   16,2155   37713 0            STCALL    UT
  2585   REF   1              16,2156   50331 0                      S40.2,3       **** NO RETURN **** SAME AS GOTO S40.2,3

  25855  REF   1                                           COUNT*    $$/S40.2
  2586                        16,2157   77775 1  S40.2,3B  VLOAD
  2587   REF   4  LAST  216   16,2160   11760 0                      XUNIT
  2588   REF  21  LAST  697   16,2161   27351 0            STOVL     SCAXIS
  2589   REF  13  LAST  724   16,2162   03713 1                      UT
  2590   REF   5  LAST  697   16,2163   00307 0            STORE     XSCREF
  2591                        16,2164   53435 0            VXV       UNIT
  2592   REF  12  LAST  723   16,2165   03632 0                      RTIG
  2593                        16,2166   34007 1            STCALL    6D
  2594   REF   2  LAST  697   16,2167   61702 0                      TSTRXUT
  2595   REF   5  LAST  697   16,2170   00315 0            STORE     YSCREF
  2596                        16,2171   57435 1            VXV       VCOMP
  2597   REF   6  LAST  724   16,2172   00307 0                      XSCREF
  2598                        16,2173   77772 0            VSL1
  2599   REF   8  LAST  698   16,2174   34323 1            STCALL    ZSCREF        ZNB AXIS IN REF COOR
  2600   REF   1              16,2175   50444 0                      P40SXTY       **** NO RETURN **** SAME AS GOTO P40SXTY
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P2601    NAME       S40.8 - CROSS PRODUCT STEERING
R2602    FUNCTION       (1) UPDATES THE VELOCITY-TO-BE-GAINED VECTOR.
R2603                   (2) GENERATES ANGULAR RATE STEERING COMMANDS FOR AUTOPILOT.
R2604                   (3) ESTABLISHES ENGINE CUT-OFF SIGNALS AT APPROPRIATE TIMES.
R2605                   (4) INITIATES THRUST-FAIL ROUTINE, R40
R26055                  (5) UPDATES CSMMASS
R2606    INPUT          VGPREV  - LAST VALUE OF THE VELOCITY-TO-BE-GAINED VECTOR
R2607                             PRIOR TO UPDATING IN METERS/CS AT +7.
R2608                   DELVREF - CHANGE IN VEHICLE VELOCITY SINCE LAST MEASUMEMENT
R2609                             IN METERS/CS AT +7.
R2610                   BDT     - EFFECT OF RATE OF CHANGE OF REQUIRED VELOCITY AND
R2611                             GRAVITY DURING DT UPON VELOCITY-TO-BE-GAINED IN
R2612                             METERS/CS AT +7.
R2613                   CSTEER  - A SCALAR OF THE STEERING LAW, SC.AT B+1, USED FOR
R2614                             SPS AIMPOINT STEERING MANEUVERS
R2615                   IDLEFAIL- A FLAG TO INHIBIT (IDLE) THE THRUST-FAIL ROUTINE
R2616                   STEERSW - A SWITCH TO PRECLUDE NEEDLESS CONDUCT OF STEERING
R2617                   REFSMMAT, DAPDATR1, PIPTIME
R2618                   EREPFRAC, ETDECAY, KPRIMEDT FOR TVC
R2619    OUTPUT         TTOGO   - TIME REMAINING FOR ENGINE BURN IN CS AT +28
R2620                   OMEGAC  - DP VECTOR RATE COMMAND, SC.AT  1/(2TVCDT) REVS/SEC
R2621                   VG, VGPREV, VGDISP, TGO, TIG, SCALED AS NOTED IN CODING
R2622                   STEERSW, IMPULSW, NVWORD1
R2623                   REPFRAC, CNTR, VCNTR, VCNTRTMP FOR TVC (R40 INTERFACING)
R2624    SUBROUTINES USED     - *SMNB* , ALARM

  2625   REF  48  LAST  721   E6,1465                           EBANK=  DAPDATR1
  26255  REF   1                                                COUNT*  $$/S40.8
  2626   REF 149  LAST  717   16,2176  0 6006 1  S40.8          TC      INTPRET
  2627                        16,2177   45001 1                 SETPD   CALL
  2628                        16,2200   00001 0                         00D
  2629   REF   1              16,2201   34331 1                         UPDATEVG
  2630                        16,2202   77745 1                 DLOAD
  2631   REF  10  LAST  711   16,2203   03074 1                         CSMMASS                                KG      B-16
  2632   REF   1              16,2204   03335 1                 STORE   MASSTMP
  2633                        16,2205   77776 1                 EXIT
  2634   REF  56  LAST  712   16,2206  0 5402 1                 TC      PHASCHNG
  2635                        16,2207   10035 0                 OCT     10035           TYPE B RESTART BELOW AND 5.3 REREADAC
  26355  REF   6  LAST  717   01,2250            5P3SPT4        =       5.3SPOT
  2636   REF 150  LAST  725   16,2210  0 6006 1                 TC      INTPRET
  2637                        16,2211   51575 1                 VLOAD   ABVAL
  2638   REF   1              16,2212   03432 1                         DELVREF         DELTA V                M/CS  B-7
  2639                        16,2213   67206 1                 PUSH    SLOAD           00D = DELTA V MAG      M/CS  B-7
  2640   REF   1              16,2214   01345 1                         DVTHRESH                               M/CS  B+2
  2641                        16,2215   44205 0                 DMP     BDSU
  2642   REF   1              16,2216   34533 0                         DPB-9           DVTHRESH               M/CS  B-7
  2643                        16,2217   67240 0  LOCHECK        BMN     SLOAD
  2644   REF   1              16,2220   51143 0                         LOTHRUST        ** MAYBE THRUST BAD **
 A2645                                                                                  THRUST GOOD : UPDATE CSMMASS
  2646   REF   1              16,2221   01351 1                         EMDOT           FLOW RATE              KG/CS B-3
 2647                           16,2222   44205 0                 DMP     BDSU
 2648    REF    1               16,2223   34530 0                         FOURSEC +1          200 B-13 : MPAC = 2 SECS MASS LOSS
 2649    REF    2  LAST   725   16,2224   03335 1                         MASSTMP
 2650    REF   11  LAST   725   16,2225   03074 1   UPDBMASS  STORE   CSMMASS             CSMMASS UPDATED FOR LAST 2 SECS
 2651                           16,2226   77614 1             BOFF
 2652    REF    6  LAST   712   16,2227   01344 0                         STEERSW             NO STEERING :
 2653    REF    4  LAST   706   16,2230   51603 0                         SERVXT1             BYPASS TGOCALC AND X-PRODUT
 2654                           16,2231   77414 0   CGTRACK   BON     EXIT                ENABLE TVCDAP CG TRACKING
 2655    REF    1               16,2232   04700 1                         SWTOVER
 2656    REF    1               16,2233   34325 1                         FREPSET             V46 SWITCHOVER HAS OCCURRED (CSM/LM)
 2657    REF   49  LAST   725   16,2234  31'465 1             CAE     DAPDATR1            ENABLE TVCDAP CG TRACKING
 2658    REF   32  LAST   705   16,2235  7 4753 0             MASK    BIT14
 2659    REF  172  LAST   722   16,2236  10 000 0             CCS     A
 2660    REF   41  LAST   722   16,2237  3 4770 0             CAF     BIT1
 2661    REF  173  LAST   726   16,2240  50 000 1             INDEX   A                   LM-OFF, LM-ON VALUE
 2662    REF    1               16,2241  31'421 1             CAE     EREPFRAC
 2663    REF    4  LAST   707   16,2242  55'633 1   REPFRACS  TS      REPFRAC

 2664    REF  151  LAST   725   16,2243  0 6006 1             TC      INTPRET
 2665                           16,2244   51375 1   TGOCALC   VLOAD   BVSU                GET DELVG
 2666    REF    2  LAST   725   16,2245   03432 1                     DELVREF
 2667    REF    4  LAST   717   16,2246   03705 0                     BDT
 2668                           16,2247   77656 1             UNIT
 2669                           16,2250   41441 0             DOT     PUSH                (00D)
 2670    REF    4  LAST   133   16,2251   03460 0                     VG
 2671                           16,2252   56244 0             BPL     DDV                 ANGLE SHOULD BE GREATER THAN PI/2
 2672    REF    1               16,2253   51137 0                     INCRSVG                   DISPLAY ALARM IF NOT
 2673    REF    1               16,2254   34632 1                     ZVEXHUST
 2674                           16,2255   41215 1             DAD     DMP                 (DOT PRODUCT UP FROM 00D)
 2675    REF    1               16,2256   11760 0                     LODPHALF
 2676                           16,2257   70501 1             NORM    SR1
 2677    REF   26  LAST   717   16,2260   00047 1                     X1
 2678                           16,2261   60325 0             PDDL    NORM
 2679                           16,2262   00045 0                     36D                 (MAG DELVG)
 2680    REF   17  LAST   689   16,2263   00050 1                     X2
 2681                           16,2264   77665 1             BDDV
 2682                           16,2265   53664 0             XSU,2   SL*
 2683    REF   27  LAST   726   16,2266   00046 0                     X1
 2684                           16,2267   57607 1                     0 -9D,2
 2685                           16,2270   41405 0             DMP     PUSH                (00D)
 2686    REF    1               16,2271   34525 1                     -FOURDT
 2687                           16,2272   54335 0             SLOAD   SR
 2688    REF    1               16,2273   03014 1                     ETDECAY             ETDECAY SC.AT B+14 CS
 2689                           16,2274   20617 0                     14D
 2690                           16,2275   45421 1             BDSU    STADR
 2691    REF   13  LAST   711   16,2276   74347 1             STORE   TGO                 TIME TO GO IN CS. AT +28
 2692                           16,2277   77615 0             DAD
 2693    REF    8  LAST   717   16,2300   01044 0                     PIPTIME
 2694    REF   74  LAST   723   16,2301   17413 1             STODL   TIG
 2695    REF   14  LAST   726   16,2302   03430 0                     TGO
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L          P40-P47                                                                           USER'S PAGE NO.  37       E6 S3

  2696                               16,2303   50025 0            DSU      BMN
  2697    REF    2  LAST   726       16,2304   34527 0                     FOURSEC
  2698    REF    1                   16,2305   51102 0                     S40.81

  2699                               16,2306   74375 0  XPRODUCT VLOAD    VXSC
  2700    REF    5  LAST   726       16,2307   03705 0  STEERING           BDT
  2701    REF    5  LAST   723       16,2310   03703 0                     CSTEER
  2702                               16,2311   52352 1           VSL2     VSU
  2703    REF    3  LAST   726       16,2312   03432 1                     DELVREF
  2704                               16,2313   63256 0           UNIT     PDVL
  2705    REF    5  LAST   726       16,2314   03460 0                     VG
  2706                               16,2315   47256 0           UNIT     VXV
  2707                               16,2316   45121 1           MXV      CALL
  2708    REF   27  LAST   720       16,2317   01734 0                     REFSMMAT            (REFSMMAT/2)
  2709    REF    4  LAST   720       16,2320   47633 1                     *SMNB*
  2710                               16,2321   77761 1           VXSC
  2711    REF    2  LAST   109       16,2322   03227 0                     KPRIMEDT            (KPRIMEDT SCIAT PI/8 RAD)
  2712    REF   13  LAST   706       16,2323   37126 0  OMEGACLC STCALL   OMEGAC
  2713    REF    5  LAST   726       16,2324   51603 0                     SERVXT1
  2714                               16,2325   77545 0  FREPSET  DLOAD    EXIT                POST-SWITCHOVER CSM/LM.  LOAD FROM LOW-
  2715    REF    1                   16,2326   36534 0                     FREPFRAC                 BANDWIDTH PARAMETER IN FIXED MEMORY
  2716    REF  266  LAST   706       16,2327  30 154 1           CAE      MPAC
  2717    REF    1                   16,2330  1 2242 0           TCF      REPFRACS
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P2718
 2719                              16,2331   43020 1  UPDATEVG STQ     BQN
 27195  REF  19  LAST  588         16,2332   03374 1                   R61CNTR
 2720   REF   7  LAST  694         16,2333   01307 1                   XDELVFLG
 2721   REF   2  LAST  717         16,2334   34360 0                   VGCOMP
 2722                              16,2335   50135 0           SLOAD   BMN
 2723   REF   5  LAST  723         16,2336   03325 0                   NBRCYCLS
 2724   REF   1                    16,2337   61721 1                   SETUP,9
 2725                              16,2340   53375 0           VLOAD   VAD
 2726   REF   4  LAST  717         16,2341   03327 1                   DELVSUM
 2727   REF   4  LAST  727         16,2342   03432 1                   DELVREF
 2728   REF   2  LAST  111         16,2343   03335 1           STORE   DELVSUMP
 2729                              16,2344   77776 1           EXIT
 2730   REF  79  LAST  722         16,2345  3 4770 0           CA      ONE
 2731   REF   6  LAST  728         16,2346  6 1724 1           AD      NBRCYCLS
 2732   REF   3  LAST  717         16,2347  55'725 1           TS      NBRCYCLP
 2733   REF  57  LAST  725         16,2350  0 5402 1           TC      PHASCHNG          TYPE B RESTART BELOW AND 5.3 REREADACCS
 2734                              16,2351   10035 0           OCT     10035
 27345  REF   7  LAST  725         01,2250            5P3SPT5  =       5.3SPOT
 2735   REF   4  LAST  728         16,2352  3 1725 0           CA      NBRCYCLP
 2736   REF   7  LAST  728         16,2353  55'724 0           TS      NBRCYCLS
 2737   REF 152  LAST  726         16,2354  0 6006 1           TC      INTPRET
 2738                              16,2355   77775 1           VLOAD
 2739   REF   3  LAST  728         16,2356   03335 1                   DELVSUMP
 2740   REF   5  LAST  728         16,2357   03327 1           STORE   DELVSUM
 2741                              16,2360   77775 1  VGCOMP   VLOAD
 2742   REF   5  LAST  728         16,2361   03432 1                   DELVREF                 CONSTRUCT DELVG, SC.AT B-7  M/CS
 2743                              16,2362   53245 1           BVSU    VAD
 2744   REF   6  LAST  727         16,2363   03705 0                   BDT
 2745   REF   2  LAST  717         16,2364   03721 0                   VGPREV
 2746   REF   6  LAST  727         16,2365   03460 0           STORE   VG                VELOCITY-TO-BE-GAINED, SC.AT B-7  M/CS
 2747                              16,2366   77646 0           ABVAL
 2748   REF   6  LAST  698         16,2367   03763 0           STORE   VGDISP            FOR DISPLAY PURPOSES
 2749                              16,2370   77776 1           EXIT
 2750   REF  58  LAST  728         16,2371  0 5402 1           TC      PHASCHNG
 2751                              16,2372   10035 0           OCT     10035              TYPE B  RESTART BELOW AND 5.3 REREADAC
 27515  REF   8  LAST  728         01,2250            5P3SPT6  =       5.3SPOT
 2752   REF 153  LAST  728         16,2373  0 6006 1           TC      INTPRET
 2753                              16,2374   77775 1           VLOAD
 2754   REF   7  LAST  728         16,2375   03460 0                   VG
 2755   REF   3  LAST  728         16,2376   37721 1           STCALL  VGPREV
 2756   REF  20  LAST  728         16,2377   03374 1                   R61CNTR
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P2757   NAME          S40.9 - VTOGAIN (AIMPOINT MANEUVERS ONLY)
R2758   FUNCTION      (1) GENERATES REQUIRED VELOCITY AND VELOCITY-TO-BE-GAINED
R2759                 VECTORS FOR USE DURING AIMPOINT MANEUVERS
R2760                 (2) UPDATES THE B VECTOR WHICH IS USED IN THE FINAL
R2761                 CALCULATION OF EXTRAPOLATING THE VELOCITY-TO-BE-GAINED
R2762   CALLING SEQ VIA FINDVAC AS NEW JOB.
R2763   INPUT         RNIT     - ACTIVE VEHICLE RADIUS VECTOR IN METERS AT +29.
R2764                 VNIT     - ACTIVE VEHICLE VELOCITY VECTOR IN METERS/CS AT +7
R2765                 VRPREV   - LAST COMPUTED VELOCITY REQUIRED VECTOR IN
R2766                             METERS/CS AT +7.
R2767                 NOMTIG      - TIME OF IGN. USED IN TARGETTING ROUTINES@+28"
R2768                 DELLT4      - TRANSFER TIME FROM PIPTIME TO TARGET@+28"
R2769                 TNIT        - TIME OF RNIT AND VNIT IN CS AT +28
R2770                 GDT/2    - HALF OF VELOCITY GAINED IN DELTA T TIME DUE TO
R2771                             ACCERERATION OF GRAVITY IN METERS/CS AT +7.
R2772                 DELVREF  - CHANGE IN VELOCITY DURING LAST 2 SEC IN
R2773                             METERS/CS AT +7.
R2774               NORMSW   SET=CENTRAL ANGLE BETWEEN RTARG AND RTIG IS BETWEEN
R2775                        165 TO 195 DEGREES
R2776                        RESET=CENTRAL ANGLE OUTSIDE CONE DESCRIBED ABOVE
R2777   OUTPUT        VGTEMP   - VELOCITY TO BE GAINED VECTOR IN METERS/CS AT +7.
R2778                 COGA        - INPUT OF INITIAL GUESS FOR LAMBERT FROM S40.1
R2779                             OR PREVIOUS PASS THRU S40.9
R2780                 GOBL/2      -OBLATENESS TERM IN AVG GRAV CALC-GOBL*RSQ/MU
R2781                 VRPREV   - VELOCITY REQUIRED VECTOR IN METERS/CS AT +7.
R2782                 BDT      - B VECTOR IN METERS/CS AT +7.
R2783   SUBROUTINES USED  -  INITVEL

  27835  REF   1                                                COUNT*  $$/S40.9
  2784   REF 154  LAST  728    16,2400  0 6006 1  S40.9         TC      INTPRET
  2785                         16,2401    71201 1               SETPD   DLOAD
  2786                         16,2402    00001 0                       0D
  2787   REF   1               16,2403    11762 1                       LO6ZEROS
  2788                         16,2404    43125 0               PDDL    BON
  2789   REF   1               16,2405    34517 0                       EP4(45)L
  2790   REF   4  LAST  716    16,2406    03705 0                       NORMSW
  2791                         16,2407    34412 1                       +3
  2792                         16,2410    77745 1               DLOAD
  2793   REF   1               16,2411    34521 0                       EP4(10)L
  27935                        16,2412    77606 1               PUSH
  2794                         16,2413    45014 0               CLEAR   CALL
  2795   REF   3  LAST  492    16,2414    00675 0                       GUESSW
  2796   REF   1               16,2415    22002 0                       HAVEGUES
  2797                         16,2416    77776 1               EXIT
  2798   REF  59  LAST  728    16,2417  0 5402 1                TC      PHASCHNG        SAVE TIME BY NOT REDOING LAMBERT CALCS
  2799                         16,2420    05021 1               OCT     05021           C, PRIORITY NEXT, JOB BELOW
  2800                         16,2421    10000 0               OCT     10000
  2801   REF 155  LAST  729    16,2422  0 6006 1                TC      INTPRET
  2802                         16,2423    77214 0  ENDLAMB      BON     VLOAD
  2803   REF   3  LAST  717    16,2424    01310 1                       FIRSTFLG
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 2804   REF   1                 16,2425   34442 1                      FIRSTTIME
 2805   REF  11  LAST   723     16,2426   03612 1                      VIPRIME
 2806                           16,2427   65251 1              VSU     PDDL
 2807   REF   2  LAST   126     16,2430   03466 0                      VRPREV
 2808   REF   5  LAST   717     16,2431   03474 0                      TNIT
 2809                           16,2432   54225 0              DSU     SL
 2810   REF   2  LAST   126     16,2433   03476 1                      INITPREV
 2811                           16,2434   20222 1                      17D
 2812                           16,2435   74265 0              BDDV    VXSC
 2813   REF   3  LAST   723     16,2436   34523 1                      200CS
 2814                           16,2437   76451 0              VSU     VSL1
 2815   REF   2  LAST    79     16,2440   01046 1                      GDT/2
 2816   REF   7  LAST   728     16,2441   03705 0              STORE   GDT
 2817                           16,2442   57535 0   FIRSTTME   SLOAD   DCOMP
 2818   REF  14  LAST   716     16,2443   03747 0                      RTX2
 2819                           16,2444   77640 0              BMN
 2820   REF   1                 16,2445   34462 0                      MOONCASE
 2821                           16,2446   53575 0              VLOAD   UNIT
 2822   REF   9  LAST   717     16,2447   01030 0                      RN
 2823                           16,2450   45345 1              DLOAD   CSU
 2824   REF   9  LAST   726     16,2451   01044 0                      PIPTIME
 2825   REF   6  LAST   693     16,2452   03450 0                      NOMTIG
 2826                           16,2453   56205 0              DMP     DCV
 2827   REF   1                 16,2454   34515 1                      EARTHMU
 2828                           16,2455   00043 0                      34D
 2829                           16,2456   53361 0              VXSC    VAD
 2830   REF   2  LAST    79     16,2457   01054 1                      GDBL/2         NOTE  NO TEST IS MADE TO SUBTRACT GDBL
 2831   REF   2  LAST   717     16,2460   03646 0                      VGTEMP         INSIDE 165-195 DEGREE CONE AREA.
 2832   REF   3  LAST   730     16,2461   03646 0              STORE   VGTEMP
 2833                           16,2462   77776 1   MOONCASE   EXIT
 2834   REF  60  LAST   729     16,2463  0 5402 1              TC      PHASCHNG
 2835                           16,2464   04021 0              OCT     04021          C, JOB BELOW
 2836   REF 156  LAST   729     16,2465  0 6006 1   COPY40.9   TC      INTPRET
 2837                           16,2466   77745 1              DLOAD
 2838   REF   4  LAST   730     16,2467   03474 0                      TNIT
 2839   REF   3  LAST   730     16,2470   27476 1              STOVL   TNITPREV
 2840   REF  12  LAST   730     16,2471   03612 1                      VIPRIME
 2841   REF   3  LAST   730     16,2472   03466 0              STORE   VRPREV
 2842                           16,2473   77414 0              CLEAR   EXIT
 2843   REF   4  LAST   729     16,2474   01270 0                      FIRSTFLG
 2844   REF  80  LAST   728     16,2475  4 4770 1     -2       CS      ONE            REDO40.9 (RESTART)  ENTRY TO END  S40.9
 2845   REF   8  LAST   728     16,2476  55'724 0              TS      NBRCYCLS
 2846   REF  61  LAST   730     16,2477  0 5402 1   ENDS40.9   TC      PHASCHNG
 2847                           16,2500   00001 0              OCT     00001
 2848   REF  74  LAST   713     16,2501  1 5205 1              TCF     ENDOFJOB

 2849   REF 157  LAST   730     16,2502  0 6006 1   REDO40.9   TC      INTPRET        S40.9 RESTARTS COME HERE TO GRACEFULLY
 2850                           16,2503   77775 1              VLOAD                       TERMINATE S40.9 SO THAT IT CAN BE
 2851   REF   2  LAST   729     16,2504   11762 1                      LO6ZEROS            SET UP WITH LATEST R,V,T NEXT PASS
 2852   REF   6  LAST   728     16,2505   17327 1              STODL   DELVSUM             (TYPE C PHASE POINTS '04021' WILL
 2853   REF   3  LAST  730   16,2506   11762 1                  LC6ZEROS             FORCE NORMAL S40.9 TERMINATIONS,
 2854   REF   9  LAST  730   16,2507   27325 0           STOVL  NBRCYCLS             RATHER THAN LOSE TIME OF BRAND NEW
 2855   REF   4  LAST  728   16,2510   03721 0                  VGPREV               PASS -- QUICK OLD DATA BETTER THAN
 2856   REF   4  LAST  730   16,2511   03646 0           STORE  VGTEMP               NONE) NOW CAN GO THRU SETUP.9
 2857                        16,2512   77776 1           EXIT                        WITHOUT DISTURBING VGPREV
 2858   REF   1              16,2513  1 2475 1           TCF    END540.9 -2     STORE 0,0 COVERED NBRCYCLS,P -- FIX UP S

 2859                        16,2514   55340 0  EARTHMU  2DEC*  -3.986032 E10 B-36*
 2859                        16,2515   61710 0
 2860                        16,2516   04000 0  EP4(45)L 2DEC   .125
 2860                        16,2517   00000 1
 2861                        16,2520   00707 1  EP4(10)L 2DEC   .027777777
 2861                        16,2521   03434 1
 2863                        16,2522   01440 0  200CS    2DEC   200 B-12
 2863                        16,2523   00000 1
 2864                        16,2524   77715 1  -FOURDT  2DEC   -800 B-18       -4(200CS), AT B+18CS (-4 FOR SCALING)
 2864                        16,2525   77777 0
 2865                        16,2526   00000 1  FOURSEC  2DEC   400.0 B-28      4 SEC
 2865                        16,2527   00620 0
 28651                       16,2530   00000 1  TWODT    2DEC   200 B-28        **** MUST FOLLOW 2DEC FOURSEC TO    ****
 28651                       16,2531   00310 0
A286515                                                                         **** MAKE FOURSEC +1 2DEC 200 B-13 ****
 28652                       16,2532   00040 0  DPB-9    2DEC   1 B-9
 28652                       16,2533   00000 1
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P2866   NAME         S40.13 - TIMEBURN
R2867   FUNCTION     TO DETERMINE
R2868                (1) WHETHER A GIVEN COMBINATION OF VELOCITY-TO-
R2869                BE-GAINED AND ENGINE CHOICE RESULT IN A BURN TIME SUFFICIENT
R2870                TO ALLOW STEERING AT THE VEHICLE DURING THE BURN
R2871                (2) THE MAGNITUDE OF THE RESULTING BURN TIME, AND
R2872                (3) IF THE BURN TIME IS < 6 SECONDS,
R2873                THE ASSOCIATED TIME OF THE ENGINE-OFF SIGNAL
R2874   CALLING SEQ VIA FINDVAC AS NEW JOB.
R2875   INPUT        VGDISP   - MAGNITUDE OF VGTIG IN M/CS AT +7
R2876                WEIGHT/G - MASS OF VEHICLE IN KG AT TIG (+16)
R2877                F        - ENGINE THRUST IN M.NEWTONS AT +7
R2878                MDOT     - RATE OF DECREASE OF VEHICLE MASS DURING
R2879                           BURN IN KG/CS AT +3
R2880   OUTPUT       IMPULSW  - ZERO FOR STEERING
R2881                         - ONE FOR ATTITUDE HOLD
R2882                TGO      - BURN TIME IN CS AT +28
R2883     THE QUANTITY M.NEWTON SHALL BE USED TO EXPRESS WEIGHT IN TERMS OF
R2884     (KILOGRAM*METER)/(CENTISECOND*CENTISECOND)
R2885     (1) M.NEWTON = (10000) NEWTONS
 2886   REF   1                                        COUNT* $$/40.13
 2887   REF  25  LAST  722   16,2534  3 4762 0  S40.13   CAF     BIT7             TEST +X TRANSLATION
 2888                        16,2535  0 0006 1           EXTEND
 2889   REF   2  LAST  550   16,2536  06 031 0           RXOR    CHAN31
 28895  REF  26  LAST  732   16,2537  7 4762 1           MASK    BIT7
 2890   REF 267  LAST  727   16,2540  54 157 0           TS      MPAC +3
 2891   REF 158  LAST  730   16,2541  0 6006 1           TC      INTPRET
 2892                        16,2542   41545 0           DLOAD   PUSH             00D = |VGTIG| AT +7
 2893   REF   7  LAST  728   16,2543   03763 0                   VGDISP
 2894                        16,2544   53135 0           SLOAD   BZE
 2895   REF 268  LAST  732   16,2545   00160 0                   MPAC +3          BIT7 CHAN31
 2896   REF   1              16,2546   34556 0                   S40.130 +1       DO NOT COMPENSATE FOR 7 SECS OF ULLAGE
 2897                        16,2547   56345 0           DLOAD   DDV
 2898   REF   1              16,2550   34630 0                   S40.135          COMPENSATION FOR 2 JET ULLAGE AT +24
 2899   REF   3  LAST  724   16,2551   03076 0                   WEIGHT/G         MASS IN KGMS AT +16
 2900                        16,2552   72414 0           BON     SL1              DOUBLE CORRECTION IF FOUR JETS
 2901   REF   1              16,2553   00700 0                   NJETSFLG
 2902   REF   2  LAST  732   16,2554   34555 0                   S40.130
 2903                        16,2555   41421 0  S40.130  BDSU    PUSH             00D = MAG(VGTIG) @ B+7 M/CS, ADJUSTED
A2904                                                                                  FOR ULLAGE.
 2905                        16,2556   56345 0   +1      DLOAD   DDV              ENTRY POINT IF ULLAGE OFF
 2906                        16,2557   00001 0                   00D              MAKE SURE MPAC CONTAINS MAG(VGTIG)
 2907   REF   2  LAST  726   16,2560   34632 1                   2VEXHUST         2 VEXHAUST (=2G ISP) @ B+7 M/CS
 2908                        16,2561   44342 1           SR1     BDSU
 2909   REF   2  LAST  726   16,2562   11760 0                   LOOPHALF         0.5
 2910                        16,2563   41205 0           DMP     DMP
 2911   REF   4  LAST  732   16,2564   03076 0                   WEIGHT/G         TOTAL MASS @ B+16 KG
 2912                        16,2565   00001 0                   00D              MAG(VGTIG) @ B+7 M/CS
 2913                        16,2566   40061 1           SL      BDV
 2914                        16,2567   20213 0                   10D              SCALING
```

```
  2915   REF   1            16,2570   34617 0                      S40.133      LARGE VG : STEERING BURN INDICATED
  2916                      16,2571   41225 1             DSU      DMP
  2917   REF   1            16,2572   01764 0                      EIMP1SEC     IMP BURN LOGIC B.P. @ E+28+14 NEWT-SEC
  2918   REF   1            16,2573   34624 0                      100B-14      1SEC @ B+14CS
  2919                      16,2574   41471 0             DDV      PUSH         02D=(DELTET-1SEC) @ B+14CS, FIMP16 SLOPE
  2920   REF   2  LAST   91 16,2575   01766 1                      EFIMP16      IMP B.LOGIC 1-6SEC SLOPE @ E+28+14 NEWT
  2921                      16,2576   51025 1             DSU      BPL
  2922   REF   1            16,2577   34626 1                      500B-14      5SEC @ B+14CS
  2923   REF   2  LAST  733 16,2600   34617 0                      S40.133      STEERING BURN INDICATED, DELTAT > 6 SEC
  2924                      16,2601   51145 0             DLOAD    BPL
  2925                      16,2602   00003 1                      02D          (DELTAT-1SEC) @ B+14CS, FIMP16 SLOPE
  2926   REF   1            16,2603   34607 1                      S40.132      1<DELTAT<6SEC, SO FIMP16 SLOPE USE IS OK
  2927                      16,2604   56205 0             DMP      DDV          0<DELTAT<1SEC, SO USE FIMP01 NOT FIMP16
  2928   REF   3  LAST  733 16,2605   01766 1                      EFIMP16      IMP B.LOGIC 1-6SEC SLOPE @ E+28+14 NEWT
  2929   REF   1            16,2606   01765 1                      EFIMP01      IMP B.LOGIC 0-1SEC SLOPE @ E+28+14 NEWT
  2930                      16,2607   77414 0  S40.132    SET      EXIT
  2931   REF   1            16,2610   01066 0                      IMPULSW      IMPULSIVE BURN
  2932   REF   7  LAST  706 16,2611 0 7224 1              TC       DPAGREE
  2933   REF 159  LAST  732 16,2612 0 6006 1              TC       INTPRET
  2934                      16,2613   54215 0             DAD      SR           MPAC CONTAINS (DELTA-1SEC), GET DELTAT
  2935   REF   2  LAST  733 16,2614   34624 0                      100B-14      1SEC @ B+14CS
  2936                      16,2615   20617 0                      14D          DELTAT @ B+28CS
  2937   REF  15  LAST  726 16,2616   03430 0             STORE    TGO
  2938                      16,2617   77776 1  S40.133    EXIT
  2939   REF  62  LAST  730 16,2620 0 5402 1              TC       PHASCHNG
  2940                      16,2621   00003 1             OCT      3
  2941   REF  75  LAST  730 16,2622 1 5205 1              TCF      ENDOFJOB

  2942   REF   1                                          COUNT    17/40.13

  2943                      16,2623   00144 0  100B-14    2DEC     100.00 B-14      1SEC @ B+14CS
  2943                      16,2624   00000 1
  2944   REF   3  LAST  733 16,2623            1SEC2D     =        100B-14
  2945                      16,2625   00764 1  500B-14    2DEC     500.00 B-14      5SEC @ B+14CS
  2945                      16,2626   00000 1
  2946   REF   2  LAST  733 16,2625            5SECOND    =        500B-14
  2947                      16,2627   00000 1  S40.135    2DEC     69.6005183 B-23 IMPULSE FROM 7.96 SECS OF 2-JET FIRING
  2947                      16,2630   04263 1
 A2948                                                                                  7.96(199.6)COS(10)  LB-SEC,  SC.AT
 A2949                                                                                  B+23 NEWTON-SEC/E+2  (7 SEC ULLAGE
 A2950                                                                                  TO GO, PLUS 0.96 SEC FROM PIPTIME)
  2951                      16,2631   17602 0  2VEXHUST   2DEC     63.020792 B-7    2(10338.0564 FPS), AT B+7 M/CS
  2951                      16,2632   25124 1
  2992   REF  10  LAST  642 30,2000                       SBANK=   LOWSUPER
  2993   REF   3  LAST  720 20,2000                       SETLOC   DAPS6
  2994                      20,2612                       BANK

  29945  REF   1                                          COUNT*   $$/40.14
  2995                      20,2612   00631 0  DEC409     DEC      409
  2996                      20,2613   00056 1  DEC46      DEC      46
```

```
R2997   CALLED BY ..DONOUN47.. (VERB 48), OR DIRECTLY BY ..FRESHDAP.. (RCS DAP)

 2998   REF  50  LAST  726    E6,1465                             EBANK= DAPDATR1
 2999   REF   1               20,2614  31'467 0  S40.14   CAE     IXX                RCS ENTRY
 3000                         20,2615   0 0006 1          EXTEND
 3001   REF   1               20,2616   7 2641 1          MP      CONTONE
 3002   REF   2  LAST  113    20,2617  55'623 0           TS      J/M
 3003   REF   1               20,2620   3 1470 0          CA      IAVG
 3004                         20,2621   0 0006 1          EXTEND
 3005   REF   2  LAST  734    20,2622   7 2641 1          MP      CONTONE
 3006   REF   2  LAST  113    20,2623  55'624 1           TS      J/M1
 3007   REF   2  LAST  113    20,2624  55'625 0           TS      J/M2
 3008                         20,2625   0 0006 1          EXTEND
 3009   REF   1               20,2626   3 2643 1          DCA     CONTTWO
 3010                         20,2627   0 0006 1          EXTEND
 3011   REF   2  LAST  734    20,2630  11'467 1           DV      IXX
 3012   REF   2  LAST  113    20,2631  55'620 0           TS      KMJ
 3013                         20,2632   0 0006 1          EXTEND
 3014   REF   2  LAST  734    20,2633   3 2643 1          DCA     CONTTWO
 3015                         20,2634   0 0006 1          EXTEND
 3016   REF   2  LAST  734    20,2635  11'470 1           DV      IAVG
 3017   REF   2  LAST  113    20,2636  55'621 1           TS      KMJ1

 3018   REF   2  LAST  113    20,2637  55'622 1           TS      KMJ2
 3019   REF 139  LAST  722    20,2640   0 0002 0          TC      Q

 3020                         20,2641    25137 0  CONTONE DEC     .662034            2PI/M
 3021                         20,2642    00023 0  CONTTWO 2DEC    .00118
 3021                         20,2643    12522 1

 3023   REF   1               21,2000                     SETLOC  DAPS3
 3024                         21,2032                     BANK

 30245  REF   1                                           COUNT*  $$/RCSUP
 3025   REF   6  LAST  589    21,2032  22 016 0   RCSUP   LXCH    BANKRUPT
 3026                         21,2033   0 0006 1          EXTEND
 3027   REF   6  LAST  589    21,2034  22 012 1           QXCH    QRUPT
 3028   REF   6  LAST  711    21,2035   0 2042 0          TCR     RCSDAPON           ACTIVATE RCS DAP
 3029   REF  25  LAST  590    21,2036   1 5323 1          TCF     RESUME

 3030   REF  51  LAST  734    E6,1465                     EBANK=  DAPDATR1
 3031   REF   1               21,2037    02140 0  RCSADDR 2CADR   RCSATT
 3031   REF   1               21,2040    42066 1


 3032                         21,2041    37704 0  0.6SECTS OCT    37704

 3033   REF  52  LAST  734    E6,1465                     EBANK=  DAPDATR1
A3034                                                                                RCSDAPON ENTRY MUST BE UNDER INT-INHIBIT
 3035   REF   1               21,2042   3 2041 0  RCSDAPON CAF    0.6SECTS           0.6 SEC ALLOWS TVCEXEC/ROLLDAP TO DIE
```

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L         P40-P47                                                                        USER'S PAGE NO.  45       E6 S3

  3036    REF    7  LAST  703    21,2043  54 030 0     +1       TS       TIME5             ENTRY FROM ROOTOPOO
  3037    REF    1               21,2044  55'464 1              TS       T5PHASE           WILL CAUSE FRESHDAP (+1)
  3038    REF   13  LAST  550    21,2045  4 1501 0              CS       RCSFLAGS          SET BIT3 TO REINITIALIZE FDAI ERROR
  3039    REF   32  LAST  632    21,2046  7 4766 0              MASK     BIT3                   DISPLAY, IN CASE SC CONT SWITCH
  3040    REF   14  LAST  735    21,2047  27'501 0              ADS      RCSFLAGS               IN SCS NOT GNC (GUIDEMODE PRIMARY)
  3041                           21,2050  0 0006 1              EXTEND
  3042    REF    1               21,2051  3 2040 1              DCA      RCSADDR           (RCSATT)
  3043    REF   10  LAST  703    21,2052  52 113 0              DXCH     T5LOC
  3044    REF   14  LAST  718    21,2053  4 4076 0              CS       DPCONFIG          SET BITS 15,14 TO 01 TO INDICATE
  3045    REF   23  LAST  718    21,2054  7 0102 0              MASK     FLAGWRD6               T5 TAKEOVER BY RCSDAP
  3046    REF    1               21,2055  6 4753 1              AD       DAP2BIT
  3047    REF   24  LAST  735    21,2056  54 102 0              TS       FLAGWRD6          KILLS TVCEXEC AND ROLLDAP STARTS
  3048    REF  140  LAST  734    21,2057  0 0002 0              TC       Q                 RETURN TO CALLER (TVCDAPOFF OR RCSDAPUP)
  30481   REF    2  LAST  643    35,2000                        SETLOC   P30S1
  30482                          35,3566                        BANK
  304825  REF    1                                              COUNT*   $$/P40
  30483   REF    3  LAST  645    35,3566  0 3525 0  STARTTGO    TC       COMPTGO           COMPTGO CAN NOT BE CALLED DIRECTLY
  30484   REF   43  LAST  700    35,3567  0 4655 0              TC       POSTJUMP          VIA BANKCALL DUE TO RESTART PROBLEMS
  30485   REF    1               35,3570   50237 1              CADR     TFIGINIT +2
```

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P3049   NAME       P41 - RCS BURN
R3050   FUNCTION   TO CONTROL THE SEQUENCE OF THE CMC DURING THE COUNTDOWN
R3051              AND THRUSTING MANEUVER OF AN RCS BURN

R3052                 R02BOTH   CHECK STATUS OF IMU

R3053                 S40.1     COMPUTE: INTIAL THRUST DIRECTION AND
R3054                                    INTIAL VALUE OF VELOCITY-TO-BE-
R3055                                    GAINED VECTOR (VGTIG)

R3056                 S40.2,3   COMPUTE: GIMBAL ANGLES IF THRUSTING WILL
R3057                                    OCCUR WITH PRESENT IMU ORIENTATION,
R3058                                    PREFERRED IMU ORIENTATION, AND
R3059                                    DESIRED THRUST DIRECTION IN SM COORDS

R3060                 R60CSM    PERFORM ATTITUDE MANEUVER

R3061                 MIDTOAV1  EXTRAPOLATE CSM STATE VECTOR TO TIG-29.96 SECS

R3062                 CLOKTASK  COMPUTE TIME-TO-GO TO IGNITION,
R3063                           RECALL CLOKTASK,
R3064                           UPDATE N 85, AND
R3065                           CALL CLOCKJOB TO DISPLAY V06N85

R3066                 TIGBLNK   BLANK DSKY AT TIG-35 SECS AND
R3067                           WAITLIST TIGAVEG IN 5 SECS

R3068                 TIGAVEG   UNBLANK DSKY,
R3069                           CAUSE CLOCKJOB TO DISPLAY NON FLASH V16N85,
R3070                           WAITLIST TTG/0 IN 29.96 SECS, AND
R3071                           START SERVICER

R3072                 CLOCKJOB  (CALLED EVERY SEC)
R3073                           DISPLAY NON FLASH V06N85 UNTIL TIG - 29.96:
R3074                           THEN DISPLAY NON FLASH V16N85

R3075                 TTG/0     NOVAC TIGNOW

R3076                 TIGNOW    DISPLAY FLASHING V16N85

R3077                 POST41    CLEAN UP AFTER BURN

R3078                 ************************************************
R3079                 PROVIDE RESTART PROTECTION AT ALL CRITICAL POINTS
R3080                 ************************************************

R3081   INPUT      SAME AS P40

R3082   ALARMS     1703         INSUFFICIENT TIME FOR INTEGRATION
R3083                           TIG WAS SLIPPED
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L         P40-P47                                                                                         USER'S PAGE NO.  47        E6 S3

P3084
  3085    REF  53  LAST  734   E6,1465                           EBANK= DAPDATR1
  3086    REF   3  LAST  713   24,2000                           SETLOC P40S
  3087                         24,3563                           BANK
  3088    REF   1                                                COUNT* $$/P41
  3091    REF 160  LAST  733   24,3563  0 6006 1  P41CSM    TC      INTPRET
  3092                         24,3564   71214 0            SET     DLOAD
  3093    REF   4  LAST  698   24,3565   00464 1                    ENG2FLAG          SET FOR RCS
  3094    REF  21  LAST  717   24,3566   15336 0                    HI6ZEROS          CSTEER = 0 FOR P41
  3095    REF   6  LAST  727   24,3567   03703 0            STORE   CSTEER
  3096                         24,3570   43145 0            DLOAD   80N
  3097    REF   1              24,3571   11534 0                    FRCS2             2JET THRUST FOR S40.1
  3098    REF   2  LAST  732   24,3572   00700 0                    NJETSFLG
  3099    REF   1              24,3573   50226 1                    P40S/F            NJETS = 1 2-JET
  3100                         24,3574   52152 0            SL1     GOTO              NJETS = 0 4-JET
  3101    REF   2  LAST  737   24,3575   50226 1                    P40S/F
  3102    REF  54  LAST  737   E6,1465                      EBANK=  DAPDATR1
  3103    REF 161  LAST  737   24,3576  0 6006 1  CALCN85   TC      INTPRET
  3104                         24,3577   77624 1            CALL
  3105    REF   2  LAST  725   24,3600   34331 1                    UPDATEVG          NEW VG FROM VGCOMP (+ MAYBE S40.9)
  3106                         24,3601   77624 1            CALL
  3107    REF   2  LAST  709   24,3602   51651 1                    P40CNV85          COMPUTE VGBODY
  3108                         24,3603   77776 1  SERVXT1   EXIT
  31081   REF   1              24,3604  3 3616 0            CAF     NEJETBTS
  31082                        24,3605  0 0006 1            EXTEND
  31083   REF   3  LAST  732   24,3606  06 0031 0           RXOR    CHAN31            ARE ANY RCS JETS FIRING
  31084   REF   2  LAST  737   24,3607  7 3616 1            MASK    NEJETBTS          NULLING OUT RESIDUAL VG'S FROM P40?
  31085                        24,3610  0 0006 1            EXTEND                    OR PERFORMING P41?
  31086   REF   3  LAST  706   24,3611  1 3614 0            BZF     SERVXT            NO

  31087   REF  60  LAST  712   24,3612  0 5547 1            TC      UPFLAG            YES - SET BURNFLAG TO INDICATE
  31088   REF   4  LAST  693   24,3613   00233 0            ADRES   BURNFLAG          THAT THE CSM DID THE BURN

  3109    REF  44  LAST  735   24,3614  0 4655 0  SERVXT    TC      POSTJUMP
  3110    REF   2  LAST  714   24,3615   77143 1            CADR    SERVEXIT

  31101                        24,3616   07700 1  NEJETBTS  OCT     07700

  3111    REF   2  LAST  444   24,3617  3 4753 1  TTG/0     CAF     PRIO20            TASK (4.4 PROTECTS IN P41)
  3112    REF  14  LAST  709   24,3620  0 5121 0            TC      NOVAC
  3113    REF  55  LAST  737   E6,1465                      EBANK=  DAPDATR1
  3114    REF   2  LAST  712   24,3621   03451 1            2CADR   TIGNOW
  3114                         24,3622   50066 1
  3115    REF  51  LAST  712   24,3623  0 5561 0  P40CLK    TC      DOWNFLAG
  3116    REF   5  LAST  645   24,3624   00155 0            ADRES   TIMRFLAG
  3117    REF  37  LAST  720   24,3625  1 5314 0            TCF     TASKOVER

  3119                         24,3626   77624 1  P41/DSP   CALL                      COMPUTE
  3120    REF   3  LAST  737   24,3627   51651 1                    P40CNV85                 VGTIG IN CTRL COORDS
  3121                         24,3630   77776 1            EXIT
```

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L          P40-P47                                                                              USER'S PAGE NO. 48       E6 S3

 3122                          24,3631  0 0006 1           EXTEND              DO CONTROL COORD CALCULATION AFTER AVEG
 3123    REF  2  LAST  712     24,3632  3 3556 1           DCA     ACADN85
 3124    REF  8  LAST  712     24,3633  53'062 0           DXCH    AVEGEXIT
 31242   REF  2  LAST  709     24,3634  3 3511 1           CAF     V06N85B
 31244   REF 21  LAST  713     24,3635  54 777 1           TS      NVWORD1     FORCE CLOCKJOB
 3125    REF 28  LAST  717     24,3636  0 5362 0           TC      2PHSCHNG
 3126                          24,3637   40036 0           OCT     40036       6.3=CLOKTASK(100CS)
 3127                          24,3640   00234 1           OCT     234         4.23=P40S/SV(PRIO12)
 31272   REF  2  LAST  699     01,2154            4P23SPT2 =       4.23SPOT
 31274   REF  5  LAST  703     01,2325            6P3SPT3  =       6.3SPOT
 3128    REF  3  LAST  529     24,3641  1 2523 0           TCF     P40S/SV
 3129    REF  2  LAST  712     24,3642  3 3512 1  P41REDSP CAF     V16N85B     ENTER FROM P41 SIDE OF TIGAVEG
 3130    REF 22  LAST  738     24,3643  54 777 1           TS      NVWORD1      REDISPLAY NONFLASHING
 3131    REF  3  LAST  699     24,3644  3 3530 1           CAF     SEC29.96 +1
 3132    REF 14  LAST  709     24,3645  0 5223 1           TC      TWIDDLE
 3133    REF  2  LAST  232     24,3646   03617 1           ADRES   TTG/0
 3134    REF 33  LAST  735     24,3647  4 4766 0           CS      BIT3        4.4 = TTG/0(2996CS), PRECHECK(-0CS)
 3135    REF  1                24,3650  1 2623 0           TCF     TTGPHS

 3136                          24,3651   40220 0  P40CNV85 STQ     SETPD
 3137    REF  3  LAST  716     24,3652   03730 0                   QTEMP1
 3138                          24,3653   00001 0                   0
 3139                          24,3654   41575 0           VLOAD   PUSH
 3140    REF  5  LAST  731     24,3655   03721 0                   VGPREV      EQUALS VGTIG (TARGETTING INPUT)
 3141                          24,3656   77624 1           CALL
 3142    REF  1                24,3657   57032 1                   S41.1
 3143    REF  6  LAST  294     24,3660   37665 0           STCALL  VGBODY
 3144    REF  4  LAST  738     24,3661   03730 0                   QTEMP1
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L       P40-P47                                                                USER'S PAGE NO. 49       [illegible]

P3145   NAME        P47 - DELTA V MONITOR
R3146   FUNCTION    TO MONITOR VEHICLE ACCELERATION AND
R3147               DISPLAY ACCUMULATED VG IN CONTROL COORDINATES

R3148                        R02BOTH   CHECK STATUS OF IMU

R3149                        MIDTOAV2  EXTRAPOLATE STATE VECTOR TO CURRENT TIME
R3150                                  + INCREMENT OF TIMEDELT

R3151                        SETUPTIG  WAITLIST TIGON IN NO. OF CS FOUND
R3152                                  IN MPAC +1 AFTER MIDTOAV2 RETURN

R3153                        TIGON     SET CALCN83 INTO AVEGEXIT,
R3154                                  NOVAC P47BODY, AND
R3155                                  START SERVICER

R3156                        CALCN83   ADD PIPA CONTENTS TO ACCUMULATED DELTA V AND
R3157                                  CONVERT TO CONTROL COORDINATES AND
R31572                                 CALCULATE INERTIAL VELOCITY, H, AND
R31574                                 HDOT FOR NOUN 62

R3158                        P47BODY   ZERO DELVIMU INITIALLY AND
R3159                                  GENERATE MONITORING DISPLAY OF ACCUMULATED
R3160                                  DELTA V IN CONTROL COORDINATES

R3161                        ****************************************************
R3162                        PROVIDE RESTART PROTECTION AT ALL CRITICAL POINTS
R3163                        ****************************************************
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P3164
 3165   REF   1                                                 COUNT* $$/P47
 3166   REF  75  LAST  726   E7,1412                            EBANK= TIG
 3167   REF 156  LAST  712   24,3662  0 4636 0  P47CSM   TC     BANKCALL         IMU STATUS CHECK
 3168   REF   6  LAST  693   24,3663   03731 1           CADR   R02BOTH
 3169   REF 162  LAST  737   24,3664  0 6006 1           TC     INTPRET
 3170                        24,3665   77624 1           CALRB
 3171   REF   1              24,3666   27566 1                  MIDTOAV2
 3172   REF 269  LAST  732   24,3667  30 155 0  SETUPTIG CAE    MPAC +1          DELTA TIME TO PREREAD (LESS THAN 100
 3173   REF  15  LAST  699   24,3670  55'672 1           TS     P40TMP              CS, WITH A TPAGREE, INT.INIT.)
 3174   REF  15  LAST  738   24,3671  0 5223 1           TC     TWIDDLE
 3175   REF   2  LAST  234   24,3672   03676 0           ADRES  TIGON
 3176   REF  63  LAST  733   24,3673  0 5402 1           TC     PHASCHNG
 3177                        24,3674   40574 0           OCT    40574            A, 4.57 = TIGON (P40TMP CS)
 31775  REF   1              01,2226            4P57SPT1 =      4.57SPOT
 3178   REF  76  LAST  733   24,3675  1 5205 1           TCF    ENDOFJOB

 3179   REF  16  LAST  740   E7,1672                     EBANK= P40TMP
 3180                        24,3676  0 0006 1  TIGON    EXTEND
 3181   REF   1              24,3677  3 3552 0           DCA    ACADN83
 3182   REF   9  LAST  738   24,3700  53'062 0           DXCH   AVEGEXIT
 3184   REF   3  LAST  391   24,3701  0 5120 1           TC     NOVAC30          FORCE ZEROING OF N83 BEFORE SERVICER
 3185   REF  76  LAST  740   E7,1412                     EBANK= TIG
 3186   REF   2  LAST  232   24,3702   03730 0           2CADR  P47BODY
 3186                        24,3703   50067 0
 3187   REF  26  LAST  719   24,3704  4 4767 1           CS     BIT2             4.2 = PRECHECK (-0CS), P47BODY (PRIO30)
 3188   REF   2  LAST  738   24,3705  1 2623 0           TCF    TIGPHS

 3189   REF  77  LAST  740   E7,1412                     EBANK= TIG
 3190   REF 163  LAST  740   24,3706  0 6006 1  CALCN83  TC     INTPRET
 3191                        24,3707   77201 1           SETPD  VLOAD
 3192                        24,3710   00001 0                  0
 3193   REF   1              24,3711   03665 1                  DELVCTL
 3194                        24,3712   41455 0           VAD    PUSH
 3195   REF   6  LAST  728   24,3713   03432 1                  DELVREF
 3196   REF   3  LAST  128   24,3714   37460 1           STCALL DV47TEMP
 3197   REF   2  LAST  738   24,3715   57032 1                  S41.1
 3198   REF   6  LAST  294   24,3716   37675 1           STCALL DELVIMU
 3199   REF   3  LAST  541   24,3717   70537 1                  S11.1            CALC. VI, H, HDOT FOR NOUN 62
 3200                        24,3720   77776 1           EXIT
 3201   REF  64  LAST  740   24,3721  0 5402 1           TC     PHASCHNG
 3202                        24,3722   10035 0           OCT    10035
 32025  REF   9  LAST  728   01,2250            5P35PT7  =      5.35SPOT
 3203   REF  15  LAST  703   24,3723  3 4773 0           CAF    FIVE
 3204   REF   8  LAST  630   24,3724  0 5607 0           TC     GENTRAN
 3205   REF   4  LAST  740   24,3725   01457 0           ADRES  DV47TEMP
 3206   REF   2  LAST  740   24,3726   01664 1           ADRES  DELVCTL
 3207   REF   4  LAST  737   24,3727  0 3614 1           TC     SERVXIT

 3208   REF 164  LAST  740   24,3730  0 6006 1  P47BODY  TC     INTPRET
 3209                             24,3731   77775 1             VLOAD
 3210    REF  22  LAST  737       24,3732   15336 0                     HI6ZEROS
 3211    REF   7  LAST  740       24,3733   03675 0             STORE  DELVIMU       CLEAR DISPLAY AND ACCUMULATOR STORAGE
 3212    REF   3  LAST  740       24,3734   03665 1             STORE  DELVCTL       UPON INITIATION OR-ENTER-RESPONSE
 3213                             24,3735   77776 1             EXIT
 3214    REF   2  LAST  168       24,3736  3 5054 0  P47BOD     CAF    PRIO15        LOWER PRIO THAN CALCN83 (20)
 3215    REF  12  LAST  588       24,3737  0 5176 1             TC     PRIOCHNG        TO PREVENT INTERRUPTION OF CALCN83
 3216    REF  65  LAST  740       24,3740  0 5402 1             TC     PHASCHNG
 3217                             24,3741   05024 1             OCT    05024         TYPE C GROUP 4 BELOW FOR NOUN 83
 3218                             24,3742   62777 1             OCT    62777         PRIO 15 NOVAC
 3219    REF   1                  24,3743  3 3516 0  P47/DSP    CAF    V1683
 3220    REF 157  LAST  740       24,3744  0 4636 0             TC     BANKCALL
 3221    REF  17  LAST  667       24,3745   20743 0             CADR   GOFLASH
 3222    REF  31  LAST  711       24,3746  0 4103 1             TC     GOTOPOOH
 3223    REF  32  LAST  741       24,3747  0 4103 1             TC     GOTOPOOH
 3224    REF   3  LAST  740       24,3750  1 3730 1             TCF    P47BODY       RECYCLE - CLEAR ACCUMULATED VELOCITY
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L        P51-P53                                                                USER'S PAGE NO.  1      E0 53

R0001    PROGRAM NAME - PROG52                                                                   DATE - AUGUST 1,1969
R0003    MODIFICATION BY ALBERT,BARNERT,HASLAM                                                   LOG SECTION - P51-P5

R0007    FUNCTION -

R0008         ALIGNS THE IMU TO ONE OF THREE ORIENTATIONS SELECTED BY THE ASTRONAUT. THE PRESENT IMU ORIENTATION IS KNOWN
R0010    AND IS STORED IN REFSMMAT. THE THREE POSSIBLE ORIENTATIONS MAY BE_

R0011         (A) PREFERRED ORIENTATION

R0012          AN OPTIMUM ORIENTATION FOR A PREVIOUSLY CALCULATED MANUEVER. THIS ORIENTATION MUST BE CALCULATED AND
R0014         STORED BY A PREVIOUSLY SELECTED PROGRAM.

R0015         (B) NOMINAL (LOCAL VERTICAL) ORIENTATION

R0016              X   = UNIT(Y   X Z   )
R0017              -SM        -SM  -SM

R0018              Y   = UNIT(V X R)
R0019              -SM        -   -

R0020              Z   = UNIT(-R)
R0021              -SM        -

R0022             WHERE_
R0023              R = THE GEOCENTRIC RADIUS VECTOR AT TIME T(ALIGN) SELECTED BY THE ASTRONAUT
R0025              -

R0026              V = THE INERTIAL VELOCITY VECTOR AT TIME T(ALIGN) SELECTED BY THE ASTRONAUT
R0028              -

R0029         (C) REFSMMAT ORIENTATION

R00291         THIS ORIENTATION IS SELECTED AUTOMATICALLY UNLESS THE ASTRONAUT KEYS IN A DIFFERENT OPTION CODE

R0030          THIS SELECTION CORRECTS THE PRESENT IMU ORIENTATION. THE PRESENT ORIENTATION DIFFERS FROM THAT TO WHICH IT
R0032         WAS LAST ALIGNED ONLY DUE TO GYRO DRIFT(I.E. NEITHER GIMBAL LOCK NOR IMU POWER INTERRUPTION HAS OCCURED
R0034         SINCE THE LAST ALIGNMENT).

R0035         AFTER A IMU ORIENTATION HAS BEEN SELECTED ROUTINE S52.2 IS OPERATED TO COMPUTE THE GIMBAL ANGLES USING THE
R0037    NEW ORIENTATION AND THE PRESENT VEHICLE ATTITUDE. CAL52A THEN USES THESE ANGLES, STORED IN THETAD,+1,+2, TO
R0039    COARSE ALIGN THE IMU. THE STAR SELECTION ROUTINE, R56, IS THEN OPERATED. IF 2 STARS ARE NOT AVAILABLE AN ALARM
R0041    IS FLASHED TO NOTIFY THE ASTRONAUT. AT THIS POINT THE ASTRONAUT WILL MANUEVER THE VEHICLE AND SELECT 2 STARS
R0043    EITHER MANUALLY OR AUTOMATICALLY. AFTER 2 STARS HAVE BEEN SELECTED THE IMU IS FINE ALIGNED USING ROUTINE R51. IF
R0045    THE RENDEZVOUS NAVIGATION PROCESS IS OPERATING(INDICATED BY RNDVZFLG) P20 IS DISPLAYED. OTHERWISE P00 IS
R0047    REQUESTED.

R0048    CALLING SEQUENCE-

R0049         THE PROGRAM IS CALLED BY THE ASTRONAUT BY DSKY ENTRY.
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L         P51-P53                                                                                    USER'S PAGE NO.  2      L  53

R0050    SUBROUTINES CALLED-

R0051        1. FLAGDOWN      6. S52.2        11. GOPERF3
R0052        2. R02BOTH       7. CAL53A       12. NEWMODEX
R0053        3. GOPERF4       8. FLAGUP       13. PRIOLARM
R0054        4. MATMOVE       9. R56
R0055        5. GOFLASH      10. R51

R0057    NORMAL EXIT MODES-

R0058        EXITS TO ENDOFJOB

R0059    ALARM OR ABORT EXIT MODES-

R0060        NONE

R0061    OUTPUT-

R0062        THE FOLLOWING MAY BE FLASHED ON THE DSKY
R0063           1. IMU ORIENTATION CODE
R0064           2. ALARM CODE 215 -PREFERRED IMU ORIENTATION NOT SPECIFIED
R0065           3. TIME OF NEXT IGNITION
R0066           4. GIMBAL ANGLES
R0067           5. ALARM CODE 405 -TWO STARS NOT AVAILABLE
R0068           6. PLEASE PERFORM P00
R0069        THE MODE DISPLAY MAY BE CHANGED TO 20

R0070    ERASABLE INITIALIZATION REQUIRED-

R0071        PFRATFLG SHOULD BE SET IF A PREFERRED ORIENTATION HAS BEEN COMPUTED.IF IT HAS BEEN COMPUTED IT IS STORED IN
R0073        XSMD,YSMD,ZSMD.
R0074        RNDVZFLG INDICATES WHETHER THE RENDEZVOUS NAVIGATION PROCESS IS OPERATING.

R0076    DEBRIS-

R0077        WORK AREA
 0078    REF   3  LAST  233   14,2002                P54      =       PROG52
 0080    REF   1              14,2000                         SETLOC  P50S
 0081                         14,2002                         BANK

 0082    REF  11  LAST  733   30,2000                         SBANK=  LOWSUPER
 0083    REF   7  LAST  451   E5,1773                         EBANK=  SAC
 0084    REF   1                                              COUNT*  $$/P52
 0087    REF  52  LAST  737   14,2002  0 5561 0  PROG52       TC      DOWNFLAG
 00875   REF  12  LAST  668   14,2003   00027 1               ADRES   UPDATFLG          BIT 7  FLAG 1
 0088    REF  53  LAST  743   14,2004  0 5561 0               TC      DOWNFLAG
 00885   REF  12  LAST  652   14,2005   00031 0               ADRES   TRACKFLG          BIT 5  FLAG 1
 0089    REF 158  LAST  741   14,2006  0 4636 0               TC      BANKCALL
 0090    REF   7  LAST  740   14,2007   03731 1               CADR    R02BOTH           IMU STATUS CHECK
 00902   REF 165  LAST  740   14,2010  0 6006 1               TC      INTPRET
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00904                        14,2011   77414 0           BON     EXIT        MINKEY SEQUENCE?
00906  REF  16  LAST  668    14,2012   05310 0                   AUTOSEQ
00908  REF   1               14,2013   30276 1                   P52AUTO     YES

0091   REF  20  LAST  555    14,2014  3 0104 1           CA      FLAGWRD8
0092   REF  10  LAST  555    14,2015  7 4760 0           MASK    UTBIT
0093                         14,2016  0 0006 1           EXTEND
0094                         14,2017  1 2025 0           BZF     +6

0095   REF   4  LAST  556    14,2020  11'351 0           CCS     OPTNTYPE
0096                         14,2021  1 2023 0           TCF     +2
0097                         14,2022  1 2025 0           TCF     +3
0098   REF  61  LAST  737    14,2023  0 5547 1           TC      UPFLAG
0099   REF  13  LAST  743    14,2024   00031 0           ADRES   TRACKFLG

0100   REF   2  LAST  700    14,2025  3 4765 1           CAF     PFRATBIT
0101   REF  19  LAST  704    14,2026  7 0076 1           MASK    FLAGWRD2    PREFERRED ORIENTATION
0102   REF 174  LAST  726    14,2027  10 000 0           CCS     A
0103   REF   1               14,2030  0 2033 0           TC      P52A
0104   REF  27  LAST  720    14,2031  3 6214 0           CAF     THREE       ION
0106   REF   2  LAST  744    14,2032  0 2034 1           TC      P52A +1
0107   REF  42  LAST  726    14,2033  3 4770 0  P52A     CAF     BIT1        YES - SET OPTION 2 = 1
0108   REF  10  LAST  554    14,2034  54 776 0    +1     TS      OPTION2
0109   REF  43  LAST  744    14,2035  3 4770 0  P52B     CAF     BIT1
0110   REF 159  LAST  743    14,2036  0 4636 0           TC      BANKCALL    FLASH OPTION CODE AND ORIENTATION CODE
0111   REF   3  LAST  553    14,2037   21074 1           CADR    GOPERF4
0112   REF  33  LAST  741    14,2040  0 4103 1           TC      GOTOPOOH
0113                         14,2041  0 2043 1           TC      +2
0114   REF   1               14,2042  0 2035 0           TC      P52B        NEW CODE - NEW ORIENTATION CODE INPUT
0115   REF  11  LAST  744    14,2043  4 0776 0           CS      OPTION2
0116   REF  28  LAST  744    14,2044  7 6214 1           MASK    THREE
0117                         14,2045  0 0006 1           EXTEND
0118   REF   1               14,2046  1 2407 1           BZF     P52C        REFERENCE
0119   REF  44  LAST  744    14,2047  7 4770 1           MASK    BIT1
0120                         14,2050  0 0006 1           EXTEND
0121   REF   1               14,2051  1 2167 1           BZF     P52J        PREFERRED
0122                         14,2052  0 0006 1           EXTEND              NOMINAL(LOCAL VERTICAL), LANDING SIGHT
0123   REF  15  LAST  703    14,2053  3 4772 1           DCA     NEG0
0124   REF  25  LAST  556    14,2054  53'251 1           DXCH    DSPTEM1
0125   REF   3  LAST  560    14,2055  3 5027 1           CAF     V06N34      PREFERRED
0126   REF  34  LAST  685    14,2056  0 5535 1           TC      VNFLASH
0127   REF  26  LAST  744    14,2057  3 1250 1           CA      DSPTEM1
0128                         14,2060  0 0006 1           EXTEND
0129                         14,2061  1 2063 1           BZF     +2
0130                         14,2062  1 2066 1           TCF     +4

0131                         14,2063  0 0006 1           EXTEND
0132   REF  29  LAST  709    14,2064  3 0025 0           DCA     TIME2
0133   REF  27  LAST  744    14,2065  53'251 1           DXCH    DSPTEM1
0134   REF  12  LAST  744    14,2066  3 0776 1           CA      OPTION2
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 0135    REF  27  LAST  740    14,2067  7 4767 1              MASK    BIT2
 0136    REF 175  LAST  744    14,2070  10 000 0              CCS     A
 0137    REF   1               14,2071  1 2145 1              TCF     S52.3              NOM - S52.3 - NOW IN-LINE
 0138    REF 166  LAST  743    14,2072  0 6006 1              TC      INTPRET            LS - P52LS - NOW IN-LINE

R0139    NAME-P52LS
R0140    FUNCTION - TO DISPLAY THE LANDING SITE LATITUDE,
R0141    LONGTITUDE AND ALTITUDE. TO ACCEPT NEW DATA VIA
R0142    THE KEYBOARD. TO COMPUTE THE LANDING SITE
R0143    ORIENTATION FOR P52 OR P54
R0144
R0145    LET:
R0146       RLS = LANDING SITE VECTOR IN REF COORDINATES
R0147       R   = CSM POSITION VECTOR IN REF COORDINATES
R0148       V   = CSM VELOCITY VECTOR IN REF COORDINATES
R0149    THEN THE LANDING SITE ORIENTATION IS:
R0150       XSMD = UNIT(RLS)
R0151       YSMD = UNIT(ZSMD*XSMD)
R0152       ZSMD = UNIT((R*V)*RLS)
R0153    INPUTS-  DSPTEM1=TIME OF ALIGNMENT
R0154             RLS=LANDING SITE VECTOR IN MOON FIXED COORINATES
R0155    OUTPUTS- XSMD,YSMD,ZSMD
R0156    SUBROUTINES- RP-TO-R ,LAT-LONG,LLASRD,LLASRDA,CSMPREC
R0157    DEBRIS- VAC, SEE SUBROUTINES
R0158
 0159                          14,2073   43014 0              SET     SET
 0160    REF  16  LAST  638    14,2074   01463 1                      LUNAFLAG
 0161    REF   8  LAST  648    14,2075   00462 1                      ERADFLAG
 0162                          14,2076   77775 1              VLOAD
 0163    REF   8  LAST  617    14,2077   02026 1                      RLS
 0164                          14,2100   14001 0              STODL   0D
 0165    REF  28  LAST  744    14,2101   01251 0                      DSPTEM1
 0166    REF   2  LAST   97    14,2102   02607 1              STORE   TSIGHT
 0167                          14,2103   34007 1              STCALL  6D
 0168    REF   4  LAST  614    14,2104   55345 0                      RP-TO-R
 0169                          14,2105   77742 0              VSR2
 0170    REF   9  LAST  634    14,2106   16152 0              STODL   ALPHAV
 0171    REF   3  LAST  745    14,2107   02607 1                      TSIGHT
 0172                          14,2110   77624 1              CALL
 0173    REF   5  LAST  617    14,2111   26453 1                      LAT-LONG
 0174                          14,2112   77624 1              CALL
 0175    REF   2  LAST  617    14,2113   62363 0                      LLASRD
 0176                          14,2114   77776 1              EXIT
 0177    REF   1               14,2115  3 5036 1   LSDISP     CAF     V06N89*
 0178    REF  35  LAST  744    14,2116  0 5535 1              TC      VNFLASH
 0179    REF 167  LAST  745    14,2117  0 6006 1              TC      INTPRET
 0180                          14,2120   77624 1              CALL
 0181    REF   2  LAST  563    14,2121   62371 0                      LLASRDA
 0182                          14,2122   45145 0              DLOAD   CALL
 0183    REF   4  LAST  745    14,2123   02607 1                      TSIGHT
 0184   REF   6  LAST  648   14,2124   26524 0                    LALOTORV
 0185                        14,2125   53575 0            VLOAD   UNIT
 0186   REF  10  LAST  745   14,2126   02152 0                    ALPHAV
 0187   REF   4  LAST   74   14,2127   14307 0            STODL   XSMD
 0188   REF   5  LAST  745   14,2130   02607 1                    TSIGHT
 0189   REF  31  LAST  723   14,2131   34041 0            STCALL  TDEC1
 0190   REF   4  LAST  617   14,2132   27145 1                    CSMPREC
 0191                        14,2133   47375 0            VLOAD   VXV
 0192   REF  20  LAST  716   14,2134   00001 0                    RATT
 0193   REF  20  LAST  716   14,2135   00007 0                    VATT
 0194                        14,2136   53435 0            VXV     UNIT
 0195   REF   5  LAST  746   14,2137   00307 0                    XSMD
 0196   REF   3  LAST   74   14,2140   00323 0            STORE   ZSMD
 0197                        14,2141   53435 0            VXV     UNIT
 0198   REF   6  LAST  746   14,2142   00307 0                    XSMD
 0199   REF   3  LAST   74   14,2143   34315 1            STCALL  YSMD
 0200   REF   1              14,2144   30170 1                    P52D
 0201   REF   2  LAST  623      5036           V06N89*    =       V06N89
R0202   NAME - S52.3
R0203   FUNCTION - TO COMPUTE AND DISPLAY THE
R0204   GIMBAL ANGLES, ALLOW ASTRONAUT TO CHOOSE
R0205   BETWEEN FAST AND ACCURATE IMU REALIGNMENT.
R0206   NOMINAL (LOCAL VERTICAL) ORIENTATION IS:
R0207               XSMD= UNIT(YSMD X ZSMD)
R0208               YSMD= UNIT(V X R)
R0209               ZSMD= UNIT(-R)
R0210   INPUT-   TIME OF ALIGNMENT IN MPAC
R0211   OUTPUT-  X,Y,ZSMD
R0212   SUBROUTINES- CSMCONIC
 0213   REF 168  LAST  745   14,2145 0 6006 1  S52.3      TC      INTPRET
 0214                        14,2146   77745 1            DLOAD
 0215   REF  29  LAST  745   14,2147   01251 0                    DSPTEM1
 0216   REF  32  LAST  746   14,2150   34041 0            STCALL  TDEC1
 0217   REF   5  LAST  746   14,2151   27145 1                    CSMPREC
 0218                        14,2152   77201 1            SETPD   VLOAD
 0219                        14,2153   00001 0                    0
 0220   REF  21  LAST  746   14,2154   00001 0                    RATT
 0221                        14,2155   53476 1            VCOMP   UNIT
 0222   REF   4  LAST  746   14,2156   24323 0            STOVL   ZSMD
 0223   REF  21  LAST  746   14,2157   00007 0                    VATT
 0224                        14,2160   53435 0            VXV     UNIT
 0225   REF  22  LAST  746   14,2161   00001 0                    RATT
 0226   REF   4  LAST  746   14,2162   00315 0            STORE   YSMD
 0227                        14,2163   53435 0            VXV     UNIT
 0228   REF   5  LAST  746   14,2164   00323 0                    ZSMD
 0229   REF   7  LAST  746   14,2165   00307 0            STORE   XSMD
 0230                        14,2166   77776 1            EXIT
 0231   REF 169  LAST  746   14,2167 0 6006 1  P52J       TC      INTPRET
 0232                        14,2170   77624 1  P52D       CALL                        READ VEHICLE ATTITUDE AND
 0233   REF   1              14,2171   22247 0                    S52.2                COMPUTE GIMBAL ANGLES
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0234                          14,2172   77776 1            EXIT
0235   REF   2  LAST  402     14,2173  3 5025 0            CAF      V06N22
0236   REF 160  LAST  744     14,2174  0 4636 0            TC       BANKCALL          DISPLAY GIMBAL ANGLES
0237   REF  18  LAST  741     14,2175   20743 0            CADR     GOFLASH
0238   REF  34  LAST  744     14,2176  0 4103 1            TC       GOTOPOOH
0239   REF   1                14,2177  0 2201 0            TC       COARSTYP
0240   REF   2  LAST  744     14,2200  0 2167 0            TC       P52J              RECYCLE - VEHICLE HAS BEEN MANEUVERED
02402  REF  16  LAST  702     14,2201  4 0106 1  COARSTYP  CS       FLGWRD10
02404  REF   2  LAST  206     14,2202  7 4762 1            MASK     AUTSQBIT
02406                         14,2203  0 0006 1            EXTEND
02408  REF   1                14,2204  1 2320 0            BZF      PERF20            IF MINKEY
0241   REF   2  LAST  170     14,2205  3 4775 0            CAF      OCT13             PLEASE PERFORM NORMAL/GYRO TORQUE
0242   REF 161  LAST  747     14,2206  0 4636 0            TC       BANKCALL
0243   REF   5  LAST  698     14,2207   21067 0            CADR     GOPERF1
0244   REF  35  LAST  747     14,2210  1 4103 0            TCF      GOTOPOOH          V34
0245   REF   1                14,2211  1 2334 0            TCF      P52K              NORMAL COARSE
0246   REF 170  LAST  746     14,2212  0 6006 1  GYCRS     TC       INTPRET
0247                          14,2213   64375 1            VLOAD    MXV
0248   REF   8  LAST  746     14,2214   00307 0                     XSMD
0249   REF  28  LAST  727     14,2215   01734 0                     REFSMMAT
0250                          14,2216   77656 1            UNIT
0251   REF   4  LAST  545     14,2217   26714 1            STOVL    XDC
0252   REF   5  LAST  746     14,2220   00315 0                     YSMD
0253                          14,2221   53521 1            MXV      UNIT
0254   REF  29  LAST  747     14,2222   01734 0                     REFSMMAT
0255   REF   4  LAST  545     14,2223   26722 1            STOVL    YDC
0256   REF   6  LAST  746     14,2224   00323 0                     ZSMD
0257                          14,2225   53521 1            MXV      UNIT
0258   REF  30  LAST  747     14,2226   01734 0                     REFSMMAT
0259   REF   4  LAST  545     14,2227   36730 0            STCALL   ZDC
0260   REF   3  LAST  545     14,2230   47240 1                     CALCGTA
0261                          14,2231   43014 0            CLEAR    CLEAR
0262   REF   1                14,2232   01260 1                     DRIFTFLG
0263   REF   6  LAST  645     14,2233   01662 1                     REFSMFLG
0264                          14,2234   77776 1            EXIT
0265   REF   1                14,2235  3 2275 0            CAF      V16N20
0266   REF 162  LAST  747     14,2236  0 4636 0            TC       BANKCALL
0267   REF   2  LAST  395     14,2237   20710 0            CADR     GODSPR
0268   REF   1                14,2240  3 3002 0            CAF      R55COR
0269   REF 163  LAST  747     14,2241  0 4636 0            TC       BANKCALL
0270   REF   5  LAST  447     14,2242   17244 0            CADR     IMUPULSE
0271   REF 164  LAST  747     14,2243  0 4636 0            TC       BANKCALL
0272   REF   8  LAST  447     14,2244   17644 1            CADR     IMUSTALL
0273   REF   1                14,2245  0 3766 0            TC       217ALARM          BAD END
0274   REF  66  LAST  741     14,2246  0 5402 1            TC       PHASCHNG
0275                          14,2247   04024 0            OCT      04024
0276   REF 171  LAST  747     14,2250  0 6006 1            TC       INTPRET
0277                          14,2251   75160 1            AXC,1    AXC,2
0278   REF   9  LAST  747     14,2252   00306 1                     XSMD
0279   REF  31  LAST  747     14,2253   01733 1                     REFSMMAT
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 0280                          14,2254   77624 1              CALL
 0281    REF   1               14,2255   34730 1                     MATHOVE
 0282                          14,2256   43014 0              CLEAR  SET
 0283    REF   2  LAST  698    14,2257   01273 0                     PFRATFLG
 0284    REF   7  LAST  747    14,2260   01462 0                     REFSMFLG
 0285                          14,2261   77234 1              RTB    VLOAD
 0286    REF   1               14,2262   31566 0                     SET1/PDT
 0287    REF  12  LAST  685    14,2263   11762 1                     ZEROVEC
 0288    REF  18  LAST  435    14,2264   01472 1              STORE  GCOMP
 0289                          14,2265   43014 0              SET    BOF
 02895   REF   2  LAST  747    14,2266   01060 0                     DRIFTFLG
 0290    REF  17  LAST  744    14,2267   05350 1                     AUTOSEQ
 02905   REF   1               14,2270   30757 1                     R51K            CONTINUE FINE ALIGN IF NOT MINKEY
 02906                         14,2271   77614 1              CLEAR
 02907   REF   8  LAST  685    14,2272   05276 1                     PCFLAG
 0291                          14,2273   77776 1  P50SEXIT    EXIT
 02915   REF   4  LAST  712    14,2274  1 4105 0              TCF    MNKGOPOO
 0292                          14,2275   04024 0  V16N20      VN     1620
 0293    REF   2  LAST  166       4776              ALRM15      EQUALS OCT15
 0294                          14,2276   74575 0  P52AUTO     VLOAD  VSR1            XDES = UNIT(XREF COS45 + YREF SIN45) (1)
 0295    REF  32  LAST  747    14,2277   01734 0                     REFSMMAT                             -                 (2)
 0296                          14,2300   74515 0              PDVL   VSR1
 0297    REF  33  LAST  748    14,2301   01742 1                     REFSMMAT +6     (1) FOR 1ST, +45-DEGREE MANEUVER
 0298                          14,2302   57414 1              BON    VCOMP           (2)     2ND  -
 0299    REF   9  LAST  748    14,2303   05316 0                     PCFLAG          IN EITHER CASE, COS45 = SIN45, AND
 0300    REF   1               14,2304   30305 1                     P52AUTOX            'UNIT' OBVIATES NEED FOR THEN.

 0301                          14,2305   53455 0  P52AUTOX    VAD    UNIT
 0302                          14,2306   77626 0              STADR
 0303    REF  10  LAST  747    14,2307   53470 1              STOVL  XSMD
 0304    REF  34  LAST  748    14,2310   01750 1                     REFSMMAT +12D
 0305    REF   7  LAST  747    14,2311   00323 0              STORE  ZSMD            ZDES = ZREF
 0306                          14,2312   53435 0              VXV    UNIT
 0307    REF  11  LAST  748    14,2313   00307 0                     XSMD
 0308    REF   6  LAST  747    14,2314   00315 0              STORE  YSMD            YDES = UNIT(ZDES * XDES)
 0309                          14,2315   52014 0              SET    GOTO
 0310    REF   3  LAST  748    14,2316   01073 1                     PFRATFLG
 0311    REF   2  LAST  746    14,2317   30170 1                     P52D

 0312    REF  24  LAST  564    14,2320  3 4764 0  PERF20      CAF    BIT5            =OCT 20, PLEASE PERF MINKEY PC TORQUE
 03125   REF 165  LAST  747    14,2321  0 4636 0              TC     BANKCALL
 0313    REF   6  LAST  747    14,2322   21067 0              CADR   GOPERF1
 03135   REF  36  LAST  747    14,2323  0 4103 1              TC     GOTOPOOH        V 34
 0314    REF   1               14,2324  0 2212 1              TC     GYCRS           PRO - DO IT
 03145   REF 172  LAST  747    14,2325  0 6006 1              TC     INTPRET         ENTR
 0315                          14,2326   77414 0              BON    EXIT
 03155   REF  10  LAST  748    14,2327   05316 0                     PCFLAG
 0316    REF   1               14,2330   30273 1                     P50SEXIT        OK TO FLUSH IT 1ST TIME ONLY
 03165   REF  25  LAST  706    14,2331  0 5671 1              TC     ALARM           BUT MAKE HIM DO 2ND
 0317                          14,2332   00402 1              OCT    00402
 0318   REF   2  LAST  747   14,2333  0 2320 1               TC       PERF20
R0319   NAME - CAL53A
R0320   FUNCTION - COARSE ALIGN THE IMU, IF NECESSARY.
R0321   INPUT -  PRESENT GIMBAL ANGLES - CDUX,CDUY,CDUZ
R0322            DESIRED GIMBAL ANGLES - THETAD,+1,+2
R0323   OUTPUT - THE IMU COORDINATES ARE STORED IN REFSMMAT
R0324   SUBROUTINES USED - 1.IMUCOARS 2.IMUSTALL 3.CURTAINS
 0325   REF   1                                              COUNT*   $$/R50
 03255  REF 173  LAST  748   14,2334  0 6006 1   P52K        TC       INTPRET
 0326                        14,2335   77624 1   CAL53A      CALL
 0327   REF   2  LAST  746   14,2336   22247 0                        S52.2           MAKE FINAL COMP OF GIMBAL ANGLES
 0328                        14,2337   66234 1               RTB      SSP
 0329   REF   1              14,2340   34744 1                        RDCDUS          READ CDUS
 0330   REF  24  LAST  649   14,2341   00051 0                        S1
 0331                        14,2342   00001 0                        1
 0332                        14,2343   40370 1               AXT,1    SETPD
 0333                        14,2344   00003 1                        3
 0334                        14,2345   00005 1                        4
 0335                        14,2346   70543 1   CALOOP      DLOAD*   SR1
 0336   REF  19  LAST  607   14,2347   01313 1                        THETAD +30,1
 0337                        14,2350   70523 1               PDDL*    SR1
 0338                        14,2351   00005 1                        4,1
 0339                        14,2352   51425 0               DSU      ABS
 0340                        14,2353   45206 1               PUSH     DSU
 0341   REF   1              14,2354   34743 0                        DEGREE1
 0342                        14,2355   71240 1               BMN      DLOAD
 0343   REF   1              14,2356   30376 0                        CALOOP1
 0344                        14,2357   51025 1               DSU      BPL
 0345   REF   1              14,2360   34744 1                        DEG359
 0346   REF   2  LAST  749   14,2361   30376 0                        CALOOP1
 0347                        14,2362   77776 1   COARFINE    EXIT
 0348   REF  67  LAST  747   14,2363  0 5402 1               TC       PHASCHNG
 0349                        14,2364   04024 0               OCT      04024
 0350   REF   1              14,2365  0 3742 0               TC       COARSUB         PERFORM ALIGNMENT
 0351   REF 174  LAST  749   14,2366  0 6006 1               TC       INTPRET
 0352                        14,2367   77234 1               RTB      VLOAD
 0353   REF   2  LAST  748   14,2370   31566 0                        SET1/PDT
 0354   REF  13  LAST  748   14,2371   11762 1                        ZEROVEC
 0355   REF  19  LAST  748   14,2372   01472 1               STORE    GCOMP
 0356                        14,2373   52014 0               SET      GOTO
 0357   REF   3  LAST  748   14,2374   01060 0                        DRIFTFLG
 0358   REF   1              14,2375   30400 0                        FINEONLY
 0359                        14,2376   77700 0   CALOOP1     TIX,1
 0360   REF   1              14,2377   30346 0                        CALOOP
 0361                        14,2400   75160 1   FINEONLY    AXC,1    AXC,2
 0362   REF  28  LAST  629   14,2401   02671 0                        XSM
 0363   REF  35  LAST  748   14,2402   01733 1                        REFSMMAT
 0364                        14,2403   77624 1               CALL
 0365   REF   2  LAST  748   14,2404   34730 1                        MATMOVE
 0366                        14,2405   77414 0   CAL53RET    SET      EXIT
 0367   REF   8  LAST  748    14,2406   01462 0                        REFSMFLG
 03675  REF   2 LAST  743 TO  749:    218    218*           COUNT*  $$/P52
 0368   REF  68  LAST  749    14,2407  0 5402 1   P52C      TC      PHASCHNG
 0369                         14,2410   04024 0             OCT     04024
 0370   REF   2  LAST  567    14,2411  3 4776 0             CAF     ALRM15
 0371   REF 166  LAST  748    14,2412  0 4636 0             TC      BANKCALL
 0372   REF   7  LAST  748    14,2413   21067 0             CADR    GOPERF1
 0373   REF  37  LAST  748    14,2414  0 4103 1             TC      GOTOPOOH
 0374                         14,2415  0 2417 1             TC      +2                V33
 0375   REF   2  LAST  233    14,2416  0 2622 0             TC      R51               FINE ALIGN
 0376   REF 175  LAST  749    14,2417  0 6006 1             TC      INTPRET
 0377                         14,2420   43234 0             RTB     CAD
 0378   REF  21  LAST  629    14,2421   51751 0                     LOADTIME
 0379   REF   1               14,2422   34652 1                     TSIGHT1
 0380                         14,2423   77624 1             CALL
 0381   REF   1               14,2424   26345 1                     LOCSAM
 03815  REF   1                                         COUNT*  $$/PICAP
R0382   NAME - PICAPAR        NOW IN-LINE

R0383   FUNCTION -
R0384     THIS PROGRAM READ THE IMU-CDUS AND COMPUTES THE VEHICLE ORIENTATION
R0385   WITH RESPECT TO INERTIAL SPACE. IT THEN COMPUTES THE SHAFT AXIS (SAX)
R0386   WITH RESPECT TO REFERENCE INERTIAL. EACH STAR IN THE CATALOG IS TESTED
R0387   TO DETERMINE IF IT IS OCCULTED BY EITHER THE EARTH,SUN OR MOON. IF A
R0388   STAR IS NOT OCCULTED  THEN IT IS PAIRED WITH ALL STAR OF LOWER INDEX.
R0389   THE PAIRED STAR  IS TESTED FOR OCCULTATION. PAIRS OF STARS THAT PASS
R0390   THE OCCULTATION TESTS ARE TESTED FOR GOOD SEPARATION.A PAIR OF STARS
R0391   HAVE GOOD SEPARATION IF THE ANGLE BETWEEN THEM IS LESS THAN 76 DEGREES
R0392   AND MORE THAN 30 DEGREES. THOSE PAIRS OF STARS WITH GOOD SEPARATION
R0393   ARE THEN TESTED TO SEE IF THEY LIE IN CURRENT FIELD OF VIEW.(WITHIN
R0394   38 DEGREES OF SAX). THE PAIR WITH MAXIMUM SEPARATION IS CHOSEN FROM
R0395   THOSE WITH GOOD SEPARATION,AND IN FIELD OF VIEW.
R0396
R0397   OUTPUT
R0398   BESTI,BESTJ -SINGLE PREC,INTEGERS,STAR NUMBERS TIMES 6
R0399   VFLAG - FLAG BIT  SET IMPLIES NO STARS IN FIELD OF VIEW
R0400
R0401   INITIALIZATION
R0402   1)A CALL TO LOCSAM MUST BE MADE
R0403   2)VEARTH = -UNIT(R)  WHERE R HAS BEEN UPDATED TOO APPROXIMATE TIME OF
R0404         SIGHTINGS.
R0405
R0406   DEBRIS
R0407   WORK AREA
R0408   X,Y,ZNB
R0409   SINCDU,COSCDU
R0410   STARAD - STAR +5
 0411                         14,2425   77624 1             CALL
 0412   REF   6  LAST  720    14,2426   47530 1                     CDUTRIG
 0413                         14,2427   45001 1             SETPD   CALL
 0414                              14,2430   00001 0                 0
 0415   REF   1                    14,2431   34756 1                 CALCSMSC
 0416                              14,2432   71214 0          SET    DLOAD           VFLAG = 1
 0417   REF   1                    14,2433   01465 1                 VFLAG
 0418   REF   1                    14,2434   11762 1                 DPZERO
 0419   REF   6  LAST  639         14,2435   24303 1          STOVL  BESTI
 0420   REF   5  LAST  629         14,2436   02714 1                 XNB
 0421                              14,2437   63361 0          VXSC   PDVL
 0422   REF   1                    14,2440   30575 0                 SIN33
 0423   REF   4  LAST  427         14,2441   02730 1                 ZNB
 0424                              14,2442   74370 0          AXT,1  VXSC
 0425                              14,2443   00344 1                 228D            X1 = 37 X 6 +6
 0426   REF   1                    14,2444   30577 1                 COS33
 0427                              14,2445   77655 1          VAD
 0428                              14,2446   53505 1          VXM    UNIT
 0429   REF  36  LAST  749         14,2447   01734 0                 REFSMMAT
 0430   REF   1                    14,2450   02760 1          STORE  SAX             SAX = SHAFT AXIS
 0431                              14,2451   66331 0          SSP    SSP             S1=S2=6
 0432   REF  25  LAST  749         14,2452   00051 0                 S1
 0433                              14,2453   00006 1                 6
 0434   REF  10  LAST  642         14,2454   00052 0                 S2
 0435                              14,2455   00006 1                 6
 0436                              14,2456   52100 1   PIC1   TIX,1  GOTO            MAJOR STAR
 0437   REF   1                    14,2457   30461 1                 PIC2
 0438   REF   1                    14,2460   30606 1                 PICEND
 0439                              14,2461   45173 0   PIC2   VLOAD* CALL
 0440   REF   3  LAST  640         14,2462   33776 1                 CATLOG,1
 0441   REF   1                    14,2463   30552 0                 OCCULT
 0442                              14,2464   73014 0          BON    LXA,2
 0443   REF   4  LAST  300         14,2465   01710 0                 CULTFLAG
 0444   REF   1                    14,2466   30456 0                 PIC1
 0445   REF  28  LAST  726         14,2467   00046 0                 X1
 0446                              14,2470   52104 0   PIC3   TIX,2  GOTO
 0447   REF   1                    14,2471   30473 1                 PIC4
 0448   REF   2  LAST  751         14,2472   30456 0                 PIC1
 0449                              14,2473   45173 0   PIC4   VLOAD* CALL
 0450   REF   4  LAST  751         14,2474   44001 0                 CATLOG,2
 0451   REF   2  LAST  751         14,2475   30552 0                 OCCULT
 0452                              14,2476   76614 0          BON    VLOAD*
 0453   REF   5  LAST  751         14,2477   01710 0                 CULTFLAG
 0454   REF   1                    14,2500   30470 1                 PIC3
 0455   REF   5  LAST  751         14,2501   33776 1                 CATLOG,1
 0456                              14,2502   45237 0          DOT*   DSU
 0457   REF   6  LAST  751         14,2503   44001 0                 CATLOG,2
 0458   REF   1                    14,2504   30601 0                 CSS66           SEPARATION LESS THAN 76 DEG.
 0459                              14,2505   43240 0          BMN    DAD
 0460   REF   2  LAST  751         14,2506   30470 1                 PIC3
 0461   REF   1                    14,2507   30603 1                 CSS6640         SEPARATION MORE THAN 30 DEG.
 0462                              14,2510   77644 1          BPL
 0463   REF   3  LAST  751         14,2511   30470 1                 PIC3
 0464                          14,2512   50373 0                VLOAD* DOT
 0465   REF   7  LAST   751    14,2513   33776 1                       CATLOG,1
 0466   REF   2  LAST   751    14,2514   02760 1                       SAX
 0467                          14,2515   50025 0                DSU    BMN                MAJOR STAR IN CONE
 0468   REF   1                14,2516   30605 1                       CSS33
 0469   REF   3  LAST   751    14,2517   30456 0                       PIC1
 0470                          14,2520   50373 0                VLOAD* DOT
 0471   REF   8  LAST   752    14,2521   44001 0                       CATLOG,2
 0472   REF   3  LAST   752    14,2522   02760 1                       SAX
 0473                          14,2523   50025 0                DSU    BMN
 0474   REF   2  LAST   752    14,2524   30605 1                       CSS33
 0475   REF   4  LAST   751    14,2525   30470 1                       PIC3
 0476                          14,2526   77614 1   STRATGY      BONCLR
 0477   REF   2  LAST   751    14,2527   01605 0                       VFLAG
 0478   REF   1                14,2530   30545 0                       NEWPAR
 0479                          14,2531   65120 1     -3         XCHX,1 XCHX,2
 0480   REF   7  LAST   751    14,2532   00302 0                       BESTI
 0481   REF   3  LAST   184    14,2533   00303 1                       BESTJ
 0482                          14,2534   47773 1   STRAT        VLOAD* DOT*
 0483   REF   9  LAST   752    14,2535   33776 1                       CATLOG,1
 0484   REF  10  LAST   752    14,2536   44001 0                       CATLOG,2
 0485                          14,2537   43006 0                PUSH   BOFINV
 0486   REF   3  LAST   752    14,2540   01545 1                       VFLAG
 0487   REF   1                14,2541   30531 0                       STRAT -3
 0488                          14,2542   45345 1                DLOAD  DSU
 0489                          14,2543   77644 1                BPL
 0490   REF   5  LAST   752    14,2544   30470 1                       PIC3
 0491                          14,2545   67130 1   NEWPAR       SXA,1  SXA,2
 0492   REF   8  LAST   752    14,2546   00302 0                       BESTI
 0493   REF   4  LAST   752    14,2547   00303 1                       BESTJ
 0494                          14,2550   77650 1                GOTO
 0495   REF   6  LAST   752    14,2551   30470 1                       PIC3
 0496                          14,2552   51321 0   OCCULT       MXV    BVSU
 0497   REF   1                14,2553   02736 1                       CULTRIX
 0498   REF   1                14,2554   00017 1                       CSS
 0499                          14,2555   77654 0                BZE
 0500   REF   1                14,2556   30571 1                       CULTED
 0501                          14,2557   75240 0                BMN    SIGN
 0502   REF   2  LAST   752    14,2560   30571 1                       CULTED
 0503   REF 270  LAST   740    14,2561   00160 0                       MPAC +3
 0504                          14,2562   75240 0                BMN    SIGN
 0505   REF   3  LAST   752    14,2563   30571 1                       CULTED
 0506   REF 271  LAST   752    14,2564   00162 1                       MPAC +5
 0507                          14,2565   43040 1                BMN    CLRGO
 0508   REF   4  LAST   752    14,2566   30571 1                       CULTED
 0509   REF   6  LAST   751    14,2567   01630 0                       CULTFLAG
 0510   REF   2  LAST   642    14,2570   00052 0                       QPRET
 0511                          14,2571   77614 1   CULTED       SETGO
 0512   REF   7  LAST   752    14,2572   01430 1                       CULTFLAG
 0513   REF   3  LAST   752    14,2573   00052 0                       QPRET
 0514    REF   1                       0016             CSS        =        CEARTH
 0515                              14,2574    21150 0   SIN33      2DEC     .5376381241
 0515                              14,2575    25157 0
 0516                              14,2576    32766 1   COS33      2DEC     .8431756920
 0516                              14,2577    22713 1
 0517                              14,2600    01736 1   CSS66      2DEC     .060480472        (COS76)/4
 0517                              14,2601    35137 1
 0518                              14,2602    73003 0   CSS6640    2DEC     -.15602587        (COS76 - COS30)/4
 0518                              14,2603    65403 0
 0519                              14,2604    06233 0   CSS33      2DEC     .197002688        COS(172(76))/4
 0519                              14,2605    26112 1
A0520                                                   V1         =        12D
 0521                              14,2606    77414 0   PICEND     BOF      EXIT
 0522    REF   4  LAST  752        14,2607    01745 0                       VFLAG
 0523    REF   1                   14,2610    30621 1                       P52F
 0524    REF  26  LAST  746        14,2611  0 5671 1   P52I       TC       ALARM
 0525                              14,2612    00405 0              OCT      405
 0526    REF   4  LAST  667        14,2613  3 5023 0              CAF      V05N09
 0527    REF 167  LAST  750        14,2614  0 4636 0              TC       BANKCALL
 0528    REF  19  LAST  747        14,2615    20743 0              CADR     GOFLASH
 0529    REF  38  LAST  750        14,2616  0 4103 1              TC       GOTOPOOH
 0530    REF   3  LAST  750        14,2617  0 2622 0              TC       R51               PROCEED - DO R51 FINE ALIGN
 0531    REF   2  LAST  744        14,2620  0 2407 0              TC       P52C              RECYCLE- VEHICLE HAS BEEN MANUEVERED
 0532                              14,2621    77776 1   P52F       EXIT
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R0533    NAME-R51  FINE ALIGN
R0534    FUNCTION-TO ALIGN THE STABLE MEMBER TO REFSMMAT
R0535    INPUT- BESTI,BESTJ(PAIR OF STAR NO )
R0536    OUTPUT- GYRO TORQUE PULSES
R0537    SUBROUTINES- R52,R54,R55(SXTNB,NBSM,AXISGEN
 0538    REF   1                                              COUNT* $$/R51
 0539    REF  45  LAST  744   14,2622  3 4770 0  R51         CAF    BIT1
 0540    REF   2  LAST  211   14,2623  54 304 1  R51.3       TS     STARIND
 0541    REF  54  LAST  743   14,2624  0 5561 0              TC     DOWNFLAG
 0542    REF   4  LAST  630   14,2625   00025 0              ADRES  TARG2FLG

 0548    REF  69  LAST  750   14,2626  0 5402 1              TC     PHASCHNG
 0549                         14,2627   05024 1              OCT    05024             RESTART  GR 4  FOR R52 - R53
 0550                         14,2630   13000 0              OCT    13000
 0551    REF   3  LAST  754   14,2631  50 304 0              INDEX  STARIND
 0552    REF   9  LAST  752   14,2632  3 0302 0              CA     BESTI
 0553                         14,2633  0 0006 1              EXTEND
 0554    REF   1              14,2634  7 3004 1              MP     1/6TH
 0555    REF   9  LAST  638   14,2635  55'140 1              TS     STARCODE
 0556    REF 176  LAST  750   14,2636  0 6006 1              TC     INTPRET
 0557                         14,2637   77624 1              CALL
 0558    REF   2  LAST  567   14,2640   30761 1                     R51DSPA
 0559                         14,2641   72131 1              SSP    LXA,1
 0560    REF  26  LAST  751   14,2642   00051 0                     SI
 0561                         14,2643   00000 1                     0
 0562    REF   4  LAST  754   14,2644   00304 0                     STARIND
 0563                         14,2645   77700 0              TIX,1
 0564    REF   1              14,2646   30651 0                     R51ST
 0565    REF   3  LAST  639   14,2647   36617 1              STCALL STARSAV2         2ND STAR
 0566    REF   2  LAST  754   14,2650   30652 0                     R51ST +1
 0567    REF   2  LAST   98   14,2651   02611 0  R51ST       STORE  STARSAV1         1ST STAR
 0568                         14,2652   54335 0    +1        SLOAD  SL               IS THIS P54
 0569    REF  14  LAST  700   14,2653   01215 0                     MODREG
 0570                         14,2654   20215 0                     12D
 0571                         14,2655   45030 0              BHIZ   CALL
 0572    REF   1              14,2656   30753 0                     R51A             NO
 0573    REF   1              14,2657   36105 0                     R56
 0574                         14,2660   77624 1  R51B        CALL
 0575    REF   1              14,2661   36052 0                     SXTSM
 0576    REF   4  LAST  754   14,2662   02617 0              STORE  STARSAV2
 0577                         14,2663   45145 0              DLOAD  CALL
 0578    REF   6  LAST  746   14,2664   02607 1                     TSIGHT
 0579    REF   1              14,2665   31651 1                     PLANET
 0580                         14,2666   53521 1              MXV    UNIT
 0581    REF  37  LAST  751   14,2667   01734 0                     REFSMMAT
 0582                         14,2670   77776 1              EXIT
 0583    REF   5  LAST  754   14,2671  10 304 1              CCS    STARIND
 0584    REF   1              14,2672  0 2744 1              TC     R51.4
 0585    REF 177  LAST  754   14,2673  0 6006 1              TC     INTPRET
 0586    REF   5  LAST  450   14,2674   26736 1              STOVL  STARAD
 0587   REF   5  LAST  754   14,2675   02617 0                      STARSAV2
 0588                        14,2676   24007 0            STOVL     60
 0589   REF   3  LAST  754   14,2677   02611 0                      STARSAV1
 0590                        14,2700   24015 0            STOVL     120
 0591   REF   3  LAST   97   14,2701   02601 1                      PLANVEC
 0592   REF   6  LAST  754   14,2702   36744 0            STCALL    STARAD +6
 0593   REF   1              14,2703   34657 1                      R54               STAR DATA TEST
 0594                        14,2704   45014 0            BOFF      CALL
 0595   REF   1              14,2705   00354 0                      FREEFLAG
 0596   REF   2  LAST  748   14,2706   30757 1                      R51K
 0597   REF   2  LAST  451   14,2707   47432 1                      AXISGEN

R0598   NAME - R55 - GYRO TORQUE
R0599   FUNCTION-COMPUTE AND SEND GYRO PULSES
R0600   INPUT- X,Y,ZDC- REFSMMAT WRT PRESENT STABLE MEMBER
R0601   OUTPUT- GYRO PULSES
R0602   SUBROUTINES- CALCGTA,GOFLASH,GODSPR,IMUFINE,IMUPULSE,GOPERF1
 06025  REF   1                                           COUNT*    $$/R55
 0603                        14,2710   77624 1  R55       CALL                        COMPUTE AND SEND GYRO PULSES
 0604   REF   4  LAST  747   14,2711   47240 1                      CALCGTA
 0605                        14,2712   77776 1  PULSEM    EXIT
 0606   REF   2  LAST  451   14,2713  3 5040 0  R55.1     CAF       V06N93
 0607   REF 168  LAST  753   14,2714  0 4636 0            TC        BANKCALL
 0608   REF  20  LAST  753   14,2715   20743 0            CADR      GOFLASH
 0609   REF  39  LAST  753   14,2716  0 4103 1            TC        GOTOPOOH
 0610   REF   1              14,2717  0 2721 1            TC        R55.2
 0611   REF   1              14,2720  0 2734 0            TC        R55RET
 0612   REF  70  LAST  754   14,2721  0 5402 1  R55.2     TC        PHASCHNG
 0613                        14,2722   00314 1            OCT       00314
 06135  REF   1              01,2165            4P31SPT1  =         4.31SPOT
 0614   REF   2  LAST  747   14,2723  3 3002 0            CA        R55CDR
 0615   REF 169  LAST  755   14,2724  0 4636 0            TC        BANKCALL
 0616   REF   6  LAST  747   14,2725   17244 0            CADR      IMUPULSE
 0617   REF 170  LAST  755   14,2726  0 4636 0            TC        BANKCALL
 0618   REF   9  LAST  747   14,2727   17644 1            CADR      IMUSTALL
 0619   REF   2  LAST  747   14,2730  0 3766 0            TC        217ALARM          BAD END
 0620   REF  71  LAST  755   14,2731  0 5402 1            TC        PHASCHNG
 0621                        14,2732   05024 1            OCT       05024
 0622                        14,2733   13000 0            OCT       13000
 0623   REF  55  LAST  754   14,2734  0 5561 0  R55RET    TC        DOWNFLAG
 0624   REF   4  LAST  748   14,2735   00051 0            ADRES     PFRATFLG
 06245  REF   2 LAST  754 TO  755:     54      54*        COUNT*    $$/R51
 0625   REF   2  LAST  168   14,2736  3 5775 1  R51KA     CAF       OCT14
 0626   REF 171  LAST  755   14,2737  0 4636 0            TC        BANKCALL
 0627   REF   8  LAST  750   14,2740   21067 0            CADR      GOPERF1
 0628   REF  40  LAST  755   14,2741  0 4103 1            TC        GOTOPOOH
 0629   REF   3  LAST  753   14,2742  0 2407 0            TC        P52C              V33
 0630   REF  41  LAST  755   14,2743  0 4103 1            TC        GOTOPOOH
 0631   REF 178  LAST  754   14,2744  0 6006 1  R51.4     TC        INTPRET
 0632   REF   4  LAST  755   14,2745   26601 1            STOVL     PLANVEC
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L         P51-P53                                                                             USER'S PAGE NO.  15       15 53

  0633   REF   6  LAST  755   14,2746   02617 0                       STARSAV2
  0634   REF   4  LAST  755   14,2747   02611 0            STORE      STARSAV1
  0635                        14,2750   77776 1            EXIT
  0636   REF 137  LAST  722   14,2751  3 4772 1            CAF        ZERO
  0637   REF   1              14,2752  1 2623 0            TCF        R51.3               CLEAR STARIND
  0638                        14,2753   77624 1  R51A      CALL
  0639   REF   5  LAST  630   14,2754   31005 0                       R52
  0640                        14,2755   77650 1            GOTO
  0641   REF   1              14,2756   30660 1                       R51B
  0642                        14,2757   77776 1  R51K      EXIT
  0643   REF   1              14,2760  0 2736 1            TC         R51KA
  0644                        14,2761   77420 1  R51DSPA   STQ        EXIT
  0645   REF   3  LAST  632   14,2762   02657 1                       SRTEMP
  0646   REF   1              14,2763  3 3003 1  R51DSP    CAF        V01N70
  0647   REF   5  LAST  563   14,2764  0 5540 0            TC         VNFLASHR
  0648                        14,2765  0 2771 1            TC         +4
  0649   REF  20  LAST  700   14,2766  3 6211 0            CAF        SIX
  0650   REF  10  LAST  632   14,2767  0 5516 0            TC         BLANKET
  0651   REF  77  LAST  740   14,2770  1 5205 1            TCF        ENDOFJOB
  0652   REF   1              14,2771  0 3636 1            TC         CHKSCODE
  0653   REF  12  LAST  638   14,2772  0 4362 1            TC         FALTON
  0654   REF   1              14,2773  0 2763 1            TC         R51DSP
  0655   REF 179  LAST  755   14,2774  0 6006 1            TC         INTPRET
  0656                        14,2775   45034 1            RTB        CALL
  0657   REF  22  LAST  750   14,2776   51751 0                       LOADTIME
  0658   REF   2  LAST  754   14,2777   31651 1                       PLANET
  0659                        14,3000   77650 1            GOTO
  0660   REF   4  LAST  756   14,3001   02657 1                       SRTEMP
  0661   REF  18  LAST  545   14,3002   02757 0  R55CDR    ECADR      OGC
  0662                        14,3003   00306 1  V01N70    VN         0170
  0663                        14,3004   05253 0  1/6TH     DEC        .1666667
R0664    NAME - R52 - AUTOMATIC OPTICS POSITIONING ROUTINE

R0665    FUNCTION- (1) TO POINT THE STAR LOS OF THE OPTICS AT A STAR OR LANDMARK DEFINED BY THE PROGRAM OR BY DSKY INPUT.
R0667              (2) TO POINT THE STAR LOS OF THE OPTICS AT THE LEM DURING RENDEZVOUS TRACKING OPERATIONS.

R0669    CALLING SEQUENCE- CALL R52

R0670    INPUT- 1. TARG1FLG AND TARG2FLG- PRESET BY CALLER
R0671           2. RNDVZFLG AND TRACKFLG- PRESET BY CALLER
R0672           3. STAR CODE- PRESET BY CALLER. ALSO INPUT THROUGH DSKY
R0673           4. LAT, LONG AND ALT OF LANDMARK- INPUT THROUGH DSKY
R0674           5. NO. OF MARKS(MARKINDX)- PRESET BY CALLER

R0675    OUTPUT-  DRIVE SHAFT AND TRUNNION CDUS

R0676    SUBROUTINES- 1. FIXDELAY         7. CLEANDSP
R0677                 2. GOPERF1          8. GODSPR
R0678                 3. GOFLASH          9. REFLASHR
R0679                 4. R53             10. R52.2
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L       P51-P53                                                                                 USER'S PAGE NO.  16      E5 S3

R0680                   5. ALARM              11. R52.3
R0681                   6. SR52.1

 0682   REF   1                                                        COUNT* $$/R52
 0683                            14,3005   77614 1  R52       CLEAR
 0684   REF   2  LAST  564       14,3006   04265 1                     ADVTRK
 0685                            14,3007   77420 1  R52VRB    STQ      EXIT
 0686   REF   3  LAST   97       14,3010   02576 1                     SAVQR52
 0687   REF   3  LAST  538       14,3011  3 5043 0            CAF      EBANK5                CALLER NOT ALWAYS IN E5.
 0688   REF  21  LAST  713       14,3012  56 003 1            XCH      EBANK
 0689   REF   1                  14,3013  55'577 1            TS       R52BNKSV
 0690                            14,3014  0 0006 1            EXTEND
 0691   REF   8  LAST  512       14,3015  3 0036 1            DCA      CDUT
 0692   REF   5  LAST  451       14,3016  53'313 0            DXCH     DESOPTT
 0693                            14,3017  0 0006 1            EXTEND
 0694   REF  30  LAST  744       14,3020  3 0025 0            DCA      TIME2
 0695   REF   1                  14,3021  52 364 1            DXCH     AOPOLD
 0696   REF 180  LAST  756       14,3022  0 6006 1            TC       INTPRET
 0697                            14,3023   43131 0            SSP      CLEAR
 0698   REF  23  LAST  718       14,3024   01324 0                     OPTIND
 0699                            14,3025   00000 1                     0
 0700   REF   1                  14,3026   00271 0                     R53FLAG
 0701                            14,3027   43014 0            BON      CLEAR
 0702   REF   3  LAST  555       14,3030   00705 0                     TARG1FLG
 0703   REF   1                  14,3031   31222 1                     R52H
 0704   REF   1                  14,3032   03660 1                     TERMIFLG
 0705                            14,3033   77776 1            EXIT
 0706   REF  10  LAST  255       14,3034  3 1354 1  R52C      CA       SWSAMPLE              IS OPTICS MODE IN AGC
 0707                            14,3035  0 0006 1            EXTEND
 0708   REF   1                  14,3036  6 3245 1            BZMF     R52M                  MANUAL
 0709   REF 181  LAST  757       14,3037  0 6006 1  R52D      TC       INTPRET               THIS IS SR52.1 - NOW IN-LINE

R0710   NAME - SR52.1
R0711
R0712   FUNCTION
R0713    TARG1 AND TARG2 FLAGS ARE LOOKED AT TO DETERMINE IF THE TARGET IS THE
R0714    LEM, STAR OR LANDMARK. IN CASE OF LEM OR LMK,THE PRESENT TIME PLUS
R0715    2 SECONDS IS SAVED IN AOPTIME (ALIAS STARAD ,+1 ). IF THE LEM  IS
R0716    THE TARGET  THEN CONIC UPDATES      OF THE CSM AND LEM ARE MADE TO
R0717    THE TIME IN AOPTIME. THE UNIT OF THE DIFFERENCE OF LEM AND CSM
R0718    POSITION VECTORS BECOMES THE REFERENCE SIGHTING VECTOR  USED IN THE
R0719    COMMON PART OF THIS PROGRAM.
R0720    IN THE CASE OF LANDMARK, THE CSM IS UPDATED CONICALLY. THE RADIUS
R0721    VECTOR FOR THE LANDMARK IS OBTAINED FROM LALOTORV. BOTH OF THESE ARE
R0722    FOUND FOR THE TIME IN AOPTIME. THE UNIT OF THE DIFFERENCE BETWEEN
R0723    THE LANDMARK AND CSM RADIUS VECTORS BECOMES THE REFERENCE SIGHTING
R0724    VECTOR FOR THE COMMON PART OF THIS ROUTINE.
R0725    IF A STAR IS THE TARGET, THE PROPER STAR IS OBTAINED FROM THE CATALOG
R0726    AND THIS VECTOR BECOMES THE REFERENCE SIGHTING VECTOR.
R0727    THE COMMON PART OF THIS PROGRAM  TRANSFORMS THE REFERENCE SIGHTING
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R0728     VECTOR INTO STABLE MEMBER COORDINATES. IT READS THE IMU-CDUS AND USES
R0729     THIS DATA IN A CALL TO CALCSXA. ON RETURN FROM CALCSXA A TEST IS
R0730     MADE TO SEE IF THE TRUNNION ANGLE IS GREATER THAN 90DEG. OR 50DEG.

R0731
R0732    OUTPUT
R0733    SAC -SINGLE PREC,2S COMP,SCALED AT HALF REVS- SHAFT ANGLE DESIRED
R0734    PAC -SINGLE PREC,2S COMP SCALED AT EIGTH REVS - TRUNNION ANGLE DESIRED
R0735
R0736    INITIALIZATION
R0737    IF TARG1FLG =1 THEN TARGET IS LEM -NO OTHER INPUT REQUIRED
R0738    IF TARG1FLG =0 AND TARG2FLG =0 THE TARGET IS STAR, STARIND SHOULD
R0739    0 OR 1 DENOTING BESTI OR BESTJ RESPECTIVELY AS STAR CODE. STAR CODES
R0740    ARE 6 TIMES STAR NUMBER.
R0741    IF TARG1FLG=0 AND TARG2FLG=1 THEN TARGET IS LANDMARK. SEE ROUTINE
R0742    CALCTGRV FOR INPUT REQUIREMENTS. HERE FIXERAD=1 FOR CONSTANT EARTH
R0743    RADIUS
R0744
R0745    DEBRIS
R0746     WORK AREA
R0747     STARAD - STAR+5 (STAR IS DESIRED LOS IN STABLE MEMBER COORDINATES)
 0748                           14,3040   43234 0     +1       RTB    DAD
 0749    REF  23  LAST  756     14,3041   51751 0                     LOADTIME
 0750    REF   1                14,3042   31271 1                     2.4SECDP
 0751                           14,3043   45214 1              BOFF   DSU
 0752    REF   3  LAST  565     14,3044   04741 1                     P24FLAG
 0753                           14,3045   31047 0                     +2
 0754    REF   1                14,3046   31273 0                     .5SECDP
 0755    REF   3  LAST   95     14,3047   02347 0              STORE  AOPTIME
 0756                           14,3050   43014 0              BON    BON
 0757    REF   4  LAST  757     14,3051   00705 0                     TARG1FLG
 0758    REF   1                14,3052   31066 0                     LEM52
 0759    REF   5  LAST  754     14,3053   00706 0                     TARG2FLG
 0760    REF   1                14,3054   31075 1                     LMK52
 0761                           14,3055   72131 1              SSP    LXA,1
 0762    REF  27  LAST  754     14,3056   00051 0                     S1
 0763                           14,3057   00000 1                     0
 0764    REF   6  LAST  754     14,3060   00304 0                     STARIND
 0765                           14,3061   77700 0              TIX,1
 0766    REF   1                14,3062   31116 0                     ST52ST
 0767                           14,3063   52175 0              VLOAD  GOTO
 0768    REF   7  LAST  756     14,3064   02617 0                     STARSAV2
 0769    REF   1                14,3065   31120 0                     COM52
 0770                           14,3066   77745 1   LEM52      DLOAD
 0771    REF   4  LAST  758     14,3067   02347 0                     AOPTIME
 0772    REF  33  LAST  746     14,3070   34041 0              STCALL TDEC1
 0773    REF   4  LAST  601     14,3071   27202 1                     LEMCONIC
 0774                           14,3072   52175 0              VLOAD  GOTO
 0775    REF  23  LAST  746     14,3073   00001 0                     RATT
 0776    REF   1                14,3074   31105 1                     LMKLMCOM
 0777                          14,3075   71214 0  LMK52      BON     DLOAD
 0778   REF    3  LAST  757    14,3076   04305 0                     ADVTRK
 0779   REF    1               14,3077   54040 1                     ADVTRACK
 0780   REF    5  LAST  758    14,3100   02347 0                     ADPTIME
 0781                          14,3101   77624 1             CALL
 0782   REF    7  LAST  746    14,3102   26524 0                     LALOTORV
 0783                          14,3103   77775 1             VLOAD
 0784   REF   11  LAST  746    14,3104   02152 0                     ALPHAV
 0785   REF    8  LAST  451    14,3105   16766 1  LMKLMCOM STODL     STAR
 0786   REF    6  LAST  759    14,3106   02347 0                     ADPTIME
 0787   REF   34  LAST  758    14,3107   34041 0             STCALL  TDEC1
 0788   REF    6  LAST  655    14,3110   27170 1                     CSMCONIC
 0789                          14,3111   52375 1             VLOAD   VSU
 0790   REF    9  LAST  759    14,3112   02766 1                     STAR
 0791   REF   24  LAST  758    14,3113   00001 0                     RATT
 0792                          14,3114   52056 0             UNIT    GOTO
 0793   REF    2  LAST  758    14,3115   31120 0                     COM52
 0794                          14,3116   77775 1  ST52ST     VLOAD
 0795   REF    5  LAST  756    14,3117   02611 0                     STARSAV1
 0796                          14,3120   53521 1  COM52      MXV     UNIT
 0797   REF   38  LAST  754    14,3121   01734 0                     REFSMMAT
 0798   REF   10  LAST  759    14,3122   02766 1             STORE   STAR
 0799                          14,3123   45001 1             SETPD   CALL
 0800                          14,3124   00001 0                     0
 0801   REF    7  LAST  750    14,3125   47530 1                     CDUTRIG          COMPUTES SINES AND COSINES FOR CALCSXA
 0802                          14,3126   77624 1             CALL                       NOW EXPECT TO SEE THE CDU ANGLES.
 0803   REF    1               14,3127   46034 1                     CALCSXA
 0804                          14,3130   71214 0             BON     DLOAD
 0805   REF    8  LAST  752    14,3131   01710 0                     CULTFLAG
 0806   REF    1               14,3132   31276 0                     R52L             GR 90 DEGREES
 0807   REF    7  LAST  451    14,3133   02776 0                     PAC
 0808                          14,3134   51025 1             DSU     BPL
 0809   REF    1               14,3135   31267 0                     38TRDEG
 0810   REF    1               14,3136   31241 1                     R52J             GR 50 DEGREES
 0811                          14,3137   45345 1             DLOAD   DSU
 0812   REF    8  LAST  759    14,3140   02776 0                     PAC
 0813   REF    1               14,3141   31275 0                     20DEGSMN
 0814                          14,3142   77440 1             BMN     EXIT
 0815   REF    2  LAST  759    14,3143   31241 1                     R52J
 0816   REF    9  LAST  759    14,3144  3 1775 0             CA      PAC
 0817   REF    1               14,3145  54 330 0             TS      PACTEMP
 0818   REF  182  LAST  757    14,3146  0 6006 1  R52JA      TC      INTPRET
 0819                          14,3147   43014 0             BON     BOFF
 0820   REF    5  LAST  756    14,3150   00705 0                     TARGIFLG
 0821   REF    1               14,3151   31170 0                     R52E
 0822   REF    4  LAST  758    14,3152   04741 1                     P24FLAG
 0823   REF    1               14,3153   31161 0                     R53CHK
 0824                          14,3154   71214 0             BOFCLR  DLOAD
 0825   REF    2  LAST  565    14,3155   04241 1                     NEWLMFLG
 0826   REF    1               14,3156   16530 0                     RATESUB
 0827   REF   7  LAST  759   14,3157   02347 0                      AOPTIME
 0828   REF   2  LAST  757   14,3160   00364 0             STORE    AOPOLD
 0829                        14,3161   77414 0  R53CHK     BON      EXIT
 0830   REF   2  LAST  757   14,3162   00311 1                      R53FLAG
 0831   REF   2  LAST  759   14,3163   31170 0                      R52E
 0832   REF   1              14,3164  3 3265 0             CAF      V06N92         NO
 0833   REF 172  LAST  755   14,3165  0 4636 0             TC       BANKCALL
 0834   REF   3  LAST  747   14,3166   20710 0             CADR     GODSPR
 0835   REF 183  LAST  759   14,3167  0 6006 1             TC       INTPRET
 0836                        14,3170   77776 1  R52E       EXIT
 0837   REF   2  LAST  759   14,3171  3 0330 1             CA       PACTEMP
 0838   REF   6  LAST  757   14,3172  55'312 1             TS       DESOPTT
 0839   REF   8  LAST  743   14,3173  3 1773 0             CA       SAC
 0840   REF   4  LAST  451   14,3174  55'313 0             TS       DESOPTS
 0841   REF  17  LAST  596   14,3175  0 5354 0  R52F       TC       CHECKMM
 0842                        14,3176   00030 1             MM       24
 0843   REF   1              14,3177  1 3202 0             TCF      R52FA          NO
 0844   REF  16  LAST  740   14,3200  3 4773 0             CAF      FIVE           YES DELAY .05 SEC
 0845   REF   2  LAST  760   14,3201  1 3203 1             TCF      R52FA +1
 0846   REF   6  LAST  559   14,3202  3 5011 1  R52FA      CAF      .5SEC          WAIT .5 SEC
 0847   REF 173  LAST  760   14,3203  0 4636 0     +1      TC       BANKCALL
 0848   REF  13  LAST  712   14,3204   01731 0             CADR     DELAYJOB
 0849   REF   2  LAST  212   14,3205  3 4757 0             CAF      TARG1BIT
 0850   REF  33  LAST  721   14,3206  7 0075 1             MASK     FLAGWRD1
 0851   REF 176  LAST  745   14,3207  10 000 0             CCS      A
 0852   REF   1              14,3210  0 3223 1             TC       R52HA

 0853   REF   1              14,3211  3 4752 0             CAF      TERM1BIT
 0854   REF  17  LAST  721   14,3212  7 0103 1             MASK     FLAGWRD7
 0855                        14,3213  0 0006 1             EXTEND
 0856   REF   1              14,3214  1 3034 1             BZF      R52C

 0857   REF   2  LAST  757   14,3215  3 1577 0  R52Q       CA       R52BNKSV
 0858   REF  22  LAST  757   14,3216  54 003 0             TS       EBANK

 0859   REF 184  LAST  760   14,3217  0 6006 1             TC       INTPRET
 0860                        14,3220   77650 1             GOTO
 0861   REF   4  LAST  757   14,3221   02576 1                      SAVQR52

 0862                        14,3222   77776 1  R52H       EXIT                    LEM
 0863   REF 174  LAST  760   14,3223  0 4636 0  R52HA      TC       BANKCALL
 0864   REF   3  LAST  559   14,3224   76333 0             CADR     R61CSM
 0865   REF  11  LAST  559   14,3225  3 4764 0             CAF      TRACKBIT
 0866   REF  34  LAST  760   14,3226  7 0075 1             MASK     FLAGWRD1
 0867                        14,3227  0 0006 1             EXTEND
 0868   REF   1              14,3230  1 3215 0             BZF      R52Q
 0869   REF 185  LAST  760   14,3231  0 6006 1             TC       INTPRET
 0870                        14,3232   52014 0             BOF      GOTO
 0871   REF  13  LAST  743   14,3233   00750 0                      UPDATFLG
 0872   REF   1              14,3234   31236 1                      R52SYNC
 0873   REF   1                14,3235   31040 1                     R52D +1
 0874                          14,3236   77776 1  R52SYNC  EXIT
 0875   REF   1                14,3237  3 3311 1           CAF       1.8SEC
 0876   REF   3  LAST  760     14,3240  1 3203 1           TCF       R52FA +1
 0877                          14,3241   77776 1  R52J     EXIT
 0878   REF   2  LAST  759     14,3242  3 3266 0           CA        38TRDEG
 0879   REF   3  LAST  760     14,3243  54 330 0           TS        PACTEMP
 0880   REF   1                14,3244  0 3146 1           TC        R52JA
 0881   REF   1                14,3245  3 4763 1  R52M     CAF       R53FLBIT           IS R53FLAG SET
 0882   REF  18  LAST  278     14,3246  7 0074 0           MASK      FLAGWRD0
 0883   REF 177  LAST  760     14,3247  10 000 0           CCS       A
 0884   REF   1                14,3250  0 3316 0           TC        R52G               YES
 0885                          14,3251  0 0004 0           INHINT                       NO
 0886   REF   2  LAST  241     14,3252  3 7645 1           CAF       PRIO24
 0887   REF  32  LAST  717     14,3253  0 5135 0           TC        FINDVAC
 0888   REF  48  LAST  630     E7,1722                     EBANK=    MRKBUF1
 0889   REF   1                14,3254   03260 0           2CADR     R53JOB
 0889   REF   1                14,3255   30067 0
 0890                          14,3256  0 0003 1           RELINT
 0891   REF   2  LAST  761     14,3257  0 3316 0           TC        R52G
 0892   REF 186  LAST  760     14,3260  0 6006 1  R53JOB   TC        INTPRET
 0893                          14,3261   77624 1           CALL
 0894   REF   2  LAST  628     14,3262   31571 0                     R53
 0895                          14,3263   77776 1  ENDPLAC  EXIT                         INTERPRETER RETURN TO ENDOFJOB(R22 USES)
 0896   REF  78  LAST  756     14,3264  0 5205 0           TC        ENDOFJOB
 0897                          14,3265   01534 1  V06N92   VN        0692
 0898                          14,3266   25252 0  38TRDEG  2DEC      .66666667          CORRESPONDS TO 50 DEGS IN TRUNNION
 0898                          14,3267   25254 0
 0899                          14,3270   00000 1  2.4SECDP 2DEC      240
 0899                          14,3271   00360 1
 0900                          14,3272   00000 1  .5SECDP  2DEC      50
 0900                          14,3273   00062 0
 0901                          14,3274   61740 0  20DEGSMN DEC       -07199
 0902                          14,3275   77777 0           DEC       -0
 0903                          14,3276   77414 0  R52L     BON       EXIT
 0904   REF   6  LAST  759     14,3277   00705 0                     TARG1FLG
 0905   REF   3  LAST  759     14,3300   31241 1                     R52J
 0906   REF   1                14,3301  3 3310 0           CAF       OCT404
 0907   REF 175  LAST  760     14,3302  0 4636 0           TC        BANKCALL
 0908   REF   1                14,3303   21766 0           CADR      PRIOLARM
 0909   REF   1                14,3304  1 3312 0           TCF       TERM52             TERMINATE
 0910   REF   1                14,3305  1 3175 0           TCF       R52F               PROCEED
 0911   REF   2  LAST  761     14,3306  1 3175 0           TCF       R52F               NO PROVISION FOR NEW DATA
 0912   REF  79  LAST  761     14,3307  1 5205 1           TCF       ENDOFJOB

 0913                          14,3310   00404 1  OCT404   OCT       404

 0914                          14,3311   00264 1  1.8SEC   DEC       180

 0915   REF 176  LAST  761     14,3312  0 4636 0  TERM52   TC        BANKCALL
 0916   REF   3  LAST  570   14,3313   20575 1              CADR    KLEENEX

 0917   REF  45  LAST  737   14,3314  0 4655 0              TC      POSTJUMP
 0918   REF   2  LAST  241   14,3315   16031 1              CADR    TERMSXT

 0919   REF  18  LAST  760   14,3316  0 5354 0   R52G       TC      CHECKMM
 0920                        14,3317   00030 1              MM      24
 0921   REF   4  LAST  761   14,3320  1 3202 0              TCF     R52FA           NO
 0922   REF   2  LAST  565   14,3321  11'131 1              CCS     PASSCNT         IS THIS THE NTH(N = NO.PASS)TIME THRU
 0923   REF   1              14,3322  1 3407 0              TCF     NOT4TH          NO
 0924   REF  20  LAST  744   14,3323  4 0076 1              CS      FLAGWRD2        HAS A NEW MARK BEEN TAKEN
 0925   REF   1              14,3324  7 4766 0              MASK    P24MKBIT
 0926   REF 178  LAST  761   14,3325  10 000 0              CCS     A
 0927   REF   2  LAST  761   14,3326  1 3037 1              TCF     R520            NO
 0933   REF 187  LAST  761   14,3327  0 6006 1              TC      INTPRET         YES OBTAIN ADDRESS OF LAST MARK
 0934                        14,3330   46135 1              SLOAD   BHIZ
 0935   REF  13  LAST  248   14,3331   03754 1                      P22DEX
 0936   REF   1              14,3332   31411 1                      LSTMRK
 0937                        14,3333   54160 1              AXC,1   XSU,1
 0938   REF  28  LAST  565   14,3334   03530 1              ECADR   SVMRKDAT -7
 0939   REF  14  LAST  762   14,3335   03753 0                      P22DEX
 0940                        14,3336   70730 1   R52K       SXA,1   DLOAD*
 0941   REF   2  LAST   79   14,3337   01077 0                      MARKDATA
 0942                        14,3340   00001 0                      0,1
 09421                       14,3341   47044 1              BPL     RTB
 09422                       14,3342   31344 0                      +2
 09423  REF   3  LAST  762   14,3343   31037 1                      R520
 0943   REF  13  LAST  617   14,3344   03670 0              STORE   S22TOFF
 0944   REF  35  LAST  759   14,3345   34041 0              STCALL  TDEC1           INT TO TIME OF MARK
 0945   REF   7  LAST  759   14,3346   27170 1                      CSMCONIC
 0946                        14,3347   77775 1              VLOAD
 0947   REF   7  LAST  617   14,3350   00017 1                      RATT1
 0948   REF  10  LAST  618   14,3351   01046 1              STORE   CSMPOS          EARTH B29 MOON B27
 0949                        14,3352   45150 1              LXA,1   CALL
 0950   REF   3  LAST  762   14,3353   01077 0                      MARKDATA
 0951   REF   3  LAST  610   14,3354   47017 1                      GETUM
 0952   REF  14  LAST  618   14,3355   25072 0              STOVL   UM              UNIT TIME OF SIGHT VECTOR
 0953   REF  11  LAST  762   14,3356   01046 1                      CSMPOS
 0954                        14,3357   77656 1              UNIT
 0955   REF  12  LAST  759   14,3360   36152 1              STCALL  ALPHAV          ALPHAV +4 = SINL FOR SETRE
 0956   REF   2  LAST  611   14,3361   26654 1                      SETRE
 0957                        14,3362   43345 1              DLOAD   DAD             CORRECT RC FOR ALT OF LMK
 0958   REF   5  LAST  618   14,3363   02240 0                      ERADM
 0959   REF   7  LAST  647   14,3364   00753 0                      ALT
 0960   REF   6  LAST  762   14,3365   02240 0              STORE   ERADM
 0961                        14,3366   77624 1              CALL                    COMPUTE LANDMARK VECTOR
 0962   REF   3  LAST  617   14,3367   61331 1                        S22F2410
 0963                        14,3370   70414 1              BOFF    VSR2
 0964   REF  26  LAST  675   14,3371   04343 1                      CMOONFLG
 0965                        14,3372   31373 1                      +1
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L          P51-P53                                                                          USER'S PAGE NO.  22       E5 53

 0966     REF  13  LAST  762    14,3373    16152 0             STODL   ALPHAV
 0967     REF  14  LAST  762    14,3374    03670 0                     S22TOFF
 0968                           14,3375    77624 1             CALL                           COMPUTE LAT,LONG,ALT
 0969     REF   6  LAST  745    14,3376    26453 1                     LAT-LONG
 0970                           14,3377    77624 1             CALL
 0971     REF   3  LAST  745    14,3400    62363 0                     LLASRD
 0972                           14,3401    77414 0             SET     EXIT
 0973     REF   3  LAST  759    14,3402    04061 1                     NEWLMFLG
 0974     REF  56  LAST  755    14,3403  0 5561 0              TC      DOWNFLAG
 09741    REF   4  LAST  565    14,3404    00052 0             ADRES   P24MKFLG
 09742    REF  81  LAST  730    14,3405  4 4770 1              CS      ONE
 09743    REF   2  LAST  565    14,3406  6 0737 1              AD      NO.PASS
 0975     REF   3  LAST  762    14,3407  55'131 1  NOT4TH      TS      PASSCNT
 0976     REF   4  LAST  762    14,3410  1 3037 1              TCF     R52D
 0977                           14,3411    52160 1  LSTMRK     AXC,1   GOTO
 0978     REF  29  LAST  762    14,3412    03573 0             ECADR   SVMRKDAT +280
 0979     REF   1               14,3413    31336 0                     R52K
 0980     REF   1               07,2000                        SETLOC  RATEBNK
 0981                           07,2530                        BANK

 09815    REF   1                                              COUNT*  $$/R52
 0982                           07,2530    45345 1  RATESUB    DLOAD   DSU
 0983     REF   8  LAST  760    07,2531    02347 0                     AOPTIME
 0984     REF   3  LAST  760    07,2532    00364 0                     AOPOLD
 0985                           07,2533    77634 0             RTB
 0986     REF   1               07,2534    45636 0                     SGNAGREE
 0987                           07,2535    77612 1             SL4
 0988     REF   4  LAST  635    07,2536    14772 0             STODL   RATETEMP               TIME DIF SCALLED B24
 0989     REF   9  LAST  763    07,2537    02347 0                     AOPTIME
 0990     REF   4  LAST  763    07,2540    00364 0             STORE   AOPOLD                 UPDATE OLD TIME REG
 0991                           07,2541    77545 0             DLOAD   EXIT                   LOAD SHAFT AND TRUNNION SCALE FACTORS
 0992     REF   2  LAST   91    07,2542    01771 1                     TRUNSF
 0993     REF   5  LAST  763    07,2543  3 0772 0              CA      RATETEMP +1
 0994     REF   6  LAST  763    07,2544  56 771 0              XCH     RATETEMP               TIME DIF SP SCALED B10
 0995                           07,2545  22 007 0              ZL
 0996     REF 272  LAST  752    07,2546  3 0155 0              CA      MPAC +1                SHAFTSF B25
 0997                           07,2547  0 0006 1              EXTEND
 0998     REF   7  LAST  763    07,2550  10 771 1              DV      RATETEMP               B15
 0999     REF  74  LAST  703    07,2551  56 001 0              XCH     L
 1000     REF   9  LAST  760    07,2552  3 1773 0              CA      SAC                    SHAFT
 1001                           07,2553  0 0006 1              EXTEND
 1002     REF   5  LAST  760    07,2554  21'313 0              MSU     DESOPTS                B-1
 1003                           07,2555  0 0006 1              EXTEND
 1004     REF  75  LAST  763    07,2556  7 0001 1              MP      L                      B14
 1005     REF   5  LAST  756    07,2557  55'657 0              TS      SRTEMP
 1006                           07,2560  22 007 0              ZL
 1007     REF 273  LAST  763    07,2561  3 0154 1              CA      MPAC                   TRUNSF B27
 1008                           07,2562  0 0006 1              EXTEND
 1009     REF   8  LAST  763    07,2563  10 771 1              DV      RATETEMP               B17
 1010     REF  76  LAST  763    07,2564  56 001 0              XCH     L
 1011   REF   4  LAST  761   07,2565  3 0330 1            CA      PACTEMP          TRUNNION
 1012                        07,2566  0 0006 1            EXTEND
 1013   REF   7  LAST  760   07,2567  21'312 1            MSU     DESOPTT          B-3
 1014                        07,2570  0 0006 1            EXTEND
 1015   REF  77  LAST  763   07,2571  7 0001 1            MP      L                B14
 1016   REF   2  LAST   98   07,2572  55'656 1            TS      TRTEMP
 1017   REF  82  LAST  763   07,2573  3 4770 0            CAF     ONE              INITIALIZE FOR SHAFT RATE
 1018   REF   9  LAST  763   07,2574  54 772 1  MAGCK     TS      RATETEMP +1      CHECK IF SHAFT,TRUN RATES GR THAN MAX
 1019   REF  10  LAST  764   07,2575  50 772 0            INDEX   RATETEMP +1
 1020   REF   3  LAST  764   07,2576  3 1656 0            CA      TRTEMP
 1021                        07,2577  0 0006 1            EXTEND
 1022   REF   1              07,2600  6 2610 1            BZMF    NEGRATE
 1023   REF   1              07,2601  6 2626 1            AD      -MAXSRT
 1024                        07,2602  0 0006 1            EXTEND
 1025   REF   1              07,2603  6 2617 0            BZMF    CMDCMP
 1026   REF   2  LAST  764   07,2604  4 2626 0            CS      -MAXSRT
 1027   REF  11  LAST  764   07,2605  50 772 0            INDEX   RATETEMP +1
 1028   REF   4  LAST  764   07,2606  55'656 1            TS      TRTEMP           SET RATE TO +MAX RATE
 1029   REF   2  LAST  764   07,2607  1 2617 1            TCF     CMDCMP
 1030                        07,2610  4 0000 0  NEGRATE   COM
 1031   REF   3  LAST  764   07,2611  6 2626 1            AD      -MAXSRT
 1032                        07,2612  0 0006 1            EXTEND
 1033   REF   3  LAST  764   07,2613  6 2617 0            BZMF    CMDCMP
 1034   REF   4  LAST  764   07,2614  3 2626 1            CA      -MAXSRT
 1035   REF  12  LAST  764   07,2615  50 772 0            INDEX   RATETEMP +1
 1036   REF   5  LAST  764   07,2616  55'656 1            TS      TRTEMP           SET RATE TO -MAX RATE
 1037   REF  13  LAST  764   07,2617  10 772 1  CMDCMP    CCS     RATETEMP +1
 1038   REF   1              07,2620  1 2574 1            TCF     MAGCK            GO DO TRUN RATE
 1039   REF 168  LAST  762   07,2621  0 6006 1            TC      INTPRET
 1040                        07,2622    77745 1            DLOAD
 1041   REF   6  LAST  764   07,2623    02657 1                    TRTEMP
 1042   REF   5  LAST  209   07,2624    34736 1            STCALL  TRATE
 1043   REF   2  LAST  759   07,2625    31161 0                    R53CHK
 1044                        07,2626    77177 0  -MAXSRT   DEC     -384             MAX PULSES
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P1047   NAME - LOCSAM ALIAS S50

R1048   FUNCTION -TO COMPUTE QUATITIGS LISTED BELOW ,USED IN THE
R1049             IMU ALIGNMENT PROGRAMS
R1050   DEFINE:
R1051        RATT=POSITION VECTOR OF CM  WRT PRIMARY BODY
R1052        VATT=VELOCITY VECTOR OF CM  WRT PRIMARY BODY
R1053        RE  =RADIUS OF EARTH
R1054        RM  =RADIUS OF MOON
R1055        ECLIPOL= POLE OF ECLIPTIC SCALED BY TANGENTIAL VELOCITY OF EARTH
R1056                 WRT TO SUN  OVER  THE VELOCITY OF LIGHT
R1057        REM =POSITION OF MOON  WRT  EARTH
R1058        RES =POSITION OF SUN  WRT EARTH
R1059        C = VELOCITY OF LIGHT
R1060
R1061
R1062            EARTH IS PRIMARY               MOON IS PRIMARY
R1063                    -                              -
R1064            VEARTH=-1(RATT)                VEARTH=-1(REM+RATT)
R1065
R1066                   -                               -
R1067            VMOON= 1(REM-RATT)             VMOON =-1(RATT)
R1068
R1069                   -                              -
R1070            VSUN = 1(RES)                  VSUN  =1(RES-REM)
R1071
R1072                              -1
R1073            CEARTH=COS(SIN (RE/RATT)+5)    CEARTH=COS 5
R1074
R1075                                                         -1
R1076            CMOON= COS 5                   CMOON=COS(SIN (RM/RATT)+5)
R1077
R1078
R1079            CSUN = COS 15                  CSUN = COS 15
R1080
R1081
R1082                          VEL/C = VSUN X ECLIPOL + VATT/C
R1083
R1084
R1085
R1086   CALL -   DLOAD  CALL
R1087                   DESIRED TIME
R1088                   LOCSAM
R1089   INPUTS - MPAC = TIME
R1090
R1091   OUTPUTS- VEARTH,VMOON,VSUN,CEARTH,CMOON,CSUN,VEL/C
R1092
R1093   SUBROUTINES- LSPOS,CSMCONIC
R1094
R1095   DEBRIS - VAC AREA,SEE SUBROUTINES
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R1096
 1097   REF   1              13,2000                      SETLOC SR52/1
 1098                        13,2345                      BANK

 1099   REF   1                                           COUNT* $$/S50

 1100   REF   1              13,2345           LOCSAM     =      S50
 1101                        13,2345  77620 0  S50        STQ
 1102   REF   3  LAST  452   13,2346  00300 1                    QMAJ
 1103   REF   7  LAST  754   13,2347  36607 0             STCALL TSIGHT
 1104   REF   2  LAST  601   13,2350  54136 1                    LSPOS
 1105   REF   2  LAST   99   13,2351  26752 0             STOVL  VMOON
 1106                        13,2352  00003 1                    2D
 1107   REF   2  LAST   99   13,2353  16744 1             STODL  VSUN
 1108   REF   8  LAST  766   13,2354  02607 1                    TSIGHT
 1109   REF  36  LAST  762   13,2355  34041 0             STCALL TDEC1
 1110   REF   8  LAST  762   13,2356  27170 1                    CSMCONIC
 1111                        13,2357  61131 0             SSP    TIX,2
 1112   REF  11  LAST  751   13,2360  00052 0                    S2
 1113                        13,2361  00000 1                    0
 1114   REF   1              13,2362  26405 1                    MOONCNTR
 1115                        13,2363  52375 1  EARTCNTR   VLOAD  VSU
 1116   REF   3  LAST  766   13,2364  02752 0                    VMOON
 1117   REF  25  LAST  759   13,2365  00001 0                    RATT
 1118                        13,2366  77656 1             UNIT
 1119   REF   4  LAST  766   13,2367  26752 0             STOVL  VMOON
 1120   REF  26  LAST  766   13,2370  00001 0                    RATT
 1121                        13,2371  57456 1             UNIT   VCOMP
 1122   REF   3  LAST   99   13,2372  16736 1             STODL  VEARTH
 1123   REF   1              13,2373  34636 0                    RSUBE
 1124                        13,2374  77624 1             CALL
 1125   REF   1              13,2375  26445 0                    OCCUS
 1126   REF   2  LAST  753   13,2376  14017 1             STODL  CEARTH
 1127   REF   1              13,2377  34654 1                    CSS5
 1128   REF   1              13,2400  24023 0             STOVL  CMOON
 1129   REF   3  LAST  766   13,2401  02744 1                    VSUN
 1130                        13,2402  77656 1             UNIT
 1131   REF   4  LAST  766   13,2403  36744 0             STCALL VSUN
 1132   REF   1              13,2404  26432 0                    ENDSAM
 1133                        13,2405  40575 1  MOONCNTR   VLOAD  VSR3
 1134   REF   5  LAST  766   13,2406  02752 0                    VMOON
 1135                        13,2407  51362 1             VSR1   BVSU
 1136   REF   5  LAST  766   13,2410  02744 1                    VSUN
 1137                        13,2411  77656 1             UNIT
 1138   REF   6  LAST  766   13,2412  26744 1             STOVL  VSUN
 1139   REF   6  LAST  766   13,2413  02752 0                    VMOON
 1140                        13,2414  53455 0             VAD    UNIT
 1141   REF  27  LAST  766   13,2415  00001 0                    RATT
 1142                        13,2416  77676 0             VCOMP
 1143   REF   4  LAST  766   13,2417  26736 1             STOVL  VEARTH
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  1144   REF  28  LAST  766   13,2420   00001 0                    RATT
  1145                        13,2421   57456 1           UNIT     VCOMP
  1146   REF   7  LAST  766   13,2422   16752 0           STODL    VMOON
  1147   REF   1              13,2423   34634 1                    RSUBM
  1148                        13,2424   77624 1           CALL
  1149   REF   2  LAST  766   13,2425   26445 0                    CCCOS
  1150   REF   2  LAST  766   13,2426   14023 0           STODL    CMOON
  1151   REF   2  LAST  766   13,2427   34654 1                    CSS5
  1152   REF   3  LAST  766   13,2430   24017 1           STOVL    CEARTH
  1153   REF   7  LAST  766   13,2431   02744 1                    VSUN
  1154                        13,2432   77635 1  ENDSAM   VXV
  1155   REF   2  LAST  602   13,2433   34644 0                    ECLIPOL
  1156   REF   6  LAST  603   13,2434   27452 1           STOVL    VEL/C
  1157   REF  22  LAST  746   13,2435   00007 0                    VATT
  1158                        13,2436   53361 0           VXSC     VAD
  1159   REF   2  LAST  602   13,2437   34642 0                    1/C
  1160   REF   7  LAST  767   13,2440   03452 1                    VEL/C
  1161   REF   8  LAST  767   13,2441   17452 1           STODL    VEL/C
  1162   REF   1              13,2442   34656 0                    CSSUN
  1163   REF   1              13,2443   34021 0           STCALL   CSUN
  1164   REF   4  LAST  766   13,2444   00300 1                    QMAJ
  1165                        13,2445   70471 1  CCCOS    DDV      SR1
  1166                        13,2446   00045 0                    360
  1167                        13,2447   43336 0           ASIN     DAD
  1168   REF   1              13,2450   34640 1                    5DEGREES
  1169                        13,2451   70546 1           COS      SR1
  1170                        13,2452   77616 0           RVQ
  1171   REF   1              16,2000                     SETLOC   P50S2
  1172                        16,2633                     BANK
  11725  REF   1                                          COUNT*   $$/S50
  1173                        16,2633   00065 1  RSUBM    2DEC     1738090 B-29     MOON RADIUS IN METERS
  1173                        16,2634   01265 1
  1174                        16,2635   00302 0  RSUBE    2DEC     6378166 B-29
  1174                        16,2636   24533 1
  1175                        16,2637   00343 0  5DEGREES 2DEC     .013888889       SCALED IN REVS
  1175                        16,2640   21616 0
  1176                        16,2641   00000 1  1/C      2DEC     .000042696 B-1   1/(9835712 FT/CS)  SCALED CSEC/M B+7
  1176                        16,2642   13143 0
  1177                        16,2643   00000 1  ECLIPOL  2DEC     0                POLE OF ECLIPTIC FOR B0=.409157363336RAD
  1177                        16,2644   00000 1
  1178                        16,2645   77777 0           2DEC     -.0000395319722 AND CONST.AB = 20.496 ARC-SEC
  1178                        16,2646   53213 1
  1179                        16,2647   00001 0           2DEC     +.0000911652662 ECLIPOL = CONST.AB.(0, -SIN B0, COS B0)
  1179                        16,2650   17630 1
  1180                        16,2651   00001 0  TSIGHT1  2DEC     24000
  1180                        16,2652   16700 1
  1181                           0016            CEARTH   =        140
  1182                           0020            CSUN     =        160
  1183                           0022            CMOON    =        180
  1184                        16,2653   07760 1  CSS5     2DEC     .2490475         (COS 5)/4
  1184                        16,2654   14473 1
  1185                     16,2655   07564 1  CSSUN    2DEC    .24148          COS 15  /4
  1185                     16,2656   15042 0
  1186  REF   1            16,2657            R54      =       CHKSDATA

R 1187  NAME - CHKSDATA

R 1188  FUNCTIONAL DESCRIPTION - CHECKS THE VALIDITY OF A PAIR OF STAR SIGHTINGS. WHEN A PAIR OF STAR SIGHTINGS ARE MADE
R 1190  BY THE ASTRONAUT THIS ROUTINE OPERATES AND CHECKS THE OBSERVED SIGHTINGS AGAINST STORED STAR VECTORS IN THE
R 1192  COMPUTER TO INSURE A PROPER SIGHTING WAS MADE. THE FOLLOWING COMPUTATIONS ARE PERFORMED_

R 1194                 OS1 = OBSERVED STAR 1 VECTOR
R 1195                 OS2 = OBSERVED STAR 2 VECTOR
R 1196                 SS1 = STORED STAR 1 VECTOR
R 1197                 SS2 = STORED STAR 2 VECTOR
R 1198                  A1 = ARCCOS(OS1 - OS2)
R 1199                  A2 = ARCCOS(SS1 - SS2)
R 1200                   A = ABS(2(A1 - A2))

R 1201  THE ANGULAR DIFFERENCE IS DISPLAYED FOR ASTRONAUT ACCEPTENCE
R 1202  EXIT MODE 1. FREEFLAG SET  IMPLIES  ASTRONAUT WANTS TO PROCEED
R 1203           2. FREEFLAG RESET IMPLIES ASTRONAUT WANTS TO RECYCLE                ERANCE)
R 1205  OUTPUT - 1.VERB 6,NOUN 3- DISPLAYS ANGULAR DIFFERENCE BETWEEN 2 SETS OF STARS.
R 1207           2.STAR VECTORS FROM STAR CATALOG ARE LEFT IN 6D AND 12D.

R 1208  ERASABLE INITIALIZATION REQUIRED -
R 1209           1.MARK VECTORS ARE STORED IN STARAD AND STARAD +6.
R 1210           2.CATALOG VECTORS ARE STORED IN 6D AND 12D.
R 1211  DEBRIS -
  1212  REF   8  LAST  640  E7,1777                      EBANK=  WHOCARES
  1213  REF   1                                          COUNT*  $$/R54
  1214                     16,2657   43020 1  CHKSDATA STQ     SET
  1215  REF   1            16,2660   02777 1                   QMIN
  1216  REF   2  LAST  755 16,2661   00074 1                   FREEFLAG
  1217                     16,2662   77760 0  CHKSAB   AXC,1                   SET XI TO STORE  EPHEMERIS DATA
  1218  REF   7  LAST  755 16,2663   02735 1                   STARAD
R 1219
  1220                     16,2664   47773 1  CHKSB    VLOAD*  DOT*            CAL. ANGLE THETA
  1221                     16,2665   00001 0                   0,1
  1222                     16,2666   00007 0                   6,1
  1223                     16,2667   65552 0           SL1     ACOS
  1224  REF   1            16,2670   00025 0           STORE   THETA
  1225                     16,2671   43014 0           BOFF    INVERT          BRANCH TO CHKSD IF THIS IS 2ND PASS
  1226  REF   3  LAST  768 16,2672   00354 0                   FREEFLAG
  1227  REF   1            16,2673   34702 0                   CHKSD
  1228  REF   4  LAST  768 16,2674   00174 0                   FREEFLAG        CLEAR FREEFLAG
  1229                     16,2675   71360 1           AXC,1   DLOAD           SET XI TO MARK ANGLES
  1230                     16,2676   00006 1                   6D
  1231  REF   2  LAST  768 16,2677   00025 0                   THETA
  1232                     16,2700   34023 1           STCALL  18D
  1233  REF   1            16,2701   34664 1                   CHKSB
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 1234                       16,2702   45345 1  CHKSD     DLOAD  DSU
 1235   REF   3  LAST  768  16,2703   00025 0                   THETA
 1236                       16,2704   00023 0                   18D                   COMPUTE POS DIFF
 1237                       16,2705   47046 0            ABS    RTB
 1238   REF   2  LAST  763  16,2706   45636 0                   SGNAGREE
 1239   REF   1             16,2707   01251 0            STORE  NORMTEM1
 1240                       16,2710   77414 0            SET    EXIT
 1241   REF   5  LAST  768  16,2711   00074 1                   FREEFLAG
 1242   REF 138  LAST  756  16,2712 3 4772 1             CAF    ZERO
 1243   REF 177  LAST  761  16,2713 0 4636 0             TC     BANKCALL
 1244   REF   4  LAST  699  16,2714   20715 0            CADR   CLEANDSP

 1245   REF   1             16,2715 3 2727 1             CAF    VB6N5
 1246   REF 178  LAST  769  16,2716 0 4636 0             TC     BANKCALL
 1247   REF  21  LAST  755  16,2717   20743 0            CADR   GOFLASH
 1248   REF  42  LAST  755  16,2720 1 4103 0             TCF    GOTOPOOH
 1249   REF   1             16,2721 0 2724 1             TC     CHKSDA                PROCEED
 1250   REF  57  LAST  763  16,2722 0 5561 0             TC     DOWNFLAG
 1251   REF   6  LAST  769  16,2723   00014 1            ADRES  FREEFLAG
 1252   REF 189  LAST  764  16,2724 0 6006 1   CHKSDA    TC     INTPRET
 1253                       16,2725   77650 1            GOTO
 1254   REF   2  LAST  768  16,2726   02777 1                   QMIN
 1255                       16,2727   01405 1  VB6N5     VN     605

 12555  REF   1                                          COUNT* $$/R50
 1256                       16,2730   77773 1  MATMOVE   VLOAD*                       TRANSFER MATRIX
 1257                       16,2731   00001 0                   0,1
 1258                       16,2732   10001 1            STORE  0,2
 1259                       16,2733   77773 1            VLOAD*
 1260                       16,2734   00007 0                   60,1
 1261                       16,2735   10007 1            STORE  60,2
 1262                       16,2736   77773 1            VLOAD*
 1263                       16,2737   00015 0                   120,1
 1264                       16,2740   10015 1            STORE  120,2
 1265                       16,2741   77616 0            RVQ
 1266                       16,2742   00056 1  DEGREE1   DEC    46
 1267                       16,2743   37722 1  DEG359    DEC    16338
 1268                       16,2744 0 0004 0   RDCDUS    INHINT                       READ CDUS
 1269                       16,2745 0 0006 1             EXTEND
 1270   REF  16  LAST  710  16,2746 3 0033 1             DCA    CDUX
 1271   REF  12  LAST  600  16,2747  50 120 1            INDEX  FIXLOC
 1272                       16,2750  52 002 1            DXCH   1
 1273   REF  11  LAST  710  16,2751 3 0034 0             CA     CDUZ
 1274   REF  13  LAST  765  16,2752  50 120 1            INDEX  FIXLOC
 1275                       16,2753  54 003 0            TS     3
 1276                       16,2754 0 0003 1             RELINT
 1277   REF   6  LAST  548  16,2755 0 6030 1             TC     DANZIG

R1278   NAME - CALCSMSC
R1279   FUNCTION - DETERMINE AND COMPUTE THE DESIRED GIMBAL ANGLES TO BE USED            FOR COARSE ALIGNMENT.
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R1281    CALLING SEQUENCE - CALL CALCSMSC
R1282    INPUT - DESIRED IMU INERTIAL ORIENTATION VECTORS-XSMD,YSMD,ZSMD
R1283    OUTPUT - GIMBAL ANGLES LEFT IN THETAD,+1,+2                                        +
R1284    SUBROUTINES USED - 1.CDUTRIG 2.CALCSMSC 3.CALCGA
 1285    REF   2  LAST  767    16,2000                          SETLOC P50S2
 1286                          16,2756                          BANK
 1287    REF   1                                                COUNT* $$/R51
 1288                          16,2756   41345 0  CALCSMSC DLOAD  DMP
 1289    REF   1               16,2757   01142 1                       SINCDUY
 1290    REF   2  LAST  545    16,2760   01152 0                       COSCDUZ
 1291                          16,2761   77676 0                DCOMP
 1292                          16,2762   70525 1                PDDL   SR1
 1293    REF   2  LAST  545    16,2763   01144 1                       SINCDUZ
 1294                          16,2764   41325 0                PDDL   DMP
 1295    REF   1               16,2765   01150 1                       COSCDUY
 1296    REF   3  LAST  770    16,2766   01152 0                       COSCDUZ
 1297                          16,2767   76466 1                VDEF   VSL1
 1298    REF   6  LAST  751    16,2770   16714 1                STODL  XNB
 1299    REF   3  LAST  546    16,2771   01146 0                       SINCDUX
 1300                          16,2772   72405 0                DMP    SL1
 1301    REF   3  LAST  770    16,2773   01144 1                       SINCDUZ
 1302                          16,2774   00033 1                STORE  26D
 1303                          16,2775   65205 0                DMP    PDDL
 1304    REF   2  LAST  770    16,2776   01142 1                       SINCDUY
 1305    REF   3  LAST  546    16,2777   01154 0                       COSCDUX
 1306                          16,3000   45205 1                DMP    DSU
 1307    REF   2  LAST  770    16,3001   01150 1                       COSCDUY
 1308                          16,3002   41325 0                PDDL   DMP
 1309    REF   4  LAST  770    16,3003   01146 0                       SINCDUX
 1310    REF   4  LAST  770    16,3004   01152 0                       COSCDUZ
 1311                          16,3005   65276 1                DCOMP  PDDL
 1312    REF   4  LAST  770    16,3006   01154 0                       COSCDUX
 1313                          16,3007   65205 0                DMP    PDDL
 1314    REF   3  LAST  770    16,3010   01142 1                       SINCDUY
 1315    REF   3  LAST  770    16,3011   01150 1                       COSCDUY
 1316                          16,3012   43205 1                DMP    DAD
 1317                          16,3013   00033 1                       26D
 1318                          16,3014   76456 1                VDEF   VSL1
 1319    REF   5  LAST  751    16,3015   02730 1                STORE  ZNB
 1320                          16,3016   76435 1                VXV    VSL1
 1321    REF   7  LAST  770    16,3017   02714 1                       XNB
 1322    REF   4  LAST  427    16,3020   02722 1                STORE  YNB
 1323                          16,3021   77616 0                RVQ
```

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P1324   PROGRAM NAME - P51 - IMU ORIENTATION DETERMINATION                                          DATE - AUGUST 1,1969
R1326   MODIFICATION BY ALBERT,BARNERT,HASLAM                                                        LOG SECTION - P51-P5

R1328   FUNCTION -

R1329        DETERMINES THE INERTIAL ORIENTATION OF THE IMU. THE PROGRAM IS SELECTED BY DSKY ENTRY. THE SIGHTING
R1331   ROUTINE IS CALLED TO COLLECT THE CDU COUNTERS AND SHAFT AND TRUNNION ANGLES FOR A SIGHTED STAR. THE DATA IS
R1333   THEN PROCESSED AS FOLLOWS.

R1334     1. SEXTANT ANGLES ARE COMPUTED IN TERMS OF NAVIGATIONAL BASE COORDINATES. LET SA AND TA BE THE SHAFT AND
R1336   TRUNNION ANGLES, RESPECTIVELY. THEN,

R1337                -
R1338                V   = (SIN(TA)*COS(SA), SIN(TA)*SIN(SA), COS(TA))    (A COLUMN VECTOR)
R1340                 NB
R1341   THE OUTPUT IS A HALF-UNIT VECTOR STORED IN STARM.

R1342     2. THIS VECTOR IN NAV.BASE COORDS. IS THEN TRANSFORMED TO ONE IN STABLE MEMBER COORDINATES.

R1344                -        T  T  T -
R1345                V   =   Q *Q *Q *V   , WHERE
R1346                         1  2  3  NB

R1347                     ( COS(IG)      0     -SIN(IG) )
R1348                     (                             )                               THE GIMBAL ANGLES ARE COMPUTED FROM
R1350                Q  = (    0         1        0     ), IG=INNER GIMBAL ANGLE      THE CDU COUNTERS AT NBSM (USING AXIS-
R1352                 1   (                             )                               ROT AND CDULOGIC)
R1354                     ( SIN(IG)      0      COS(IG) )

R1355
R1356                     ( COS(MG)   SIN(MG)     0     )
R1357                     (                             )
R1358                Q  = (-SIN(MG)   COS(MG)     0     ), MG=MIDDLE GIMBAL ANGLE
R1359                 2   (                             )
R1360                     (    0         0        1     )

R1361
R1362                     (    1         0        0     )
R1363                     (                             )
R1364                Q  = (    0      COS(OG)  SIN(OG)  ), OG=OUTER GIMBAL ANGLE
R1365                 3   (                             )
R1366                     (    0     -SIN(OG)  COS(OG)  )

R1367     3. THE STAR NUMBER IS SAVED AND THE SECOND STAR IS THEN SIMILARLY PROCESSED.

R1369     4. THE ANGLE BETWEEN THE TWO STARS IS THEN CHECKED AT CKSDATA.

R1370     5. REFSMMAT IS THEN COMPUTED AT AXISGEN AS FOLLOWS.
R1371            -       -
R1372       LET S  AND S  BE TWO STAR VECTORS EXPRESSED IN TWO COORDINATE SYSTEMS,A AND B (BASIC AND STABLE MEMBER).
```

```
R1374               1      2

R1375    DEFINE,     -    -
R1376                U  = S
R1377                 A    A1

R1378                -        -     -
R1379                V  = UNIT(S   X S  )
R1380                 A         A1   A2

R1381                -    -   -
R1382                W = U X V
R1383                 A    A   A
R1384        AND
R1385                -    -
R1386                U  = S
R1387                 B    B1

R1388                -        -     -
R1389                V  = UNIT(S   X S  )
R1390                 B         B1   B2

R1391                -    -   -
R1392                W  = U X V
R1393                 B    B   B

R1394        THEN    -        -       -       -
R1395                X  = U  *U + V  *V + W  *W
R1396                      B1  A   B1  A   B1  A

R1397                -        -       -       -            (REFSMMAT)
R1398                Y  = U  *U + V  *V + W  *W
R1399                      B2  A   B2  A   B2  A

R1400                -        -       -       -
R1401                Z  = U  *U + V  *V + W  *W
R1402                      B3  A   B3  A   B3  A

R1403          THE INPUTS CONSIST OF THE FOUR HALF-UNIT VECTORS STORED AS FOLLOWS

R1404                -
R1405                S   IN 6-11 OF THE VAC AREA
R1406                 A1

R1407                -
R1408                S   IN 12-17 OF THE VAC AREA
R1409                 A2

R1410                -
R1411                S   IN STARAD
```

```
R1412                  B1

R1413                  -
R1414                  S    IN STARAD +6
R1415                  BZ

R1416   CALLING SEQUENCE

R1417     THE PROGRAM IS CALLED BY THE ASTRONAUT BY DSKY ENTRY.

R1418   SUBROUTINES CALLED.

R1419         GOPERF3
R1420         GOPERF1R
R1421         GODSPR
R1422         IMUCOARS
R1423         IMUFIN20
R1424         R53
R1425         SXTNB
R1426         NBSM
R1427         MKRELEAS
R1428         CHKSDATA
R1429         MATMOVE

R1430   ALARMS

R1431         NONE.
R1432   ERASABLE INITIALIZATION

R1433         IMU ZERO FLAG SHOULD BE SET.

R1434   OUTPUT

R1435         REFSMMAT
R1436         REFSMFLG

R1437   DEBRIS

R1438         WORK AREA
R1439         STARAD
R1440         STARIND
R1441         BESTI
R1442         BESTJ

 1443   REF   1              14,2000                           SETLOC P50S1
 1444                        14,3414                           BANK
 1445   REF   1                                                COUNT* $$/P5153
 1446   REF   2  LAST  225   14,3414              P53          EQUALS P51
 1447   REF  46  LAST  392   14,3414  4 1333 1    P51          CS     IMODES30
 1448   REF   2  LAST  150   14,3415  7 4760 0                 MASK   IMUOPBIT
```

```
1449   REF 179  LAST  762   14,3416  10 000 0             CCS     A
1450   REF   1              14,3417  0 3423 1             TC      P51A
1451   REF  27  LAST  753   14,3420  0 5671 1             TC      ALARM
1452                        14,3421   00210 1             OCT     210
1453   REF  43  LAST  769   14,3422  0 4103 1             TC      GOTOPOOH
1454   REF 179  LAST  769   14,3423  0 4636 0   P51A      TC      BANKCALL
1455   REF   1              14,3424   03745 1             CADR    R02ZERO

1456   REF   1              14,3425  3 4776 0   P51AA     CAF     PRFMSTAQ
1457   REF 180  LAST  774   14,3426  0 4636 0             TC      BANKCALL
1458   REF   9  LAST  755   14,3427   21067 0             CADR    GOPERF1
1459   REF  44  LAST  774   14,3430  0 4103 1             TC      GOTOPOOH          TERM.
1460   REF   1              14,3431  0 3454 1             TC      P51B              V 33
1461   REF  72  LAST  755   14,3432  0 5402 1             TC      PHASCHNG
1462                        14,3433   05024 1             OCT     05024
1463                        14,3434   13000 0             OCT     13000
1464   REF   1              14,3435  3 4772 1             CAF     P51ZERO
1465   REF  20  LAST  749   14,3436  55'307 0             TS      THETAD            ZERO THE GIMBALS
1466   REF  21  LAST  774   14,3437  55'310 0             TS      THETAD +1
1467   REF  22  LAST  774   14,3440  55'311 1             TS      THETAD +2
1468   REF   3  LAST  747   14,3441  3 5025 0             CAF     V06N22
1469   REF 181  LAST  774   14,3442  0 4636 0             TC      BANKCALL
1470   REF   2  LAST  449   14,3443   20705 1             CADR    GODSPRET
1471   REF   1              14,3444  3 3565 1             CAF     V41K              NOW DISPLAY COARSE ALIGN VERB 41
1472   REF 182  LAST  774   14,3445  0 4636 0             TC      BANKCALL
1473   REF   3  LAST  774   14,3446   20705 1             CADR    GODSPRET
1474   REF   2  LAST  749   14,3447  0 3742 0             TC      COARSUB           PERFORM ALIGNMENT
1475   REF  73  LAST  774   14,3450  0 5402 1             TC      PHASCHNG
1476                        14,3451   05024 1             OCT     05024
1477                        14,3452   13000 0             OCT     13000
1478   REF   1              14,3453  1 3425 0             TCF     P51AA             COARSE ALIGN DONE - RECYCLE FOR FINE
```

```
P1479      DO STAR SIGHTING AND COMPUTE NEW REFSMMAT

 1480  REF 190  LAST  769   14,3454  0 6006 1  P51B     TC      INTPRET
 1481                       14,3455   40331 1           SSP     SETPD
 1482  REF   7  LAST  758   14,3456   00305 1                   STARIND          INDEX-STAR 1 OR 2
 1483                       14,3457   00000 1                   0
 1484                       14,3460   00001 0                   0
 1485                       14,3461   77234 1           RTB     VLOAD
 1486  REF   3  LAST  749   14,3462   31566 0                   SET1/PDT
 1487  REF  14  LAST  749   14,3463   11762 1                   ZEROVEC
 1488  REF  20  LAST  749   14,3464   01472 1           STORE   GCOMP
 1489                       14,3465   43014 0           SET     CLEAR
 1490  REF   4  LAST  749   14,3466   01060 0                   DRIFTFLG         ENABLE T4 COMPENSATION
 1491  REF   6  LAST  753   14,3467   00666 1                   TARG2FLG         SHOW MARK IS STAR - NOT LANDMARK
 1492                       14,3470   77776 1           EXIT
 1493  REF  74  LAST  774   14,3471  0 5402 1  P51C     TC      PHASCHNG
 1494                       14,3472   05024 1           OCT     05024
 1495                       14,3473   13000 0           OCT     13000
 1496  REF  19  LAST  762   14,3474  0 5354 0           TC      CHECKMM
 1497                       14,3475   00065 1           MM      53               BACKUP PROGRAM
 1498  REF   1              14,3476  1 3504 1           TCF     P51C.1           NOT P53
 1499  REF 191  LAST  775   14,3477  0 6006 1           TC      INTPRET
 1500                       14,3500   77624 1           CALL
 1501  REF   2  LAST  754   14,3501   36105 0                   R56
 1502                       14,3502   77650 1           GOTO
 1503  REF   1              14,3503   31507 1                   P51C.2
 1504  REF 192  LAST  775   14,3504  0 6006 1  P51C.1   TC      INTPRET
 1505                       14,3505   77624 1           CALL
 1506  REF   3  LAST  761   14,3506   31571 0                   R53              SIGHTING ROUTINE
 1507                       14,3507   77624 1  P51C.2   CALL                     COMPUTE LOS IN SM FROM MARK DATA
 1508  REF   2  LAST  754   14,3510   36052 0                   SXTSM
 1509                       14,3511   77606 1           PUSH
 1510                       14,3512   53135 0           SLOAD   BZE
 1511  REF   8  LAST  775   14,3513   00305 1                   STARIND
 1512  REF   1              14,3514   31520 1                   P51D
 1513                       14,3515   45575 1           VLOAD   STADR
 1514  REF   8  LAST  758   14,3516   41160 0           STCALL  STARSAV2         DOWNLINK
 1515  REF   1              14,3517   31526 1                   P51E
 1516                       14,3520   45575 1  P51D     VLOAD   STADR
 1517  REF   6  LAST  759   14,3521   61166 1           STODL   STARSAV1
 1518  REF   9  LAST  766   14,3522   02607 1                   TSIGHT
 1519                       14,3523   77624 1           CALL
 1520  REF   3  LAST  756   14,3524   31651 1                   PLANET
 1521  REF   5  LAST  755   14,3525   02601 1           STORE   PLANVEC
 1522                       14,3526   77776 1  P51E     EXIT
 1523  REF  75  LAST  775   14,3527  0 5402 1           TC      PHASCHNG
 1524                       14,3530   05024 1           OCT     05024
 1525                       14,3531   13000 0           OCT     13000
 1526  REF   9  LAST  775   14,3532  10 304 1           CCS     STARIND
 1527  REF   1              14,3533  1 3542 0           TCF     P51F             STAR 2
 1528   REF  76  LAST  775   14,3534  0 5402 1             TC        PHASCHNG
 1529                        14,3535   05024 1             OCT       05024
 1530                        14,3536   13000 0             OCT       13000
 1531   REF  46  LAST  754   14,3537  3 4770 0             CAF       BIT1
 1532   REF  10  LAST  775   14,3540  54 304 1             TS        STARIND
 1533   REF   1              14,3541  1 3471 1             TCF       P51C              GO DO SECOND STAR
 1534   REF  77  LAST  776   14,3542  0 5402 1  P51F       TC        PHASCHNG
 1535                        14,3543   05024 1             OCT       05024
 1536                        14,3544   13000 0             OCT       13000
 1537   REF 193  LAST  775   14,3545  0 6006 1             TC        INTPRET
 1538                        14,3546   45145 0             DLOAD     CALL
 1539   REF  10  LAST  775   14,3547   02607 1                       TSIGHT
 1540   REF   4  LAST  775   14,3550   31651 1                       PLANET
 1541                        14,3551   24015 0             STOVL     12D
 1542   REF   6  LAST  775   14,3552   02601 1                       PLANVEC
 1543                        14,3553   24007 0             STOVL     6D
 1544   REF   7  LAST  775   14,3554   02611 0                       STARSAV1
 1545   REF   8  LAST  768   14,3555   26736 1             STOVL     STARAD
 1546   REF   9  LAST  775   14,3556   02617 0                       STARSAV2
 1547   REF   9  LAST  776   14,3557   36744 0             STCALL    STARAD +6
 1548   REF   2  LAST  768   14,3560   34657 1                       CHKSDATA          CHECK STAR ANGLES IN STARAD AND
 1549                        14,3561   77414 0             BON       EXIT
 1550   REF   7  LAST  769   14,3562   00314 1                       FREEFLAG
 1551   REF   1              14,3563   11716 1                       P51G
 1552   REF   2  LAST  774   14,3564  0 3425 1             TC        P51AA
 15525  REF   1              04,2000                       SETLOC    P50S4
 15526                       04,3716                       BANK

 15528  REF   1                                            COUNT*    $$/P5153
 1553                        04,3716   77624 1  P51G       CALL
 1554   REF   3  LAST  755   04,3717   47432 1                       AXISGEN           COME BACK WITH REFSMMAT IN XDC
 1555                        04,3720   75160 1             AXC,1     AXC,2
 1556   REF   5  LAST  747   04,3721   02713 0                       XDC
 1557   REF  39  LAST  759   04,3722   01733 1                       REFSMMAT
 1558                        04,3723   45014 0             CLEAR     CALL
 1559   REF   9  LAST  750   04,3724   01662 1                       REFSMFLG
 1560   REF   3  LAST  749   04,3725   34730 1                       MATMOVE
 1561                        04,3726   77414 0             SET       EXIT
 1562   REF  10  LAST  776   04,3727   01462 0                       REFSMFLG
 1563   REF  45  LAST  774   04,3730  0 4103 1             TC        GOTOPOOH
 15635  REF   2  LAST  773   14,2000                       SETLOC    P50S1
 15636                       14,3565                       BANK

 15638  REF   2 LAST  773 TO  776:    105     105*         COUNT*    $$/P5153
 1564   REF   3  LAST  748      4776            PRFMSTAQ   =         OCT15
 1565   REF 139  LAST  769      4772            P51ZERO    =         ZERO
 1566   REF  17  LAST  760      4773            P51FIVE    =         FIVE
 1567                        14,3565   12200 0  V41K       VN        4100
 1568   REF  17  LAST  709   14,3566  3 0025 0  SET1/PDT   CA        TIME1
 1569   REF   9  LAST  539   14,3567  55'277 0             TS        1/PIPADT
 1570   REF   7  LAST  769   14,3570  1 6030 0          TCF    DANZIG
```

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L        P51-P53                                                                                USER'S PAGE NO.  37      E7 S3

P1571      SXTSM COMPUTES AN LOS VECTOR IN SM COORD FROM OCDU AND ICDU MARK DATA

  1572    REF   1                17,2000                          SETLOC P50S3
  1573                           17,2052                          BANK
  15735   REF   1                                                 COUNT* $$/K51
  1574                           17,2052    77745 1   SXTSM       DLOAD
  1575    REF  49  LAST   761    17,2053    03723 1                      MRKBUF1
  1576    REF  11  LAST   776    17,2054    02607 1               STORE  TSIGHT
  1577                           17,2055    77760 0               AXC,1
  1578    REF  50  LAST   778    17,2056    03722 0                      MRKBUF1          ADDRESS OF MARK DATA FOR P50'S
  1579                           17,2057    77620 0   SXTSM1      STQ                     CALLED HERE FROM GETUM (P20 AND P22)
  1580    REF   5  LAST   767    17,2060    00300 1                      QMAJ
  1581                           17,2061    66744 0               LXC,2  SLOAD*
  1582    REF  11  LAST   776    17,2062    00304 0                      STARIND
  1583    REF   1                17,2063    41673 0                      MKDNCDR,2
  1584                           17,2064    76744 1               LXC,2  VLOAD*
  1585    REF 274  LAST   763    17,2065    00154 1                      MPAC
  1586                           17,2066    00001 0                      0,1
  1587                           17,2067    10001 1               STORE  0,2
  1588                           17,2070    77743 1               DLOAD*
  1589                           17,2071    00006 1                      5,1
  1590                           17,2072    10006 0               STORE  5,2
  1591                           17,2073    77773 1   SXTSM2      VLOAD*
  1592                           17,2074    00003 1                      2,1
  1593    REF   8  LAST   596    17,2075    35172 0               STCALL CDUSPOT
  1594    REF   2  LAST   512    17,2076    46000 0                      SXTNB
  1595                           17,2077    77624 1               CALL
  1596    REF   2  LAST   597    17,2100    47642 1                      TRG*NBSM         TRANSFER LOS TO SM
  1597                           17,2101    34041 0               STCALL 32D
  1598    REF   6  LAST   778    17,2102    00300 1                      QMAJ
  1599    REF   7  LAST   630    17,2103    03674 1   MKDNCDR     ECADR  MARKDOWN
  1600    REF   2  LAST   183    17,2104    03460 0               ECADR  MARK2DWN
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P1601   NAME - R53 - SIGHTING MARK ROUTINE
```

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P1602   FUNCTION -
R1603           TO PERFORM A SATISFACTORY NUMBER OF SIGHTING MARKS FOR THE REQUESTING PROGRAM (OR ROUTINE). SIGHTINGS
R1605   CAN BE MADE ON A STAR OR LANDMARK. WHEN THE CMC ACCEPTS A MARK IT RECORDS AND STORES 5 ANGLES (3 ICDUS AND 2
R1607   OCDUS) AND THE TIME OF THE MARK.

R1608   CALLING SEQUENCE
R1609     R53 IS CALLED AND RETURNS IN INTERPRETIVE CODE. RETURN IS VIA QPRET.
R1610     THERE IS NO ERROR EXIT IN THIS ROUTINE ITSELF.

R1611   SUBROUTINES CALLED
R1612     SXTMARK
R1613     OPTSTALL
R1614     GOFLASH

R1615   ERASABLE INITIALIZATION
R1616     TARGET FLAG - STAR OR LANDMARK
R1617     MARKINDX - NUMBER OF MARKS WANTED
R1618     STARIND - INDEX TO BESTI OR BESTJ (STAR NUMBER)
R1619   OUTPUT
R1620     MARKSTAT CONTAINS INDEX TO VACANT AREA WHERE MARK DATA IS STORED
R1621     BESTI (INDEXED BY STARIND) CONTAINS STAR NUMBER SIGHTED
R1622   DEBRIS
R1623     MARKINDX CONTAINS NUMBER OF MARKS DESIRED
 1624   REF   2  LAST  639   14,2000                      SETLOC RT53
 1625                        14,3571                      BANK

 1626   REF   1                                           COUNT* $$/R53
 1627                        14,3571   43020 1  R53        STQ     SET                   SET SIGHTING MARK FLAG
 1628   REF   2  LAST  121   14,3572   03457 1                    R53EXIT
 1629   REF   3  LAST  760   14,3573   00071 1                    R53FLAG
 1630                        14,3574   77776 1            EXIT
 1631   REF 183  LAST  774   14,3575 0 4636 0  R53A       TC      BANKCALL
 1632   REF   2  LAST  452   14,3576   16000 0            CADR    SXTMARK
 1633   REF  20  LAST  775   14,3577 0 5354 0            TC      CHECKMM
 1634                        14,3600   00030 1            MM      24
 1635                        14,3601 1 3603 0            TCF     +2
 1636   REF   1              14,3602 1 3612 0            TCF     R53A1
 1637   REF  21  LAST  780   14,3603 0 5354 0            TC      CHECKMM
 1638                        14,3604   00026 0            MM      22                    P22?
 1639   REF   8  LAST  437   14,3605 3 4766 1            CAF     FOUR                  NO, IS MARKINDX = 1
 1640   REF   1              14,3606 6 3650 1            AD      MINS                  YES, IS MARKINDX = 5 (CHECKMM LEAVES 0)
 1641   REF  12  LAST  452   14,3607 6 0301 0            AD      MARKINDX
 1642                        14,3610 0 0006 1            EXTEND
 1643   REF   1              14,3611 1 3575 1            BZF     R53A                  NO MARKS TAKEN.  DO AGAIN.
 1644   REF 184  LAST  780   14,3612 0 4636 0  R53A1      TC      BANKCALL
 1645   REF   4  LAST  452   14,3613   16073 1            CADR    MKRELEAS
 16457  REF 140  LAST  776   14,3614 3 4772 1  R53C1      CAF     ZERO
 16458  REF 185  LAST  780   14,3615 0 4636 0            TC      BANKCALL
 16459  REF   5  LAST  769   14,3616   20715 0            CADR    CLEANDSP
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  1646   REF  28  LAST  700   14,3617  4 4763 0  R53B       CS      0116           CUT BETWEEN P20S AND P50S
  1647   REF  15  LAST  754   14,3620  6 1214 1             AD      MODREG         P22,P23 CALL
  1648                        14,3621  0 0006 1             EXTEND
  1649   REF   1              14,3622  6 3631 0             BZMF    R53D           YES
  1653   REF   1              14,3623  3 3635 1  R53C       CAF     V01N71
  1654   REF  36  LAST  745   14,3624  0 5535 1             TC      VNFLASH
  1655   REF   2  LAST  756   14,3625  0 3636 1  R53Z       TC      CHKSCODE
R16551   ROUTINE TO ALLOW ONLY +0 <= STARCODE <= +50, OTHERWISE 'OPERATOR ERROR'

  1656   REF  13  LAST  756   14,3626  0 4362 1             TC      FALTON
  1657   REF   1              14,3627  0 3623 0             TC      R53C
  1658   REF   1              14,3630  0 3732 1             TC      STORIJ         SET BESTI(BESTJ) = 1ST(2ND) STARCODE
  1659   REF 194  LAST  776   14,3631  0 6006 1  R53D       TC      INTPRET
  1660                        14,3632   77614 1  R53OUT     SETGO
  1661   REF   2  LAST  757   14,3633   03420 1                     TERMIFLG       SET TERMINATE FOR R52
  1662   REF   3  LAST  780   14,3634   03457 1                     R53EXIT
  1663   REF  21  LAST  756      6211            SIGHTSIX =         SIX
  1664                        14,3635   00307 0  V01N71     VN      0171
R1665
R1666      ******  KEEP IN SAME BANK AS R51 AND R53 *********
  1667   REF  10  LAST  754   14,3636  11'140 1  CHKSCODE CCS       STARCODE
  16675  REF   1              14,3637  1 3643 1             TCF     SCPOS          > 0, CHECK IF <= 50
  1668   REF   2  LAST  382   14,3640  1 6710 0             TCF     Q+2            = +0, OK
  16685  REF 141  LAST  735   14,3641  0 0002 0             TC      Q              NEGATIVE STARCODE OF ANY
  1669   REF 142  LAST  781   14,3642  0 0002 0             TC      Q              MAGNITUDE IS IMPROPER
  1670   REF   1              14,3643  6 3647 1  SCPOS      AD      NEG47
  1671                        14,3644  0 0006 1             EXTEND
  1672   REF   3  LAST  781   14,3645  6 6710 1             BZMF    Q+2            <= 50, OK
  1673   REF 143  LAST  781   14,3646  0 0002 0             TC      Q              > 50, IMPROPER
  1675                        14,3647   77730 0  NEG47      OCT     77730
  1676                        14,3650   77772 0  MIN5       DEC     -5
```

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P1677   NAME-S52.2
R1678   FUNCTION-COMPUTE GIMBAL ANGLES FOR DESIRED SM AND PRESENT VEHICLE
R1679   CALL-  CALL  S52.2
R1680   INPUT- X,Y,ZSMD
R1681   CUTPUT- OGC,IGC,MGC,THETAD,+1,+2
R1682   SUBRCUTINES-CDUTRIG,CALCSMSC,MATMOVE,CALCGA
 1683   REF   1               11,2000                          SETLOC S52/2
 1684                         11,2247                          BANK

 1685   REF   1                                                COUNT* $$/S52.2
 1686                         11,2247   45020 1  S52.2         STQ    CALL
 1687   REF   7  LAST  778    11,2250   00300 1                       QMAJ
 1688   REF   8  LAST  759    11,2251   47530 1                       CDUTRIG
 1689                         11,2252   77624 1                CALL
 1690   REF   2  LAST  751    11,2253   34756 1                       CALCSMSC
 1691                         11,2254   66370 0                AXT,1  SSP
 1692                         11,2255   00022 1                       18D
 1693   REF  28  LAST  758    11,2256   00051 0                       S1
 1694                         11,2257   00006 1                       6D
 1695                         11,2260   61373 1  S52.2A        VLOAD* VXM
 1696   REF   8  LAST  770    11,2261   02736 1                       XNB +18D,1
 1697   REF  40  LAST  776    11,2262   01734 0                       REFSMMAT
 1698                         11,2263   77656 1                UNIT
 1699   REF   9  LAST  782    11,2264   06736 0                STORE  XNB +18D,1
 1700                         11,2265   77700 0                TIX,1
 1701   REF   1               11,2266   22260 0                       S52.2A
 1702                         11,2267   75160 1  S52.2.1       AXC,1  AXC,2
 1703   REF  12  LAST  748    11,2270   00306 1                       XSMD
 1704   REF  29  LAST  749    11,2271   02671 0                       XSM
 1705                         11,2272   77624 1                CALL
 1706   REF   4  LAST  776    11,2273   34730 1                       MATMOVE
 1707                         11,2274   77624 1                CALL
 1708   REF   3  LAST  629    11,2275   47344 1                       CALCGA
 1709                         11,2276   77650 1                GOTO
 1710   REF   8  LAST  782    11,2277   00300 1                       QMAJ
```

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R1711        THE ADVTRACK ROUTINE IS USED TO COMPUTE AN OPTICS LOS VECTOR TO
R1712     A POINT ON THE GROUND TRACK 60 DEGRESS FORWARD OF THE LOCAL VERTICAL
R1713     OF AN ADVANCED ORBIT A SPECIFIED NUMBER OF REVOLUTIONS FROM NOW

 1714     REF   1                26,2000                      SETLOC 26P50S
 1715                            26,2040                      BANK
 17155    REF   1                                             COUNT* $$/R52
 1716                            26,2040   77601 0   ADVTRACK SETPD
 1717                            26,2041   00001 0                   0
 1718                            26,2042   41575 0            VLOAD  PUSH          INITIALIZE FOR RP-TO-R
 1719     REF   3  LAST  459     26,2043   15330 0                   UNITZ         UZ VEC IN PD 0-5
 1720                            26,2044   41434 1            RTB    PUSH          TIME IN PD 6-7
 1721     REF  24  LAST  758     26,2045   51751 0                   LOADTIME
 1722     REF  10  LAST  763     26,2046   36347 1            STCALL AOPTIME       TIME ALSO IN AOPTIME FOR CSMCONIC
 1723     REF   5  LAST  745     26,2047   55345 0                   RP-TO-R       GET MOON ROTATION VEC IN REF
 1724     REF  11  LAST  759     26,2050   16766 1            STODL  STAR
 1725     REF  11  LAST  783     26,2051   02347 0                   AOPTIME       PICK UP TIME
 1726     REF  37  LAST  766     26,2052   34041 0            STCALL TDEC1         UPDATE STATE TO TIME
 1727     REF   9  LAST  766     26,2053   27170 1                   CSMCONIC
 1728                            26,2054   47375 0            VLOAD  VXV
 1729     REF  23  LAST  767     26,2055   00007 0                   VATT
 1730     REF  29  LAST  767     26,2056   00001 0                   RATT
 1731                            26,2057   24031 0            STOVL  240           SAVE -UNIT(V X R) FOR 2ND ROTATION
 1732     REF  30  LAST  783     26,2060   00001 0                   RATT
 1733                            26,2061   57456 1            UNIT   VCOMP
 1734                            26,2062   41401 1            SETPD  PUSH          PUSH LOS=-UNIT(RVEC)  PD 0-5
 1735                            26,2063   00001 0                   0
 1736                            26,2064   54335 0            SLOAD  SL
 1737     REF  20  LAST  638     26,2065   03752 1                   LANDMARK
 1738                            26,2066   20214 1                   11D
 1739                            26,2067   41342 1            SR1    DMP
 1740     REF   1                26,2070   14135 0                   MPERIOD
 1741     REF  12  LAST  783     26,2071   36347 1            STCALL AOPTIME       ROTATE ANG ABOUT UR
 1742     REF   1                26,2072   54105 1                   ROTA
 1743                            26,2073   53575 0            VLOAD  UNIT
 1744                            26,2074   00031 0                   240           PICK UP 2ND ROTATION AXIS
 1745     REF  12  LAST  783     26,2075   16766 1            STODL  STAR
 1746     REF   1                26,2076   14133 0                   DP1/6
 1747                            26,2077   77625 0            DSU
 1748     REF  13  LAST  783     26,2100   02347 0                   AOPTIME       2ND RAT ANGLE = 60 - A
 1749     REF  14  LAST  783     26,2101   36347 1            STCALL AOPTIME
 1750     REF   2  LAST  783     26,2102   54105 1                   ROTA          GO ROTATE 2ND TIME
 1751     REF  13  LAST  783     26,2103   36766 0            STCALL STAR          STORE FINAL LOS IN STAR
 1752     REF   3  LAST  759     26,2104   31120 0                   COM52         RETURN TO SR52.1

 1753                            26,2105   73545 1   ROTA     DLOAD  SIN
 1754     REF  15  LAST  783     26,2106   02347 0                   AOPTIME
 1755                            26,2107   47315 0            PDVL   VXV           PUSH 1/2SIN(A)  PD  6-7
 1756     REF  14  LAST  783     26,2110   02766 1                   STAR            UR VEC
 1757                            26,2111   00001 0                   0               LOS
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  1758                                26,2112   72561 0             VXSC    VSL2            1/2SIN(A)(URXLOS)  PD 6-11
  1759                                26,2113   50315 0             PDVL    DOT
  1760     REF  15  LAST   783        26,2114   02766 1                     STAR
  1761                                26,2115   00001 0                     0
  1762                                26,2116   72561 0             VXSC    VSL2
  1763     REF  16  LAST   784        26,2117   02766 1                     STAR
  1764                                26,2120   71525 0             PDDL    COS             1/2(UR . LOS)UR  12-17
  1765     REF  16  LAST   783        26,2121   02347 0                     ADPTIME
  1766                                26,2122   51315 1             PDVL    6VSU            PUSH 1/2COS(A)  18-19
  1767                                26,2123   00015 0                     12D
  1768                                26,2124   00001 0                     0
  1769                                26,2125   76561 1             VXSC    VSL1            UP 18-19
  1770                                26,2126   53255 0             VAD     VAD             UP 12-17  UP 6-11
  1771                                26,2127   40256 1             UNIT    SETPD
  1772                                26,2130   00001 0                     0
  1773                                26,2131   43406 1             PUSH    RVQ

  1774                                26,2132   05252 1   DP1/6     2DEC    .16666666
  1774                                26,2133   25251 0
  1775                                26,2134   01414 1   MPERIOD   2DEC    .047619            APPROX LUNAR ROT ANG IN 2HRS X 16
  1775                                26,2135   06044 1
```

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P1776   NAME - R56 - ALTERNATE LOS SIGHTING MARK ROUTINE
R1777   FUNCTIONAL DESCRIPTION
R1778           TO PERFORM SIGHTING MARKS FOR THE BACK-UP ALIGNMENT PROGRAMS (P53,P54).  THE ASTRONAUT KNOWS THE
R1780   COORDINATES (OPTICS) OF THE ALTERNATE LINE OF SIGHT HE MUST USE FOR THIS ROUTINE.  WHEN THE ASTRONAUT KEYS IN
R1782   ENTER IN RESPONSE TO THE FLASHING V50 N25 R1-XXXXX THE CMC STORES THE THREE ICDU ANGLES AND TWO ANGLES DISPLAYED
R1784   IN N92.

R1785   CALLING SEQUENCE
R1786           CALL
R1787                   R56

R1788   SUBROUTINES CALLED
R1789           A PORTION OF SXTMARK (VAC.AREA SEARCH)
R1790           GOFLASH
R1791           GOPERF1

R1792   ERASABLE INITIALIZATION
R1793           STARIND-INDEX TO STAR NUMBER

R1794   OUTPUT
R1795           MARKSTAT-INDEX TO VAC.AREA WHERE OUTPUT IS STORED.
R1796           BESTI (INDEXED BY STARIND) CONTAINS STAR NUMBER.
R1797           ICDU AND OCDU ANGLES IN VAC. AREA AS FOLLOWS-
R1798               VAC +2  CDUY
R1799               VAC +3  CDUS
R1800               VAC +4  CDUZ
R1801               VAC +5  CDUT
R1802               VAC +6  CDUX

  1804   REF   2  LAST  778   17,2000                          SETLOC  P50S3
  1805                        17,2105                          BANK
  18055  REF   1                                               COUNT*  $$/R56
  1806                        17,2105   77420 1  R56           STQ     EXIT
  1807   REF   4  LAST  781   17,2106   03457 1                        R53EXIT
  1808   REF   1              17,2107  3 2162 0                CAF     V06N94B
  1809   REF  37  LAST  781   17,2110  0 5535 1                TC      VNFLASH
  1810   REF 186  LAST  780   17,2111  0 4636 0  R56A          TC      BANKCALL
  1811   REF   3  LAST  568   17,2112   16062 1                CADR    TESTMARK

  1812   REF 141  LAST  780   17,2113  3 4772 1                CAF     ZERO
  1813   REF 187  LAST  785   17,2114  0 4636 0                TC      BANKCALL
  1814   REF   6  LAST  780   17,2115   20715 0                CADR    CLEANDSP

  1815   REF   1              17,2116  3 2161 0  R56A1         CAF     VB53              DISPLAY V53 REQUESTING ALTERNATE MARK
  1816   REF 188  LAST  785   17,2117  0 4636 0                TC      BANKCALL
  1817   REF   1              17,2120   20601 1                CADR    GOMARK2
  1818   REF  46  LAST  776   17,2121  1 4103 0                TCF     GOTOPOOH          V34-TERMINATE
  1819   REF   1              17,2122  1 2116 1                TCF     R56A1             V33-DONT PROCEED-JUST ENTER TO MARK
  1820   REF 195  LAST  781   17,2123  0 6006 1                TC      INTPRET
  1821                        17,2124   77745 1                DLOAD
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 1822   REF  51  LAST  778   17,2125    03726 1                         MRKBUF1 +3
 1823   REF  10  LAST  763   17,2126    16774 1                 STODL   SAC
 1824   REF  52  LAST  786   17,2127    03730 0                         MRKBUF1 +5
 1825   REF  10  LAST  759   17,2130    02776 0                 STORE   PAC
 1826                        17,2131    77776 1                 EXIT
 1827                        17,2132   0 0004 0                 INHINT
 1828   REF  11  LAST  710   17,2133   0 4606 0                 TC      E7SETTER

 1829   REF  53  LAST  786   E7,1722                            EBANK=  MRKBUF1
 1830                        17,2134   0 0006 1                 EXTEND
 1831   REF  31  LAST  757   17,2135   3 0025 0                 DCA     TIME2
 1832   REF  54  LAST  786   17,2136   53'723 1                 DXCH    MRKBUF1
 1833   REF   3  LAST  710   17,2137   3 0033 1                 CA      CDUY             ENTER-THIS IS A BACKUP SYSTEM MARK
 1834   REF  55  LAST  786   17,2140   55'724 0                 TS      MRKBUF1 +2
 1835   REF  12  LAST  769   17,2141   3 0034 0                 CA      CDUZ
 1836   REF  56  LAST  786   17,2142   55'726 1                 TS      MRKBUF1 +4
 1837   REF  17  LAST  769   17,2143   3 0032 0                 CA      CDUX
 1838   REF  57  LAST  786   17,2144   55'730 0                 TS      MRKBUF1 +6
 1839                        17,2145   0 0003 1                 RELINT
 1840   REF   4  LAST  757   17,2146   3 5043 0                 CAF     EBANK5           MAY NOT NEED TO DO THIS
 1841   REF  23  LAST  760   17,2147   54 0003 0                TS      EBANK

 1842   REF   3  LAST  769   E5,1777                            EBANK=  QMIN

 1843   REF   7  LAST  568   17,2150   0 5527 1                 TC      CLEARMRK         ENABLE EXTENDED VERBS
 1844   REF   1              17,2151   3 4321 0                 CAF     OCT16
 1845   REF 189  LAST  785   17,2152   0 4636 0                 TC      BANKCALL
 1846   REF  10  LAST  774   17,2153    21067 0                 CADR    GOPERF1
 1847   REF  47  LAST  785   17,2154   0 4103 1                 TC      GOTOPOOH         TERM.
 1848   REF   1              17,2155   1 2157 1                 TCF     R56B             PROCEED-MARK COMPLETED
 1849   REF   1              17,2156   1 2111 0                 TCF     R56A             RECYCLE - DO ANOTHER MARK - LIKE REJECT
 1850   REF 190  LAST  786   17,2157   0 4636 0   R56B          TC      BANKCALL
 1851   REF   1              17,2160    31614 0                 CADR    R53C1
 1852                        17,2161    15200 1   VB53          VN      05300            ALTERNATE MARK VERB
 1853                        17,2162    01536 0   V06N94B       VN      00694
 1854   REF   3  LAST  776   14,2000                            SETLOC  P50S1
 1855                        14,3651                            BANK

 18555  REF   1                                                 COUNT*  $$/PLNET
 1856   REF  12  LAST  778   14,3651    02607 1   PLANET        STORE   TSIGHT
 1857                        14,3652    45020 1                 STQ     CALL
 1858   REF   4  LAST  786   14,3653    02777 1                         QMIN
 1859   REF   2  LAST  750   14,3654    26345 1                         LOCSAM
 1860                        14,3655    77775 1                 VLOAD
 1861   REF   5  LAST  766   14,3656    02736 1                         VEARTH
 1862                        14,3657    24001 0                 STOVL   0D
 1863   REF   8  LAST  767   14,3660    02744 1                         VSUN
 1864   REF   6  LAST  786   14,3661    26736 1                 STOVL   VEARTH
 1865                        14,3662    00001 0                         0D
 1866   REF   9  LAST  786   14,3663    02744 1                 STORE   VSUN
 1867                          14,3664   77776 1  NOSAM    EXIT
 1868   REF   2  LAST  781     14,3665  0 3732 1           TC       STORIJ              SET BESTI(BESTJ) = 1ST(2ND) STARCODE
 1869   REF 180  LAST  774     14,3666  10 000 0           CCS      A
 1870   REF   1                14,3667  1 3700 1           TCF      NOTPLAN
 1871   REF   1                14,3670  3 5035 1           CAF      VNPLANV
 1872   REF  38  LAST  785     14,3671  0 5535 1           TC       VNFLASH
 1873   REF 196  LAST  785     14,3672  0 6006 1           TC       INTPRET
 1874                          14,3673   74375 0           VLOAD    VXSC
 1875   REF   6  LAST  639     14,3674   03705 0                    STARSAV3
 1876   REF   1                14,3675   31731 0                    1/SQR3
 1877                          14,3676   52056 0           UNIT     GOTO
 1878   REF   1                14,3677   31723 0                    CORPLAN
 1879   REF 181  LAST  787     14,3700  4 0000 0  NOTPLAN  CS       A
 1880   REF   1                14,3701  6 3727 0           AD       DEC227
 1881                          14,3702  0 0006 1           EXTEND
 1882   REF   1                14,3703  6 3714 0           BZMF     CALSAM1
 1883   REF  12  LAST  778     14,3704  50 304 0           INDEX    STARIND
 1884   REF  10  LAST  754     14,3705  3 0302 0           CA       BESTI
 1885   REF  14  LAST  769     14,3706  50 120 1           INDEX    FIXLOC
 1886   REF  29  LAST  751     14,3707  54 046 1           TS       X1
 1887   REF 197  LAST  787     14,3710  0 6006 1           TC       INTPRET
 1888                          14,3711   52173 0           VLOAD*   GOTO
 1889   REF  11  LAST  752     14,3712   33776 1                    CATLOG,1
 1890   REF   2  LAST  787     14,3713   31723 0                    CORPLAN
 1891   REF 198  LAST  787     14,3714  0 6006 1  CALSAM1  TC       INTPRET
 1892                          14,3715   70740 0           LXC,1    DLOAD*
 1893   REF  13  LAST  787     14,3716   00304 0                    STARIND
 1894   REF  11  LAST  787     14,3717   00303 1                    BESTI,1
 1895                          14,3720   76740 0           LXC,1    VLOAD*
 1896   REF 275  LAST  778     14,3721   00154 1                    MPAC
 1897   REF  10  LAST  776     14,3722   02372 0                    STARAD -228D,1
 1898                          14,3723   53455 0  CORPLAN  VAD      UNIT
 1899   REF   9  LAST  767     14,3724   03452 1                    VEL/C
 1900                          14,3725   77650 1           GOTO
 1901   REF   5  LAST  786     14,3726   02777 1                    QMIN
 1902                          14,3727   00343 0  DEC227   DEC      227
 1903   REF   3  LAST  639        5035            VNPLANV  =        V06N88
 1904                          14,3730   22363 1  1/SQR3   2DEC     .57735021
 1904                          14,3731   11623 0
 1905   REF   3  LAST  564     14,3732  4 7677 1  STORIJ   CS       HIGH9               CALLED AT R53Z, NOSAM(PLANET)
 1906   REF  11  LAST  781     14,3733  7 1140 1           MASK     STARCODE
 1907                          14,3734  0 0006 1           EXTEND
 1908   REF   1                14,3735  7 6211 1           MP       SIGHTSIX
 1909   REF  78  LAST  764     14,3736  56 001 0           XCH      L
 1910   REF  14  LAST  787     14,3737  50 304 0           INDEX    STARIND
 1911   REF  12  LAST  787     14,3740  54 302 1           TS       BESTI
 1912   REF 144  LAST  781     14,3741  0 0002 0           TC       Q                   RETURN TO CALLER
 19125  REF   2 LAST  749 TO  750:     43     43*          COUNT*   $$/R50
 1913   REF 145  LAST  787     14,3742  3 0002 0  COARSUB  CA       Q
 1914   REF   6  LAST  787     14,3743  55'777 0           TS       QMIN
 1915    REF   6  LAST  314   14,3744  3 1335 0  STALLOOP CA       MODECADR           IS IMU IN USE?
 1916                         14,3745  0 0006 1           EXTEND
 1917    REF   1              14,3746  1 3753 1           BZF      CORSCALL           NO, GO AHEAD WITH COARSE ALIGN
 1918    REF  12  LAST  709   14,3747  3 5016 0           CAF       1SEC              YES, SO WAIT A SEC
 1919    REF 191  LAST  786   14,3750  0 4636 0           TC       BANKCALL
 1920    REF  14  LAST  760   14,3751   01731 0           CADR     DELAYJOB
 1921    REF   1              14,3752  0 3744 0           TC       STALLOOP                                   AND TRY AGAIN
 1922    REF 192  LAST  788   14,3753  0 4636 0  CORSCALL TC       BANKCALL
 1923    REF   3  LAST  428   14,3754   16724 1           CADR     IMUCOARS           PERFORM COARSE ALIGN
 1924    REF 193  LAST  788   14,3755  0 4636 0           TC       BANKCALL
 1925    REF  10  LAST  755   14,3756   17644 1           CADR     IMUSTALL
 1926    REF   3  LAST  755   14,3757  0 3766 0           TC       217ALARM           BAD END
 1927    REF 194  LAST  788   14,3760  0 4636 0           TC       BANKCALL
 1928    REF   1              14,3761   17133 0           CADR     IMUFIN20           PERFORM FINE ALIGN
 1929    REF 195  LAST  788   14,3762  0 4636 0           TC       BANKCALL
 1930    REF  11  LAST  788   14,3763   17644 1           CADR     IMUSTALL
 1931    REF   4  LAST  788   14,3764  0 3766 0           TC       217ALARM           BAD END
 1932    REF   7  LAST  787   14,3765  0 1777 1           TC       QMIN
 1933                         14,3766  0 0004 0  217ALARM INHINT                      JUST LIKE 'CURTAINS,' NOW DEPARTED
 1934    REF 146  LAST  787   14,3767  3 0002 0           CA       Q
 1935    REF   1              14,3770  0 5673 0           TC       ALARM2
 1936                         14,3771   00217 0           OCT      00217
 1937    REF   3  LAST  283   14,3772  0 1363 0           TC       ALMCADR            RETURN TO USER
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L       LUNAR AND SOLAR EPHEMERIDES SUBROUTINES                          USER'S PAGE NO.  1      E 53

R0001   LUNAR AND SOLAR EPHEMERIDES SUBROUTINES

R0002   FUNCTIONAL DESCRIPTION

R0003           THESE SUBROUTINES ARE USED TO DETERMINE THE POSITION AND VELOCITY
R0004           VECTORS OF THE SUN AND THE MOON RELATIVE TO THE EARTH AT THE
R0005           SPECIFIED GROUND ELAPSED TIME INPUT BY THE USER.

R0006           THE POSITION OF THE MOON IS STORED IN THE COMPUTER IN THE FORM OF
R0007           A NINTH DEGREE POLYNOMIAL APPROXIMATION WHICH IS VALID OVER A 15
R0008           DAY INTERVAL BEGINNING SHORTLY BEFORE LAUNCH.  THEREFORE THE TIME
R0009           INPUT BY THE USER SHOULD FALL WITHIN THIS 15 DAY INTERVAL.

R0010           LSPOS COMPUTES THE POSITION VECTORS OF THE SUN AND THE MOON.

R0011           LUNPOS COMPUTES THE POSITION VECTOR OF THE MOON.

R0012           LUNVEL COMPUTES THE VELOCITY VECTOR OF THE MOON.

R0014   CALLING SEQUENCE

R0015                 DLOAD  CALL
R0016                        TIME              GROUND ELAPSED TIME
R0017                        SUBROUTINE        LSPOS OR LUNPOS OR LUNVEL

R0018   INPUT

R0019           1) SPECIFIED GROUND ELAPSED TIME IN CS X B-28 LOADED IN MPAC.

R0020           2) TIMEMO - TIME AT THE CENTER OF THE RANGE OVER WHICH THE LUNAR
R0021              POSITION POLYNOMIAL IS VALID IN CS X B-42.

R0022           3) VECOEM - VECTOR COEFFICIENTS OF THE LUNAR POSITION POLYNOMIAL
R0023              LOADED IN DESCENDING SEQUENCE IN METERS/CS**N X B-2

R0024           4) RESO - POSITION VECTOR OF THE SUN RELATIVE TO THE EARTH AT
R0025              TIMEMO IN METERS X B-38.

R0026           5) VESO - VELOCITY VECTOR OF THE SUN RELATIVE TO THE EARTH AT
R0027              TIMEMO IN METERS/CS X B-9.

R0028           6) OMEGAES - ANGULAR VELOCITY OF THE VECTOR RESO AT TIMEMO IN
R0029              REV/CS X B+26.

R0030           ALL EXCEPT THE FIRST INPUT ARE INCLUDED IN THE PRE-LAUNCH
R0031           ERASABLE DATA LOAD.

R0032   OUTPUT - LSPOS

R0033           1) 2D OF VAC AREA CONTAINS THE POSITION VECTOR OF THE SUN RELATIVE
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R0034              TO THE EARTH AT TIME INPUT BY THE USER IN METERS X B-38.

R0035           2) MPAC CONTAINS THE POSITION VECTOR OF THE MOON RELATIVE TO THE
R0036              EARTH AT TIME INPUT BY THE USER IN METERS X B-29.

R0037   OUTPUT - LUNPOS

R0038           MPAC CONTAINS THE POSITION VECTOR OF THE MOON RELATIVE TO THE
R0039           EARTH AT THE TIME INPUT BY USER IN METERS X B-29.

R0040   OUTPUT - LUNVEL

R0041           MPAC CONTAINS THE VELOCITY VECTOR OF THE MOON RELATIVE TO THE
R0042           EARTH AT TIME INPUT BY THE USER IN METERS/CS X B-7.

R0046   SUBROUTINES USED

R0047           NONE

R0048   REMARKS

R0049           THE VAC AREA IS USED FOR STORAGE OF INTERMEDIATE AND FINAL RESULTS
R0050           OF COMPUTATIONS.

R0051           S1, X1 AND X2 ARE USED BY THESE SUBROUTINES.
R0052           PRELAUNCH ERASABLE DATA LOAD ARE ONLY ERASABLE STORAGE USED BY
R0053           THESE SUBROUTINES.
R0054           RESTARTS DURING OPERATION OF THESE SUBROUTINES MUST BE HANDLED BY
R0055           THE USER.

  0057   REF   1                26,2000                          SETLOC  EPHEM
  0058                          26,2136                          BANK

  0059   REF   1                                                 COUNT*  $$/EPHEM
  0060   REF   9  LAST  768     E7,1777                          EBANK=  WHOCARES
  0063                          26,2136   52170 0   LSPOS        AXT,1   GOTO
  0064   REF   1                26,2137   54163 1                        RES                      AREA.  THE POSITION VECTOR OF THE MOON
  0065   REF   1                26,2140   54146 0                        LSTIME                   IS STORED IN MPAC.
  0066                          26,2141   52170 0   LUNPOS       AXT,1   GOTO                     COMPUTES THE POSITION VECTOR OF THE MOON
  0067   REF   1                26,2142   54201 0                        REM                      AND STORES IT IN MPAC.
  0068   REF   2  LAST  790     26,2143   54146 0                        LSTIME
  0069                          26,2144   77770 1   LUNVEL       AXT,1
  0070   REF   1                26,2145   54212 1                        VEM                      AND STORES IT IN MPAC.
  0075                          26,2146   54201 0   LSTIME       SETPD   SR
  0076                          26,2147   00001 0                        0D
  0077                          26,2150   20617 0                        14D
  0078                          26,2151   57571 0                TAD     DCOMP
  0079   REF  11  LAST  540     26,2152   01707 0                        TEPHEM
  0080                          26,2153   57571 0                TAD     DCOMP
  0081   REF   2  LAST   92     26,2154   02034 1                        TIMEMO
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0082                        26,2155   66261 1               SL      SSP
0083                        26,2156   20221 1                       16D
0084   REF  29  LAST  782   26,2157   00051 0                       S1
0085                        26,2160   00006 1                       6D
0086                        26,2161   77650 1               GOTO
0087   REF  30  LAST  787   26,2162   00046 0                       X1
0088                        26,2163   41206 0   RES         PUSH    DMP                                                 PD- 2
0089   REF   1              26,2164   02147 1                       OMEGAES
0090                        26,2165   71406 0               PUSH    COS                                                 PD- 4
0091                        26,2166   65361 0               VXSC    PDDL                                                PD- 8
0092   REF   2  LAST   93   26,2167   02133 1                       RESO
0093                        26,2170   63356 1               SIN     PDVL                                                PD-10
0094   REF   3  LAST  791   26,2171   02133 1                       RESO
0095                        26,2172   53406 0               PUSH    UNIT                                                PD-16
0096                        26,2173   53435 0               VXV     UNIT
0097   REF   3  LAST  630   26,2174   02141 1                       VESO
0098                        26,2175   76435 1               VXV     VSL1                                                PD-10
0099                        26,2176   53361 0               VXSC    VAD                                                 PD-02
0100                        26,2177   77772 0               VSL1
0102                        26,2200   14003 1   RESA        STODL   2D                  RES IN METERS X B-38 IN 2D OF VAC.  PD- 0
0103                        26,2201   63370 0   REM         AXT,1   PDVL                                                PD- 2
0104                        26,2202   00066 1                       54D
0105   REF   2  LAST   93   26,2203   02037 1                       VECOEM
0106                        26,2204   52761 0   REMA        VXSC    VAD*
0107                        26,2205   00001 0                       0D
0108   REF   3  LAST  791   26,2206   02133 1                       VECOEM +60D,1
0109                        26,2207   72500 1               TIX,1   VSL2                REM IN METERS X B-29 IN MPAC.
0110   REF   1              26,2210   54204 0                       REMA
0111                        26,2211   77616 0               RVQ
0112                        26,2212   65370 0   VEM         AXT,1   PDDL                                                PD- 2
0113                        26,2213   00060 1                       48D
0114   REF   1              26,2214   14233 0                       NINEB4
0115                        26,2215   74206 0               PUSH    VXSC                                                PD- 4
0116   REF   4  LAST  791   26,2216   02037 1                       VECOEM
0117                        26,2217   77761 1   VEMA        VXSC
0118                        26,2220   00001 0                       0D
0119                        26,2221   14005 1               STODL   4D                                                  PD- 2
0120                        26,2222   41425 1               DSU     PUSH                                                PD- 4
0121   REF   1              26,2223   31771 1                       ONEB4
0122                        26,2224   53357 0               VXSC*   VAD
0123   REF   5  LAST  791   26,2225   02125 0                       VECOEM +54D,1
0124                        26,2226   00035 1                       4D
0125                        26,2227   72500 1               TIX,1   VSL2                VEM IN METERS/CS X B-7 IN MPAC.
0126   REF   1              26,2230   54217 1                       VEMA
0127                        26,2231   77616 0               RVQ
0128                        26,2232   22000 1   NINEB4      2DEC    9.0 B-4
0128                        26,2233   00000 1
0129   REF   1              34,3770             ONEB4       =       DP2(-4)             1 B-4
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L    P61-P67                                               USER'S PAGE NO.  1     E0 53

R0001 PROGRAM:           P61
R0002 MOD NO.:           0    MAR. 13, 1967
R0003 MOD BY:            R. HIRSCHKOP
R0004 MOD NO:  1         MOD BY:  RR BAIRNSFATHER     DATE:  22 JUN 67    RESTARTS.
R0006 MOD NO:  2         MOD BY:  RR BAIRNSFATHER     DATE:  17 JAN 68    COLOSSUS GSOP CHANGES.
R0008 MOD NO:  3         MOD BY:  RR BAIRNSFATHER     DATE:   8 MAY 68    DELETE CMSM MANEUVER (PCR 50)
R00091 MOD NO:  4        MOD BY:  RR BAIRNSFATHER     DATE:   1 JUL 69    PCR 787: TICK TTE
R0010 FUNCTION:          TO CALCULATE AND DISPLAY EMS INITIALIZATION DATA
R0011 CALLING SEQUENCE-  BY V37
R0012 EXIT-              TO P62
R0013 SUBROUTINE CALLS-  S61.1 , S61.3 , GOFLASH , FLAGUP , R02BOTH

R0014 ERASABLE INITIALIZATION:
R0015           EMSALT  (-29) M         .05G ALTITUDE ABOVE FISCHER ELLIPSOID   PAD LOADED.
R0017           ALFAPAD  /180           HYPERSONIC CM TRIM ANGLE OF ATTACK      PAD LOADED
R0019 OUTPUT:   THE FOLLOWING REGISTERS ARE WRITTEN IN FOR USE BY DISPLAYS
R0020           GMAX   100 GMAX  (-14)  G,S     MAXIMUM ACCELERATION
R0021           VPRED  (-7)  M/CS       PREDICTED VELOCITY AT 400K FT
R0022           GAMMAEI  GAMMA/360      PREDICTED GAMMA    AT 400K FT
R0023           RTGO   THETAH/360       RANGE ANGLE TO SPLASH FROM EMSALT       EMSALT IS PAD LOADED
R0025           VIO    (-7) M/CS        INERTIAL VELOCITY  AT      EMSALT       EMSALT IS PAD LOADED
R0027           TTE    (-28) CS         TIME      TO               EMSALT       EMSALT IS PAD LOADED
R0029           LAT(SPL)  /360          TARGET LOCATION                         LEFT BY DSKY
R0031           LNG(SPL)  /360          TARGET LOCATION                         LEFT BY DSKY
R0033           HEADSUP    (0)          +1 = LIFT DOWN,  -1 = LIFT UP           LEFT BY DSKY
R0035 DEBRIS:   SEE SUBROUTINES.

 0037 REF   1          26,2000                     SETLOC P60S
 0038                  26,2234                     BANK

 0039 REF  13 LAST 540 E6,1661                     EBANK= AOG

 0040 REF   1                                      COUNT* $$/P61

 0041 REF  33 LAST 726 26,2234 3 4753 1  P61       CA     BIT14             EXTENDED VERB SHOULD BE FREE THIS CLOSE
 0042 REF  14 LAST 521 26,2235 55'247 0            TS     EXTVBACT          TO V37
A0043                                                                       LOCK OUT EXTENDED VERBS SO CAN USE TFF
A0044                                                                       ROUTINES.EXT VERB ERASE IS USED

 0045 REF  83 LAST 764 26,2236 4 4770 1            CS     ONE               REMOVE IF HEADSUP EVER ON UPLINK DATA
 0046 REF   3 LAST 293 26,2237 55'726 1            TS     HEADSUP           PRELOAD

 0047 REF   1          26,2240 0 2546 1            TC     S61.1             CHECK STATE VECTOR AND IMU ORIENTATION
A0048                                                          RV 60GENRET. DOES PHASCHNG, GROUP 4.

 0049 REF   1          26,2241 3 5034 0            CA     V06N61            LAT(SPL)       LNG(SPL)        HEADSUP
A0050                                                                       XXX.XX DEG     XXX.XX DEG      XXXXX.
 0051 REF   6 LAST 756 26,2242 0 5540 0            TC     VNFLASHR
 0054 REF   1          26,2243 0 2247 1            TC     P61.4
 0056 REF  78 LAST 776 26,2244 0 5402 1  P61.3     TC     PHASCHNG
 0057                            26,2245   00014 1             OCT      00014

 0058    REF  80  LAST  761      26,2246  0 5205 0             TC       ENDOFJOB

 0061                            26,2247  22 007 0  P61.4      ZL
 0062    REF   4  LAST  792      26,2250  11'726 1             CCS      HEADSUP          C(HEADSUP)=  +1/-1
 0063    REF  34  LAST  792      26,2251  3 4753 1             CA       BIT14            IF HEADSUP POS,ROLLC =180 DEG.(LIFT DWN)
 0064                            26,2252  12 253 0             NOOP                      IF HEADSUP NEG,ROLLC=0 (LIFT UP)
 0065    REF   7  LAST  293      26,2253  53'716 1             DXCH     ROLLC            ROLLC IS USED BY S62.3: GIM ANG AT .05G

 00655   REF  35  LAST  793      26,2254  3 4753 1  AGIN,MON   CA       BIT14            LOCK OUT EXTENDED VERBS.(REDUNDANT ON
 00656   REF  15  LAST  792      26,2255  55'247 0             TS       EXTVBACT          INITIAL PASS)

 0066    REF 199  LAST  787      26,2256  0 6006 1             TC       INTPRET
 0067                            26,2257   77745 1  NEWRNVN    DLOAD
 0068    REF  10  LAST  730      26,2260   01044 0                      PIPTIME          SAVE TIME OF RN,VN TO DETERMINE IF AN
 0069    REF   2  LAST  122      26,2261   37651 1             STCALL   MM               UPDATE HAS OCCURRED
 0070    REF   1                 26,2262   52063 0                      STARTEN1         INITIALIZE
 0071                            26,2263   43175 0             VLOAD    CLEAR            'TTE' WILL BE DECREMENTED UNTIL
 0072    REF  10  LAST  730      26,2264   01030 0                      RN
 00722   REF   1                 26,2265   03274 0                      .05GSW           THE DRAG > 0.05 G .
A00723                                                                                   .05GSW SET =1 BY  FRESH START.
 0073    REF  15  LAST  648      26,2266   02320 1             STORE    RONE
 0074                            26,2267   77656 1             UNIT
 0075    REF   1                 26,2270   26334 1             STOVL    URONE
 0076    REF  10  LAST  717      26,2271   01036 0                      VN
 0077    REF  11  LAST  524      26,2272   02326 1             STORE    VONE
 0078                            26,2273   53435 0             VXV      UNIT
 0079    REF   2  LAST  793      26,2274   02334 1                      URONE
 0080    REF   2  LAST  122      26,2275   03502 0             STORE    UNI
 0081                            26,2276   45345 1  DUMPP61    DLOAD    DSU
 0082    REF   3  LAST  793      26,2277   03651 0                      MM               INITIAL VALUE OF PIPTIME
 0083    REF  11  LAST  793      26,2300   01044 0                      PIPTIME
 0084                            26,2301   45040 1             BMN      CALRB
 0085    REF   1                 26,2302   54257 0                      NEWRNVN          UPDATED... GO TRY AGAIN
 0086    REF   1                 26,2303   54652 1                      S61.2            GET DISPLAY DATA FOR N60 AND N63
A0087                                                                                    AND RETURN IN BASIC, BELOW.
 0089    REF   8  LAST  786      26,2304  0 5527 1  P61.1      TC       CLEARMRK
 0090    REF   1                 26,2305  3 5033 1             CA       V06N60           GMAX          VPRED          GAMMAEI
A0091                                                                                    XXX.XX G      XXXXX. FPS     XXX.XX DEG
 0092    REF  39  LAST  787      26,2306  0 5535 1             TC       VNFLASH
R0099    'TICKTTE' DECREMENTS 'TTE' DISPLAY NOUN N63 AT A 2 SECOND RATE. 'TICKTTE' IS LOCATED IN 'SERVICER' AND
R0101    OPERATES ONLY DURING P61 THROUGH P63. THUS N63 IS 'ON CALL' & ON ENTRY  DOWNLIST THROUGH P63.
R0102    'TICKTTE' WILL GIVE PROPER ANSWER IN EVENT OF RESTART OR A RECYCLE VIA   V32.

 0106    REF   1                 26,2307  3 2425 0             CA       V16N63           RTGO          VIO            TTE
A0107                                                                                    XXXX.X NM     XXXXX. FPS     XX8XX M,S
 0108    REF 196  LAST  788      26,2310  0 4636 0             TC       BANKCALL
 0109    REF  22  LAST  769      26,2311   20743 0             CADR     GOFLASH
 0110    REF  48  LAST  786      26,2312  0 4103 1             TC       GOTOPOOH
 0111                       26,2313  0 2315 1         TC      +2
 0112   REF   1             26,2314  0 2254 0         TC      AGIN,MON        REDO CONIC CALC. ASSUME EXT VB INACTIVE

R0113                                 .... THEN FALL INTO P62
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R0114   PROGRAM-                    P62
R0115   MOD NO.-                    0    MAR. 13, 1967
R0116   MOD BY-                     R. HIRSCHKOP
R0117   MOD NO:  1                  MOD BY:  RR BAIRNSFATHER         DATE: 21 MAR 67
R0118   MOD NO:  2                  MOD BY:  RR BAIRNSFATHER         DATE:  22 JUN 67     RESTARTS.
R0120   MOD NO:  3                  MOD BY:  RR BAIRNSFATHER         DATE:  17 JAN 68     COLOSSUS GSOP CHANGES.
R0122   MOD NO:  4                  MOD BY:  RR BAIRNSFATHER         DATE:   8 MAY 68     MOVE START OF DESIRED GIMBAL CALC.
R0124   FUNCTION-                   1) TO NOTIFY CREW WHEN GNC SYSTEM IS PREPARED FOR CM/SM SEPARATION
R0126                               2) TO ORIENT THE CM TO THE CORRECT ATTITUDE FOR ATMOSPHERIC ENTRY
R0128   CALLING SEQUENCE-           BY V37 OR DIRECTLY FROM P61
R0129   EXIT-                       TO P63
R0130   ERASABLE INITIALIZATION:
R0131                 ALFAPAD                                         LEFT BY PAD LOAD
R0132                 LADPAD                                          LEFT BY PAD LOAD
R0133                 LODPAD                                          LEFT BY PAD LOAD
R0134                 LAT(SPL)      (MAY BE CHANGED BELOW)            LEFT BY DSKY, VIA P61
R0136                 LNG(SPL)      (MAY BE CHANGED BELOW)            LEFT BY DSKY, VIA P61
R0138                 HEADSUP       (MAY BE CHANGED BELOW)            LEFT BY DSKY, VIA P61
R0140   SUBROUTINE CALLS:           NEWMODEX , S61.1 , CM/DAPIC , CM/DAPON , R0280TH , GOPERF1 , GOFLASH , GODSPR

 0142   REF   1                                             COUNT* $$/P62

 0143   REF   5  LAST  537   26,2315  0 5344 1    +2       TC     NEWMODEX       MODE CHANGE IF ENTERED FROM P61
 0144                        26,2316   00076 0             MM     62             MODE CHANGE AUTOMATIC VIA V 37.
 0145   REF  84  LAST  792   26,2317  3 4770 0             CA     ONE
 0146   REF   7  LAST  537   26,2320  54 332 1             TS     DNLSTCOD

 0147   REF   2  LAST  792   26,2321  0 2546 1  P62        TC     S61.1          CHECK STATE VECTOR AND IMU ORIENTATION.

 0148   REF 200  LAST  793   26,2322  0 6006 1             TC     INTPRET
 0149                        26,2323   47131 1             SSP    RTB
 0150   REF   2  LAST  116   26,2324   03325 0                    POSEXIT
 0151   REF   1              26,2325   54402 0                    P62.3          CALCULATE DESIRED .05G GIMBAL ANGLES,
A0152                                                                            WITHOUT DISPLAY.
 0153   REF   1              26,2326   41703 0                    CM/DAPIC       START CM/POSE AND BODY RATE CALC

A0154                                                                  DOES 2PHSCHNG, OCT 40116, OCT 05024, OCT 13000.
A0155                                                                            CM/DAPIC SETS EBANK = EBAOG

A0156                                                                            AND RETURNS IN BASIC TO P62.2.
 0157                        26,2327  0 0006 1  P62.2      EXTEND
 0158   REF   1              26,2330  3 2431 0             DCA    POSECADR       CONTINUE WITH CM/POSE AFTER AV G.
 0159   REF  10  LAST  740   26,2331  53'062 0             DXCH   AVEGEXIT

 0160   REF   1              26,2332  3 2545 1             CAF    OCT41          REQUEST SEPARATION
 0161   REF 197  LAST  793   26,2333  0 4636 0             TC     BANKCALL
 0162   REF   1              26,2334   21147 0             CADR   GOPERF1R
 0163   REF  49  LAST  793   26,2335  0 4103 1             TC     GOTOPOOH
 0164                        26,2336  0 2341 0             TC     +3             PROCEED
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A0165                                                               NOTE:  NODOFLAG WILL BE SET IN CM/DAPON. <<<
 0166                          26,2337  0 2332 1          TC     -5                 ENTER
 0167    REF   1               26,2340  0 2244 1          TC     P61.3              FOR PHASCHNG AND ENDOFJOB.

 0168    REF  46  LAST  762    26,2341  0 4655 0   +3     TC     POSTJUMP
 0169    REF   1               26,2342   41624 1          CADR   CM/DAPON           DISABLE RCS DAP, ENABLE ENTRY DAP AND
A0170                                                                               DO ATTITUDE HOLD.

A0171                                                               WILL IDLE UNTIL CM/POSE DOES ONE UPDATE.
A0172                                                               CM/DAPON DOES NO PHASCHNG.

 0173    REF   2  LAST  792    26,2343  3 5034 0  P62.1   CA     V06N61             LAT(SPL)      LNG(SPL)       HEADSUP
A0174                                                                               XXX.XX DEG    XXX.XX DEG     0000X.

A0175                                                                  TERMINATE  ATTITUDE HOLD. SET UP COMMANDS:
A0176                                                                  ROLLC,  ALFACOM,  BETACOM.   BEGIN MANUVER TO
A0177                                                                  ENTRY ATTITUDE.

 0178    REF 198  LAST  795    26,2344  0 4636 0          TC     BANKCALL
 0179    REF  23  LAST  793    26,2345   20743 0          CADR   GOFLASH
 0180                          26,2346  0 2343 1          TC     -3
 0181                          26,2347  0 2351 1          TC     +2
 0182                          26,2350  0 2343 1          TC     -5

 0183    REF  79  LAST  792    26,2351  0 5402 1          TC     PHASCHNG
 0184                          26,2352   04024 0          OCT    04024              USE ENTRYVN FOR DISPLAY BELOW.

A0185                                                                               EBANK WAS SET IN CM/DAPON TO EBAOG

 0186    REF   5  LAST  793    26,2353  11'726 1          CCS    HEADSUP            C(HEADSUP) = +/- 1
 0187    REF  36  LAST  793    26,2354  3 4753 1          CA     BIT14              IF HEADSUP POS,ROLLC=180 DEG (LIFT DWN)
 0188                          26,2355  12 356 1          NOOP                      IF HEADSUP NEG,ROLLC=0 DEG  (LIFT UP)
 0189    REF   8  LAST  793    26,2356  55'715 1          TS     ROLLC
 0190    REF   1               26,2357  3 1411 1          CA     ALFAPAD            NOMINAL ALFATRIM PAD LOADED, NEG. NO.
 0191                          26,2360  22 007 0          ZL
 0192    REF   2  LAST  116    26,2361  53'604 0          DXCH   ALFACOM            SET ALFACOM = ALFA TRIM, BETACOM=0

 0193    REF  85  LAST  795    26,2362  3 4770 0          CA     ONE                PERMITS EXCAP2 TO CHANGE FLAG TO +0
 0194    REF   1               26,2363  55'727 0          TS     P63FLAG            AS INDICATOR. STARTS UP P63.

 0195    REF   4  LAST  774    26,2364  3 5025 0          CA     V06N22             SET UP DISPLAY FOR CDU DESIRED VALUES
 0196    REF   1               26,2365  55'122 0          TS     ENTRYVN            FROM ENTRY ATTITUDE CALC, THAT IS
A0197                                                                               ALREADY GOING.
 0198    REF  62  LAST  744    26,2366  0 5547 1          TC     UPFLAG             TURN ON ENTRY DISPLAY
 0199    REF   1               26,2367   00134 1          ADRES  ENTRYDSP           ENTRYDSP = 92D  BIT 13  FLAG 6
A01991                                            SKIP
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  0200   REF   5  LAST  187   26,2370  4 1700 0             CS       CMDAPMOD        GO DIRECTLY TO P63 IF BODY ATTITUDE
  0201   REF  86  LAST  796   26,2371  7 4770 1             MASK     ONE             IS SUCH THAT THE DELAY TASK: WAKEP62
  0202                        26,2372  0 0006 1             EXTEND                   WILL BE OMITTED.
  0203   REF   1              26,2373  1 2422 0             BZF      P63.1           DISABLE GRP 4, GO TO ENDOFJOB.

A 0204                                                                               (IE, CONTINUE IF CMDAPMOD = -1, OR +0)
  0205   REF   1              26,2374  0 2406 1             TC       P63

A 0206                                                                       PUT JOB TO SLEEP UNTIL VEHICLE MANUVER HAS
A 0207                                                                       REDUCED ALFA TO +/-45 DEG. CONSIDER REMAINING
A 0208                                                                       65 DEG (25 DEG IF ALFA NEG) TO ALFA TRIM TO
A 0209                                                                       OCCUR AT 3 DEG/SEC, AND TERMINATE P62 AT THAT
A 0210                                                                       TIME.
A 0211                                                                       TASK WAKEP62 IS CALLED FROM ENTRY DAP.

  0212   REF   4  LAST  628   26,2375  3 5052 0  WAKEP62    CA       PRIO13
  0213   REF  15  LAST  737   26,2376  0 5121 0             TC       NOVAC
  0214   REF  14  LAST  792   E6,1661                       EBANK=   AOG
  0215   REF   2  LAST  797   26,2377   02406 1             2CADR    P63
  0215                        26,2400   54066 0
  0216   REF  38  LAST  737   26,2401  0 5314 1             TC       TASKOVER

A 0218                                                                    EACH 2 SEC, CALCULATE GIMBAL ANGLES FOR ENTRY CON-
A 0219                                                                    DITIONS THAT WILL HOLD IF REORIENTATION WERE MADE
A 0220                                                                    AT PRESENT RN, VN. COME HERE FROM CM/POSE AND ALSO
A 0221                                                                    IN KEPLER PHASE OF ENTRY.
  0222                        26,2402   52131 0  P62.3      SSP      GOTO            SET RETURN ADDRESS SO THAT   ROUTINE
  0223   REF   4  LAST  752   26,2403   00053 1                      QPRET           GOES DIRECTLY TO ENTRY GUIDANCE EXIT
  0224   REF   1              26,2404   53574 1                      ENDEXIT         THAT DOES ENTRY DISPLAY ,GRP 5.
  0225   REF   1              26,2405   20412 1                      S62.3            PUT DESIRED CDU VALUES IN CPHI'S FOR
A 0226                                                                               N22 DISPLAY.
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P0227            P63
R0228   PROGRAM-             P63
R0229   MOD NO.-             0    MAR. 13, 1967
R0230   MOD BY-              R. HIRSCHKOP
R0231   MOD NO:  1           MOD BY:  RR BAIRNSFATHER      DATE:  22 JIN 67      RESTARTS.
R0233   MOD NO:  2           MOD BY:  RR BAIRNSFATHER      DATE:  14 JUL 67      REVISED RESTARTS
R0235   FUNCTION-            1) TO INITIALIZE THE ENTRY EQUATIONS
R0236                        2) TO CONTINUE TO HOLD THE CM TO THE CORRECT ATTITUDE WITH RESPECT TO THE ATMOSPHERE FOR
R0238                           THE ONSET OF ENTRY DECELERATION. ROLL ANGLE IS LIFT UP/DOWN AS SPECIFIED BY HEADSUP.
R0240                        3) TO SENSE .05 G
R0241   CALLING SEQUENCE-    DIRECTLY FROM P62
R0242   EXIT-                TO ENDOFJOB
R0243   SUBROUTINE CALLS-    NEWMODEX , GODSPR

 0244   REF   1                                          COUNT* $$/P63

 0245   REF   6 LAST  795    26,2406  0 5344 1  P63      TC     NEWMODEX
 0246                        26,2407   00077 1           MM     63

A0247                                                                           ARRIVE WITH EBANK = AOG.

 0248   REF   1              26,2410  3 2427 1           CA     ENTCADR         CONTINUE AT STARTENT AFTER CM/POSE .

A0249                                                                   AT END OF STARTENT, CHANGE ADDRESS IN GOTOADDR
A0250                                                                   TO CONTINUE AT  SCALEPOP  THEREAFTER.

 0251   REF   3 LAST  795    26,2411  55'724 0           TS     POSEXIT

 0252   REF   1              26,2412  3 2426 0           CA     V06N64          G            VI            R TO SPLSH
A0253                                                                           XXX.XX G     XXXXX. FPS    XXXX.X NM
 0254   REF   2 LAST  796    26,2413  55'122 0           TS     ENTRYVN         FOR DISPLAY CALL IN OVERNOUT.

 02541  REF  87 LAST  797    26,2414  4 4770 1           CS     ONE             IN CASE FLAG IS LEFT AT +1 BY DAP. THE
 02542  REF   2 LAST  796    26,2415  55'727 0           TS     P63FLAG         -1 ASSURES THAT EXO-ATM DAP WILL NOT
A02543                                                                          CALL P63 OUT OF SEQUENCE IN P66 .

 02545  REF  80 LAST  796    26,2416  0 5402 1           TC     PHASCHNG        THIS IS REQUIRED TO PRESERVE CLEANDSP
 02546                       26,2417   00004 0           OCT    00004           RETURN IN EVENT OF AN EXTENDED VERB..

 02547  REF 199 LAST  796    26,2420  0 4636 0           TC     BANKCALL        FLUSH 'N22' DISPLAY, IF ON. (OMIT
 02548  REF   7 LAST  785    26,2421   20715 0           CADR   CLEANDSP        DISPLAY DURING 'STARTENT' PASS.)

 0255   REF  81 LAST  798    26,2422  0 5402 1  P63.1    TC     PHASCHNG
 0256                        26,2423   00004 0           OCT    00004           DISABLE. DISPLAY RESTARTED VIA ENTRY.

 0257   REF  81 LAST  793    26,2424  0 5205 0           TC     ENDOFJOB

 0260                        26,2425   04077 0  V16N63   VN     1663
 0261                        26,2426   01500 0  V06N64   VN     0664
 0262   REF   1              26,2427   52000 0  ENTCADR  CADR   STARTENT
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 0263    REF   6  LAST  305   E7,1451                           EBANK= RTINIT         TO CARY OVER INTO ENTRY STEERING.
 0264    REF   1              26,2430    03404 1  POSECADR 2CADR   CM/POSE
 0264    REF   1              26,2431    76067 1
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P0265   PROGRAM-            P64
R0266   MOD NO.-            1     SEPT. 19, 1967
R0267   MOD BY-             R. HIRSCHKOP
R0268   MOD NO:  2          MOD BY:  RR BAIRNSFATHER       DATE:   8 MAY 68      REVISED COMMENTS FOR COLOSSUS
R02691  MOD NO:  3          MOD BY: RR BAIRNSFATHER        DATE: 1 MAR '69  N74
R0270   FUNCTION-           1.  TO START ENTRY GUIDANCE AT .05G SELECTING ROLL  ATTITUDE, CONSTANT DRAG LEVEL, AND
R0272                       DRAG THRESHOLD,  KA  , WHICH ARE KEYED TO THE .05G POINT.
R0274                       2.  SELECT FINAL PHASE P67 IF V < 27000 FPS WHEN .2G OCCURS.
R0276                       3.  ITERATE FOR UP-CONTROL SOLUTION  P65  IF V > 27000 FPS AND IF ALTITUDE RATE AND DRAG
R0278                       LEVEL CONDITIONS ARE SATISFIED. ENTER P65 WHEN CONSTANT DRAG CONTROLLER HAS BROUGHT RANGE
R0280                       AS PREDICTED TO WITHIN 25 NM OF DESIRED RANGE.
R0281                       4.  SELECT FINAL PHASE  P67  IF NO UP-CONTROL SOLUTION EXISTS WITH VL > 18000 FPS.
R0283   CALLING SEQUENCE-   BY RTB FROM REENTRY CONTROL
R0284   EXIT-               BACK TO REENTRY CONTROL
R0285   SUBROUTINE CALLS-   NEWMODEX


 0287   REF   1             26,2000                    SETLOC P60S1
 0288                       26,2432                    BANK

R0289            THIS DISPLAY IS CALLED EACH PASS THROUGH STEERING. RESTART PROTECTION IS VIA STEERING.

 0291   REF   1                                        COUNT* $$/P64

 0292   REF   7  LAST  798  26,2432  0 5344 1  P64     TC     NEWMODEX        ENTER VIA RTB WHEN .05G IS EXCEEDED.
 0293                       26,2433   00100 0          MM     64
 0294   REF   1             26,2434  3 2437 0          CA     V06N74          ROLLC        VI           D
A0295                                                                         XXX.XX DEG   XXXXX. FPS   XXX.XX G
 0296   REF   3  LAST  798  26,2435  55'122 0          TS     ENTRYVN         DISPLAY VIA OVERNOUT.

 0297   REF   8  LAST  777  26,2436  0 6030 1          TC     DANZIG          ... AND CONTINUE IN INITROLL ...


 0298                       26,2437   01512 0  V06N74  VN     0674
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R0299    PROGRAM:               P65
R0300    MOD NO:  0             MOD BY:  RR BAIRNSFATHER       DATE:  17 JAN 68      COLOSSUS GSOP ADDITION.
R0302    FUNCTION:              TO CONTINUE ENTRY GUIDANCE, USING THE UP-CONTROL PHASE TO STEER TO A CONTROLLED EXIT
R0304                           CONDITION. THIS PHASE TERMINATES  A) IF D  < Q7 FPSS, GO TO P66    ,
R0306                                                             B) IF ROOT NEG, AND IF V < VL +500FPS, GO TO P67.
R0308
R0309    CALLING SEQUENCE:      BY RTB FROM REENTRY CONTROL
R0310    EXIT:                  BACK TO REENTRY CONTROL, OR TO ENDOFJOB.
R0311    SUBROUTINE CALLS:      NEWMODEX

 0312    REF   1                                                  COUNT* $$/P65

 0313    REF   8  LAST  800     26,2440  0 5344 1  P65          TC      NEWMODEX          ENTER VIA RTB WHEN RANGE < 25 N M OF
 0314                           26,2441   00101 1               MM      65                TARGET.

 0315    REF   5  LAST  797     26,2442  3 5052 0               CA      PRIO13
 0316    REF  16  LAST  797     26,2443  0 5121 0               TC      NOVAC
 0317    REF   4  LAST  800        1122                         EBANK=  ENTRYVN
 0318    REF   2  LAST  234     26,2444   02456 1               2CADR   P65.1
 0318                           26,2445   54062 1
 0319    REF  29  LAST  738     26,2446  0 5362 0               TC      2PHSCHNG          2 PHASE CHG REQUIRED TO PREVENT RE-
 0320                           26,2447   00554 0               OCT     00554             STARTING FLASHING DISPLAY TWICE.
 0321                           26,2450   10035 0               OCT     10035             4.55 SPOT AND SERVICER, HERE.
 03212   REF   1                01,2223            4P55SPT1 =           4.55SPOT
 03214   REF  10  LAST  740     01,2250            5P3SPT8  =           5.3SPOT
 0322    REF 201  LAST  795     26,2451  0 6006 1               TC      INTPRET
 0323                           26,2452   47131 1               SSP     RTB
 0324    REF   2  LAST  122     26,2453   03646 0                       GOTOADDR          CHANGE ENTRY MODE TO UPCONTRL.
 0325    REF   1                26,2454   53034 0                       UPCONTRL
 0326    REF   1                26,2455   52120 0                       REFAZE10          GO HERE TO REESTABLISH ENTRY SEQUENCER.
A0327                                                                                     AND CONTINUE AT UPCONTRL...

 0328    REF  58  LAST  769     26,2456  0 5561 0  P65.1        TC      DOWNFLAG
 0329    REF   2  LAST  796     26,2457   00134 1               ADRES   ENTRYDSP          ENTRYDSP = 92D  BIT 13 FLAG 6
A03291
 0330    REF   1                26,2460  3 2472 1               CA      V16N69            ROLLC          DL  (Q7)        VL
 0331    REF 200  LAST  798     26,2461  0 4636 0               TC      BANKCALL          XXX.XX DEG     XXX.XX G        XXXXX. FPS
 0332    REF   4  LAST  632     26,2462   21101 1               CADR    GOFLASHR
 0333                           26,2463  0 2460 1               TC      -3                NODOFLAG IS SET..
 0334                           26,2464  0 2467 0               TC      +3
 0335                           26,2465  0 2460 1               TC      -5
 0336    REF   2  LAST  796     26,2466  0 2244 1               TC      P61.3             EST. GRP 4 FOR DSPLAY AND DO ENDOFJOB
A0337                                                                                     IF PROCEED, CONTINUE.
 0338    REF  63  LAST  796     26,2467  0 5547 1               TC      UPFLAG
 0339    REF   3  LAST  801     26,2470   00134 1               ADRES   ENTRYDSP          ENTRYDSP = 92D   BIT13 FLAG 6
A03391
 0340    REF   2  LAST  797     26,2471  0 2422 1               TC      P63.1             DISABLE GRP 4,START UP ENTRY DISPLAY

A0341                                                                                     N06V68 VIA OVERNOUT, AS USED IN P64.
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0342                        26,2472  04105 1  V16N69   VN      1669
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P0343   PROGRAM:                P66
R0344   MOD NO:  0              MOD BY:  RR BAIRNSFATHER       DATE:  17 JAN 68     COLOSSUS GSOP ADDITIONS.
R0346   FUNCTION:               KEEP CM ATTITUDE IN TRIM TO THE RELATIVE VELOCITY VECTOR. ENTRY GUIDANCE STOPS GENERATING
R0348                           ROLL COMMANDS UNTIL DRAG BUILDS UP TO  Q7+0.5 FPSS.
R0349
R0350   CALLING SEQUENCE:       VIA RTB FROM REENTRY CONTROL.
R0351   EXIT:                   BACK TO REENTRY CONTROL.
R0352   SUBROUTINE CALLS:       NEWMODEX

 0353   REF   1                                           COUNT* $$/P66

 0354   REF   9  LAST  801      26,2473  0 5344 1  P66     TC      NEWMODEX          ENTER VIA RTB WHEN D < Q7 FPSS
 0355                           26,2474   00102 1          MM      66

 0356   REF   5  LAST  796      26,2475  3 5025 0          CA      V06N22            OGA            IGA            MGA
A0357                                                                                XXX.XX DEG     XXX.XX DEG     XXX.XX DEG
 0358   REF   1                 26,2476  0 2502 1          TC      P66END            IN CASE CAME FROM P65, GO DISABLE GRP4,
A0359                                                                                AND SET ENTRYDSP TO DO DISPLAY VIA
A0360                                                                                OVERNOUT.
A0361                                                                                ... AND CONTINUE AT KEP2
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L        P61-P67                                                                            USER'S PAGE NO. 13      E6 S3

P0362    P67

R0363    PROGRAM-                 P67
R0364    MOD NO.-                 0    MAR. 16, 1967
R0365    MOD BY-                  R. HIRSCHKOP
R0366    FUNCTION-                TO TERMINATE STEERING WHEN THE CM VELOCITY WRT EARTH = 1000 FT/SEC
R0368    CALLING SEQUENCE-
R0369    EXIT-                    TO POOH
R0370    SUBROUTINE CALLS-        GOFLASH


R0371                THIS DISPLAY IS CALLED EACH PASS THROUGH STEERING. RESTART PROTECTION IS VIA STEERING.

 0373    REF   1                                                  COUNT* $$/P67

 0374    REF  10  LAST  803       26,2477  0 5344 1  P67          TC      NEWMODEX           ENTER VIA RTB
 0375                             26,2500   00103 0               MM      67
 0376    REF   1                  26,2501  3 2510 1               CA      V06N66             ROLLC          XRNGERR        ONRNGERR
A0377                                                                                        XXX.XX DEG     XXXX.X NM      XXXX.X NM
 0378    REF   5  LAST  801       26,2502  55'122 0  P66END       TS      ENTRYVN            DISPLAY VIA OVERNOUT.

 0379    REF  64  LAST  801       26,2503  0 5547 1               TC      UPFLAG             (IN CASE CAME FROM P65. ENTRY DISPLAY
 0380    REF   4  LAST  801       26,2504   00134 1               ADRES   ENTRYDSP           WILL FLUSH FLASHING DISP. IF STILL ON)
A03802                                                                                       BIT 13 FLAG 6
 0381    REF  82  LAST  798       26,2505  0 5402 1  KILLGRP4     TC      PHASCHNG           DISABLE GRP4, IN CASE CAME FROM HUNTEST.
 0382                             26,2506   00004 0               OCT     0004               (COME TO KILLGRP4 VIA RTB,RET TO CALLER)

 0383    REF   9  LAST  800       26,2507  0 6030 1               TC      DANZIG             ... AND CONTINUE AT PREDICT3 ...

 0384                             26,2510   01502 1  V06N66       VN      0666

 0386    REF   1                  26,2000                         SETLOC  P60S2
 0387                             26,2511                         BANK

 03875   REF   2 LAST  804 TO  804:      10      10*              COUNT* $$/P67
 0388    REF   1                  26,2511  3 2544 0  P67.1        CA      V16N67             RTOGO          LAT            LONG
A0389                                                                                        XXXX.X NM      XXX.XX DEG     XXX.XX DEG
 0390    REF 201  LAST  801       26,2512  0 4636 0               TC      BANKCALL
 0391    REF  24  LAST  796       26,2513   20743 0               CADR    GOFLASH
 0392                             26,2514  0 2517 0               TC      +3                 EFFECTIVE GOTOPOOH
 0393                             26,2515  0 2517 0               TC      +2
 0394    REF   2  LAST  234       26,2516  0 2511 0               TC      P67.1              REDO

 0395                             26,2517  0 0004 0               INHINT
 03955   REF   1                  26,2520  3 4767 0               CA      CM/DSBIT
 0396    REF   1                  26,2521  6 4770 0               AD      GYMDIBIT
 03965                            26,2522  4 0000 0               COM
 0397    REF   1                  26,2523  7 0102 0               MASK    CM/FLAGS           CM/DSTBY , GAMDIFSW
 0398    REF   2  LAST  804       26,2524  54 102 0               TS      CM/FLAGS
 0399                             26,2525  0 0003 1               RELINT
 0400                         26,2526  0 0006 1           EXTEND
 0401   REF   1               26,2527  3 2644 0           DCA      SERVCAD2
 0402   REF  11  LAST  795    26,2530  53'062 0           DXCH     AVEGEXIT

 0403   REF  50  LAST  795    26,2531  1 4103 0           TCF      GOTOPOOH
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L         P61-P67                                                                          USER'S PAGE NO. 15       E6 S3

 0404                           26,2532   43175 0  P67.2     VLOAD   CLEAR              CALC PRESENT LAT, LONG, ALT.
 0405   REF  11  LAST  793      26,2533   01030 0                    RN
 0406   REF   9  LAST  745      26,2534   00662 0                    ERADFLAG           USE PAD RAD FOR ALT.(NOT SEEN ANYWAY)
 0407   REF  14  LAST  763      26,2535   16152 0            STODL   ALPHAV
 0408   REF  12  LAST  793      26,2536   01044 0                    PIPTIME            USE TIME OF RN
 0409                           26,2537   45014 0            CLEAR   CALL
 0410   REF  17  LAST  745      26,2540   01663 0                    LUNAFLAG
 0411   REF   7  LAST  763      26,2541   26453 1                    LAT-LONG
 0412                           26,2542   77634 0  P67.3     RTB                        ENTRY EXIT THAT OMITS DISPLAY.
 0413   REF   1                 26,2543   53607 0                    SERVNOUT

 0414                           26,2544   04103 1  V16N67    VN      1667
 0415                           26,2545   00041 1  OCT41     OCT     41
 0416   REF   1                 26,2643            SERVCAD2 =        SERVCAD1
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L       P61-P67                                                                  USER'S PAGE NO.  16        E6 S3

P0417   SUBROUTINE NAME:     S61.1
R0418   MOD NO:  0                                                               DATE:            21 FEB 67
R0420   MOD BY:  RR BAIRNSFATHER                                                 LOG SECTION:     P61-P67
R0422   MOD NO:  1                 MOD BY:  RR BAIRNSFATHER      DATE:  22 JUN 67      RESTARTS.
R0424   FUNCTIONAL DESCRIPTION:     CALLED BY BOTH P61 AND P62
R0425            FIRST,TEST TO SEE IF   AVERAGEG   IS ON. IF NOT, UPDATE THE STATE VECTOR TO PRESENT TIME + TOLERANCE
R0427            AND TURN ON   AVERAGEG   AT THAT TIME, AND CONTINUE.   OTHERWISE CONTINUE:   SEE IF  IMU Y AXIS IS
R0429            WITHIN 30 DEG OF V*R.  IF YES, EXIT SUBROUTINE S61.1.    IF NO,  SEE IF -Y AXIS OF IMU IS WITHIN
R0431            30 DEG OF V*R.   IF YES, DISPLAY ALARM:  01427    IMU REVERSED.
R0432                              IF NO, DISPLAY ALARM:   01426    IMU UNSATISFACTORY.
R0434            IN EITHER OF THESE LAST 2 CASES, WAIT  10 SEC  AND THEN EXIT SUBROUTINE  S61.1.

R0436   REMARK:                      THERE WILL BE A SHORT 10 SEC DELAY IF AN ALARM EXIT IS TAKEN. THE DELAY FOR INTEGRATION IS
R0438                                AS SHORT AS CAN BE MADE, BUT IS ARBITRARY SINCE IT  DEPENDS ON THE AGE OF THE STATE VECTOR.

R0440   CALLING SEQUENCE:  CALL
R0441                                     S61.1
R0442                           C(MPAC) UNSPECIFIED
R0443                           PUSHLOC UNSPECIFIED

R0444   SUBROUTINES CALLED:  LOADTIME, CSMPREC, TPAGREE,
R0445                          WAITLIST, JOBSLEEP, JOBWAKE, PREREAD, ALARM, GODSPR, BANKCALL, DELAYJOB
R0447   NORMAL EXIT MODES:     RVQ
R0448   ALARMS:  01426      IMU UNSATISFACTORY
R0449            01427      IMU REVERSED
R0450   OUTPUT:  POSSIBLE ALARMS
R0451            POSSIBLY TDEC1, RATT, VATT, RN, VN
R0452   ERASABLE INITIALIZATION REQUIRED:
R0453            AVEGFLAG                 AVERAGEG ON OR OFF                        LEFT BY SERVICER
R0455            PIPTIME   (-28) CS       TIME OF PIPA UPDATE                       LEFT BY READACCS
R0457            RN      (-29) M          STATE VECTOR                              LEFT BY AVERAGEG
R0459            VN      (-7) M/CS        STATE VECTOR                              LEFT BY AVERAGEG
R0461            REFSMMAT  (-1)           .5 REF TO SM MATRIX                       LEFT BY LAST IMU ALIGNMENT
R0463   DEBRIS:  QPRET
R0464            POSSIBLY PIPTIME1, RATT, VATT, TDEC1, RN1, VN1, QTEMP, X1       IF UPDATED
R0466            PUSH LIST LOCS USED BY CSMPREC

 0467   REF  15  LAST  797   E6,1661                           EBANK= AOG                FOR 60GENRET , S61DT
 0469   REF   1              26,2000                           SETLOC P60S3
 0470                        26,2546                           BANK

 0471   REF   1                                                COUNT* $$/S61.1

 0472                        26,2546  0 0006 1  S61.1          EXTEND
 0473   REF   2  LAST  119   26,2547  23'773 0                 QXCH    60GENRET          SAVE RET ADDR IN EB 6
 0474   REF 202  LAST  804   26,2550  0 4636 0                 TC      BANKCALL
 0475   REF   8  LAST  743   26,2551   03731 1                 CADR    R02BOTH
 0476   REF 202  LAST  801   26,2552  0 6006 1                 TC      INTPRET

 0477                        26,2553   45014 0                 BON     CALRB
 0478    REF   2  LAST  517   26,2554   00716 1                       AVEGFLAG       IS AVERAGEG ON
 0479    REF   1              26,2555   54605 0                       S61.1A         YES
 0480    REF   2  LAST  740   26,2556   27566 1                       MIDTOAV2       GET FUTURE STATE VECTOR SOON AS CAN

 0481    REF 276  LAST  787   26,2557  3 0155 0              CA       MPAC +1        RETURN INHINTED ***
 0482    REF   3  LAST  234   26,2560  55'774 0              TS       S61DT          FOR RESTART.
 0483    REF  21  LAST  710   26,2561  0 5233 0              TC       WAITLIST
 0484    REF   9  LAST  698   E7,1425                        EBANK=   DVTOTAL
 0485    REF   2  LAST  234   26,2562   02567 1              2CADR    S61.1C
 0485                         26,2563   54067 1
 0486    REF  83  LAST  804   26,2564  0 5402 1              TC       PHASCHNG
 0487                         26,2565   40434 0              OCT      40434
 04875   REF   1              01,2204              4P43SPT1  =        4.43SPOT
 0488    REF  82  LAST  798   26,2566  0 5205 0              TC       ENDOFJOB

 0489    REF   6  LAST  801   26,2567  3 5052 0  S61.1C      CA       PRIO13
 0490    REF  33  LAST  761   26,2570  0 5135 0              TC       FINDVAC
 0491    REF  16  LAST  807   E6,1661                        EBANK=   ACG
 0492    REF   2  LAST  234   26,2571   02604 1              2CADR    S61.1A-1
 0492                         26,2572   54066 0
 0493                         26,2573  0 0006 1              EXTEND
 0494    REF   2  LAST  806   26,2574  3 2644 0              DCA      SERVCAD1       HE WHO STARTS AVERAGEG MUST SERVICE
 0495    REF  12  LAST  805   26,2575  53'062 0              DXCH     AVEGEXIT       THE EXIT.

 0496    REF  30  LAST  801   26,2576  0 5362 0              TC       2PHSCHNG
 0497                         26,2577   00454 1              OCT      00454
 0498                         26,2600   00175 1              OCT      00175
 049802  REF   1              01,2207              4P45SPT1  =        4.45SPOT
 049804  REF   1              01,2272              5P17SPT1  =        5.17SPOT
 04981   REF  12  LAST  786   26,2601  0 4606 0              TC       E7SETTER

 0499    REF  47  LAST  796   26,2602  0 4655 0              TC       POSTJUMP
 0500    REF   3  LAST  700   26,2603   76607 1              CADR     PREREAD        PREREAD DOES TC TASKOVER.

 0501    REF 203  LAST  807   26,2604  0 6006 1  S61.1A-1    TC       INTPRET
 0502                         26,2605   77204 1  S61.1A      BOVB     VLOAD
 0503    REF   2  LAST  305   26,2606   57544 0                       TCDANZIG       TURN OFF DVFIND, IF ON
 0504    REF  11  LAST  793   26,2607   01036 0                       VN             VN   (-7) M/CS
 0505                         26,2610   64235 1              VXV      MXV
 0506    REF  12  LAST  806   26,2611   01030 0                       RN             RN  (-29)  M
 0507    REF  41  LAST  782   26,2612   01734 0                       REFSMMAT       .5 UNIT MATRIX
 0508                         26,2613   71256 0              UNIT     DLOAD
 0509    REF 277  LAST  808   26,2614   00160 0                       MPAC +3        GET  COS(THETA)/2
 0510                         26,2615   43240 0              BMN      DAD
 0511    REF   1              26,2616   54623 1                       S61.1B         DO TEST ON -YSM
 0512    REF   1              26,2617   14646 0                       C(30)LIM       = 1.0 -.5 COS(30)
 0513                         26,2620   47004 0              BOVB     RTB
 0514    REF   1              26,2621   54642 0                       RETRN1
 0515    REF   1              26,2622   54627 0                       RETRN3
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0516                         26,2623   43276 0  S61.18     DCOMP   DAD
0517   REF   2  LAST  808    26,2624   14646 0                     C(30)LIM         = 1.0- .5 COS(30)
0518                         26,2625   77404 1             BOVB    EXIT
0519   REF   1               26,2626   54632 1                     RETRN2

0520   REF  28  LAST  774    26,2627  0 5671 1  RETRN3     TC      ALARM
0521                         26,2630   01426 0             OCT     01426            IMU UNSATISFACTORY
0522   REF   2  LAST  809    26,2631  0 2634 1             TC      RETRN2 +2

0523   REF  29  LAST  809    26,2632  0 5671 1  RETRN2     TC      ALARM
0524                         26,2633   01427 1             OCT     01427            IMU REVERSED

0525   REF   5  LAST  753    26,2634  3 5023 0  +2         CAF     V05N09
0526   REF 203  LAST  807    26,2635  0 4636 0             TC      BANKCALL
0527   REF   4  LAST  760    26,2636   20710 0             CADR    GODSPR           DO DISPLAY
0528   REF   1               26,2637  3 2647 0             CA      10SECS
0529   REF 204  LAST  809    26,2640  0 4636 0             TC      BANKCALL
0530   REF  15  LAST  788    26,2641   01731 0             CADR    DELAYJOB

0531   REF   3  LAST  807    26,2642  0 1773 0  RETRN1     TC      60GENRET

0532   REF  10  LAST  808    E7,1425                       EBANK=  DVTOTAL
0533   REF   3  LAST  737    26,2643   03143 1  SERVCAD1   2CADR   SERVEXIT
0533                         26,2644   76067 1
0534                         26,2645   22111 0  C(30)LIM   2DEC    .566985          = 1.0 -.5 COS(30)
0534                         26,2646   17335 1
0535                         26,2647   01750 1  10SECS     DEC     1000             1000 CS
0536                         26,2650   00000 1  60SECDP    2DEC    6000 B-28        6000 CS
0536                         26,2651   13560 0
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L       P61-P67                                                                  USER'S PAGE NO. 19       E6 S3

P0537

R0538   PROGRAM NAME:     S61.2                                                  DATE:          14 FEB 67
R0540   MOD NO:  1                                                               LOG SECTION:   P61-P67
R0542   MOD BY:  MORTH / BAIRNSFATHER
R0543   MOD NO:  2          MOD BY:  MORTH/BAIRNSFATHER   DATE:  11 MAY 67      ADD 2ND ITER FOR ERAD AT 400K FT.
R0545   MOD NO:  3          MOD BY:  RR BAIRNSFATHER      DATE:  21 NOV 67      VARIABLE MU ADDED.
R0547   MOD NO:  4          MOD BY:  RR BAIRNSFATHER      DATE:  21 MAR 68      DIFFERENT EARTH/MOON SCALES IN TFF'S
R0549   FUNCTIONAL DESCRIPTION:      CALLED BY P61.  PROVIDES DISPLAYS FOR NOUNS  N60  AND  N63  .
R0551           PROGRAM CALCULATES ENTRY DISPLAY OF MAXIMUM ACCELERATION EXPECTED  (GMAX)   AND ALSO THE EXPECTED
R0553           INERTIAL VELOCITY (VPRED) AND ENTRY ANGLE   (GAMMAEI)   THAT WILL OBTAIN AT 400K FT ABOVE THE FISCHER
R0555           ELLIPSOID.  PROGRAM ALSO CALCULATES A SECOND DISPLAY RELATIVE  TO THE EMSALT  ABOVE FISCHER ELLIPSOID
R0557           AND CONSISTS OF RANGE TO SPLASH FROM NOW (RTGO) , PREDICTED INERTIAL VELOCITY (VIO) , AND THE TIME TO
R0559           GO FROM NOW (TTE) .
R0560   CALLING SEQUENCE:  CALL
R0561                             S61.2
R0562           C(MPAC) UNSPECIFIED
R0563           PUSHLOC WILL BE SET TO ZERO.

R0564   SUBROUTINES CALLED:  TFFCONIC,  CALCTFF,  TFF/TRIG,  FISHCALC,  GETERAD,  VGAMCALC
R0566   NORMAL EXIT MODES,    RTB   P61.1
R0567   ALARMS:  NONE
R0568   OUTPUT:  THE FOLLOWING REGISTERS ARE WRITTEN IN FOR USE BY DISPLAYS
R0569           GMAX   100 GMAX  (-14)  G,S      MAXIMUM ACCELERATION
R0570           VPRED  (-7)  M/CS       PREDICTED VELOCITY AT 400K FT
R0571           GAMMAEI  GAMMA/360      PREDICTED GAMMA    AT 400K FT
R0572                                   FOR TM, DP(GAMMAEI) = (GAMMAEI, RTGO) / 360
R0574           RTGO   THETAH/360       RANGE ANGLE TO SPLASH FROM EMSALT        EMSALT IS PAD LOADED
R0576           VIO    (-7) M/CS        INERTIAL VELOCITY  AT       EMSALT       EMSALT IS PAD LOADED
R0578           TTE    (-28) CS         TIME      TO                EMSALT       EMSALT IS PAD LOADED

R0580           PUSHLOC = 0
R0581           CONIC PARAMETERS STORED IN VAC AREA (SEE TFF SUBROUTINES)
R0582   ERASABLE INITIALIZATION REQUIRED:
R0583           RONE   (-29) M          STATE VECTOR                             LEFT BY USER
R0585           VONE   (-7)  M/CS       STATE VECTOR                             LEFT BY USER
R0587           URONE  UR/2                                                      LEFT BY USER
R0589           UNI    (-1)             UNIT NORMAL V*R                          LEFT BY ENTRY / P61
R0591           THETAH  THETAH/360      RANGE ANGLE                              LEFT BY ENTRY / P61
R0593           UNITW  (0)              UNIT POLAR VECTOR                        LEFT BY  PAD LOAD
R0595           EMSALT  (-29) M         EMS INTERFACE ALTITUDE                   LEFT BY  PAD LOAD
R0597                                   ORBITAL REENTRY:  284643 FT,  LUNAR REENTRY:  297431 FT.
R0599   DEBRIS:  QPRET,
R0600           ALL PDL LOCATIONS ABOVE 12D, INCLUDING X1,X2,S1,S2
R0601           ALSO PDL+0  ...  PDL+5,  WHERE INITIAL PUSHLOC = PDL
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P0602

R0603   THE FOLLOWING PUSH LIST LOCATIONS HAVE BEEN RESERVED FOR TFF ROUTINES AND ARE REPEATED HERE FOR CONVENIENCE.

R0605   OF COURSE  FOR S61.2 USAGE, EARTH ORIGIN SCALING IS USED.

A0606                                                    BELOW        E:   IS USED FOR EARTH ORIGIN SCALE
A0607                                                                 M:   IS USED FOR MOON  ORIGIN SCALE

A0608                                  RTERM      =        18D          TERMINAL RADIUS M  E: (-29)  M: (-27)
A0609                                  NRTERM     =        16D          TERMINAL RADIUS M  E: (-29+NR)
A0610                                                                                    M: (-27+NR)
A0611                                  RMAG1      =        12D          PRESENT RADIUS M   E: (-29)  M: (-27)
A0612                                  NRMAG      =        32D          PRESENT RADIUS M   E: (-29+NR)
A0613                                                                                    M: (-27+NR)
A0614                                  SDELF/2                          SIN(THETA)  /2
A0615                                  CDELF/2    =        14D          COS(THETA) /2
A0616                                  TFFX       =        34D          X, ARGUMENT OF SERIES T(X).
A0617                                  TFFTEM     =        36D          ARG  FOR TRANSFER ANGLE CALCULATION.
A0618                                  TFFNP      =        28D          LC P  M  E: (-38+2NR)   M: (-36+2NR)
A0619                                  TFF/RTMU   =        30D          1/SQRT(MU)           E: (17)   M: (14)
A0620                                  TFFVSQ     =        20D          -(VN.VN/MU)  1/M   E: (20)   M: (18)
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P0621

 0623   REF   2  LAST  804   26,2000                         SETLOC P6052
 0624                        26,2652                         BANK

 0625   REF   1                                              COUNT* $$/S61.2

A0626                                                                          PDL LEFT AT ZERO BY TARGETNG

 0627                        26,2652   45345 1   S61.2       DLOAD  DSU
 06271  REF   1              26,2653   02020 1                      EMSALT
 06272  REF   1              26,2654   15006 0                      290KFT
 06273                       26,2655   71244 0               BPL    DLOAD
 06274  REF   1              26,2656   55002 0                      LUNENT
 0628   REF   1              26,2657   31757 0                      1/RTMU         ESTABLISH MU FOR ORBITAL ENTRIES
 06281                       26,2660   77624 1   CALLCON     CALL
 0629   REF   1              26,2661   57151 0                      TFFCONIC       FILL VAC AREA WITH CONIC PARAMETERS

 0630                        26,2662   45145 0               DLOAD  CALL
 0631   REF   1              26,2663   15024 0                      RTRIAL         1 ST GUESS AT TERMINAL RADIUS  (-29)
 0632   REF   2  LAST  525   26,2664   57261 0                      CALCTFF        SAVES MPAC IN RTERM  (18D)

 0633                        26,2665   77624 1               CALL                  CALC SDELF/2,  CDELF/2
 0634   REF   2  LAST  647   26,2666   57052 1                      TFF/TRIG       RETURN WITH S(THETA) IN MPAC

 0635                        26,2667   77624 1               CALL                  GET FISCHER RADIUS (-29) M
 0636   REF   1              26,2670   55033 1                      FISHCALC       ANS IN MPAC AND IN ERADM.

 0637                        26,2671   45015 1               DAD    CALL
 0638   REF   2  LAST  812   26,2672   02020 1                      EMSALT
 0639   REF   3  LAST  812   26,2673   57261 0                      CALCTFF        SAVES MPAC IN  RTERM  (18D)

 06391  REF   2  LAST  124   26,2674   03733 0               STORE  TTE1           USED IN TARGET ITERATION (DISPTARG)
 0640                        26,2675   57415 0               DAD    DCOMP          DECR 'TTE' FROM BASE 'TTE2' IN 'SERVICER
 0641   REF   4  LAST  793   26,2676   03651 0                      MM             'PIPTIME' FOR STATE VECTOR
A0642                                                                              ONLIST AND DSKY WILL USE TTE.
 0643   REF   2  LAST  124   26,2677   03735 0               STORE  TTE2           TTE=PIPTIME+TTE2=-(TTE1+MM-PIPTIME)
 06431                       26,2700   77615 0               DAD                   DECREMENT 'TTE' FOR DISPLAY AND DOWNLINK
 06432  REF  13  LAST  806   26,2701   01044 0                      PIPTIME        UNTIL SERVICER COMES ALONG.
 06433  REF   6  LAST  293   26,2702   37727 1               STCALL TTE            'TTE' IS NEGATIVE AS IN COUNTDOWN.

A0644                                                                              TTE= TIME FROM NOW TO EMSALT +FISCHER

 0645   REF   3  LAST  812   26,2703   57052 1                      TFF/TRIG       S(THETA) IN MPAC ON RETURNING
A0646                                                                              AND THETA= RANGE FROM NOW TO EMSALT
 0647                        26,2704   77624 1               CALL
 0648   REF   2  LAST  812   26,2705   55033 1                      FISHCALC
 0649                        26,2706   77624 1               CALL
 0650   REF   1              26,2707   11744 0                      VRCALC
 0651                        26,2710   77624 1               CALL
 06511  REF    1                  26,2711    11731 1                        DISPTARG
 06512                            26,2712    77624 1            CALL
 06513  REF    2  LAST  813       26,2713    11731 1                        DISPTARG
 06514  REF    5  LAST  293       26,2714    37714 1            STCALL      RTGO
 0652   REF    2  LAST  647       26,2715    55054 0                        VGAMCALC

 0653                             26,2716    77605 1            DMP                         MPAC = GAMMA
A0654                                                                                       PDL0  HAS VGAM.
 0655                             26,2717    43265 1            BDDV        DAD
 0656   REF    1                  26,2720    15032 1                        VEMSCON         -HS D 180/PI (-14)
 0657                             26,2721    00001 0                        0               VGAM FROM PDL0.
 0658   REF    6  LAST  293       26,2722    17725 1            STODL       VIO             PREDICTED VELOCITY AT EMSALT.

A0659                                                                  GAMMA AND VGAM AT 300K FT ARE REQUIRED BY  GMAX
A0660                                                                  ALGORITHM.

 0661   REF    7  LAST  762       26,2723    02240 0                        ERADM           EARTH RADIUS FROM GETERAD     (-29) M
A0662                                                                                       = FISCHER RADIUS  (-29)
 0663                             26,2724    77615 0            DAD
 0664   REF    1                  26,2725    06456 0                        300KFT          M  (-29)
 0665   REF    1                  26,2726    34023 1            STCALL      RTERM           TERMINAL RADIUS  M  (-29)

 0666   REF    1                  26,2727    55051 0                        PREVGAM         VGAMCALC WITH NEW RTERM

A0667                                                                                       VBAR = (V(FPS)  - 36KF/S) / 20KF/S
R0668    GMAX = (4/(1+ 4.8 VBARSQ))(GAM -6.05 -2.4 VBARSQ) -10(L/D -.3) +10                 ASSUME L/D = 0.3, BANK =0.

A0670                                             GMAXCALC
 0671                             26,2730    45325 1            PDDL        DSU             GAM TO PDL2
 0672                             26,2731    00001 0                        0               VGAM IS IN PDL0  (-7)
 0673   REF    1                  26,2732    15010 1                        36KFT/S         (-7)   M/CS
 0674                             26,2733    63471 0            DDV         DSQ
 0675   REF    1                  26,2734    15012 0                        20KFT/S         (-6)   M/CS
 0676                             26,2735    00001 0            STORE       0               VBARSQ  (-2)  TO PDL0

 0677                             26,2736    43205 1            DMP         DAD
 0678   REF    1                  26,2737    15014 0                        KR1
A0679                                                                                       GAM,    POS DOWN, FROM PDL2
 0680                             26,2740    41215 1            DAD         DMP
 0681   REF    1                  26,2741    15016 1                        -6.05DEG
 0682   REF    1                  26,2742    15020 1                        KR2
 0683                             26,2743    77725 1            PDDL                        XCH PDL+0 FOR VBARSQ  (-2)
 0684                             26,2744    43271 1            DDV         DAD
 0685   REF    1                  26,2745    15030 0                        KR4
 0686   REF    2  LAST  791       26,2746    31771 1                        DP2(-4)
 0687                             26,2747    77665 1            BDDV
A0688                                                                                       NUM FROM PDL+0
 0689                             26,2750    51015 1            DAD         BPL
 0690   REF    1                  26,2751    15022 0                        KR3
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L         P61-P67                                                                                     USER'S PAGE NO.  23      E6 S3

 0691                            26,2752   54755 1                    +3
 0692                            26,2753   77745 1           DLOAD
 0693     REF  23  LAST  741     26,2754   15336 0                    HI6ZEROS
 0694     REF   3  LAST  292     26,2755   17722 0           STODL    GMAX              100 GMAX  (-14)

R0695     DISPLAY USES GMAX AS SP, SO LO WORD IS WRITTEN OVER BY VPRED.

 0696     REF   8  LAST  813     26,2756   02240 0                    ERADM             = FISCHER RADIUS  (-29) M
 0697                            26,2757   45015 1           DAD      CALL              2 ND  ITERATION FOR FISCHER RADIUS
 0698     REF   1                26,2760   15026 1                    400KFT
 0699     REF   4  LAST  812     26,2761   57261 0                    CALCTFF           ESTABLISH TRANSFER ANGLE DATA.
 0700                            26,2762   77624 1           CALL
 0701     REF   4  LAST  812     26,2763   57052 1                    TFF/TRIG          GET SIN, COS DELF
 0702                            26,2764   77624 1           CALL
 0703     REF   3  LAST  812     26,2765   55033 1                    FISHCALC          GET CORRESPONDING FISCHER RADIUS.

 0704                            26,2766   73015 1           DAD      LXA,2             SAVE HI-WORD FOR DOWNLIST.
 0705     REF   2  LAST  814     26,2767   15026 1                    400KFT            M  (-29)
 0706     REF   6  LAST  813     26,2770   03713 1                    RTGO              (RANGE ANGLE FROM EMSALT)/360
 0707     REF   2  LAST  813     26,2771   34023 1           STCALL   RTERM
 0708     REF   2  LAST  813     26,2772   55051 0                    PREVGAM           VGAMCALC WITH NEW RTERM

 0709                            26,2773   67076 1           DCOMP    SXA,2             HI-WORD OF EACH ON DOWNLIST.
 0710     REF 278  LAST  808     26,2774   00155 0                    MPAC   +1
 0711     REF  10  LAST  292     26,2775   17761 1           STODL    GAMMAEI           CONIC GAMMA/360 AT 400K FT.    ( HI-WORD)
A0712                                                                                   CONIC RTGO/360 FROM EMSALT     (LOW-WORD)
A0713                                                                                   FOR TM, DP(GAMMAEI)= (GAMMA, RTGO)/360

A0714                                                                                   VGAM FROM PDL+0    (-7)
 0715                            26,2776   77626 0           STADR
 0716     REF   8  LAST  292     26,2777   74020 0           STORE    VPRED             CONIC VELOCITY AT 400K FT

 0717                            26,3000   77634 0           RTB
 0718     REF   1                26,3001   54304 1                    P61.1
A0719                                                                                   PDL BACK TO ZERO.

 07192                           26,3002   52145 0  LUNENT   DLOAD    GOTO
 07193    REF   2  LAST  522     26,3003   06452 1                    1/RTMUE           ESTABLISH MU FOR LUNAR TYPE ENTRIES
 07194    REF   1                26,3004   54660 0                    CALLCON
 07195                           26,3005   00002 0  290KFT   2DEC     88392.0 B-29
 07195                           26,3006   26244 1
 0720                            26,3007   33335 1  36KFT/S  2DEC     109.728 B-7       (-7) M/CS = 36 KFT/S (-7)
 0720                            26,3010   05707 1
 0721                            26,3011   36365 1  20KFT/S  2DEC     121.92 B-7        (-6) M/CS  = 2 20KFT/S  (-7)
 0721                            26,3012   30244 0
 0722                            26,3013   77113 1  KR1      2DEC     -.026666667       =- 2.4  4 / 360
 0722                            26,3014   42770 1
 0723                            26,3015   77354 0  -6.05DEG 2DEC     -.016805556       = -6.05 / 360
 0723                            26,3016   65030 1
 0724                            26,3017   21450 0  KR2      2DEC     .54931641         =(360/4) 100 (-14) =  9000 B-14
 0724                            26,3020   00001 0
 0725                            26,3021   01750 1  KR3       2DEC    1000  B-14       = 100  (10.0)  (-14)    G,S
 0725                            26,3022   00000 1
A0726                                                                                   ASSUMES L/D = 0.3, BANK =0.
 0727                            26,3023   00305 1  RTRIAL    2DEC    6460097.18 B-29  RPAD +284643 FT =21 194 545 FT
 0727                            26,3024   04541 0
A0728                                                                         RPAD DEFINED AS 20 909 901.57 FT =6 373 338 M
 0729                            26,3025   00003 1  400KFT    2DEC    121920 B-29      METERS
 0729                            26,3026   27040 0

R0730    300KFT   2DEC    91440 B-29          (-29)  M

R0731    EMSALT   2DEC    86759.2 B-29        284643 FT (-29) M     (ORBITAL REENTRY)

R0732    EMSALT   2DEC    90657 B-29          297431 FT (-29) M     (LUNAR REENTRY)

 0733                            26,3027   32525 1  KR4       2DEC    .833333333
 0733                            26,3030   12525 0
 0734    REF   2  LAST   522     23,2455            300KFT    EQUALS MINPERE
 0735                            26,3031   77777 0  VEMSCON   2DEC    -.0389676 B-14    = -HS D  /2  PI  (-14)    M SQ/ CS SQ
 0735                            26,3032   76601 1
A0736                                                                    =- 16369   .056  32.2  .3048  .3048/2 PI     (-14)
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R0737   SUBROUTINE NAME:   FISHCALC              (USED BY  S61.2)                DATE:              01.21.67
R0739   MOD NO:  0                                                               LOG SECTION:     P61-P67
R0741   MOD BY:  MORTH / BAIRNSFATHER
R0742   MOD NO:  1             MOD BY:  RR BAIRNSFATHER      DATE:  11 MAY 67    INCLUDE  GETERAD  CALL
R0744   FUNCTIONAL DESCRIPTION:  GIVEN THE PRESENT POSITION, UNITR, CALCULATE A  NEW UNITR THAT IS ROTATED THROUGH
R0746           TRANSFER ANGLE, THETA, ALONG TRAJECTORY. THEN CALCULATE  SIN(LAT)  AND USE TO OBTAIN FISCHER RADIUS.

R0748           SINCE FISHCALC USES UNI (LEFT BY ENTRY) EARTH SCALING IS ASSUMED.(WILL IMPROVE FOR SUITABLE TENNANT)

R0750   CALLING SEQUENCE:  CALL
R0751                            FISHCALC
R0752           ENTER WITH .5 SIN(THETA) IN MPAC.
R0753           PUSHLOC IS AT PDL+0, AN ARBITRARY BASE VALUE IF LEQ 8D

R0754   SUBROUTINES CALLED:  GETERAD
R0755   NORMAL EXIT MODE:    RVQ
R0756   EXIT MODES:           NONE
R0757   OUTPUT:  ERADM  (-29) M   IN MPAC ON RETURNING
R0758           NEW UNIT VECTOR NOT SAVED.
R0759           SIN(LAT) NOT SAVED.
R0760           PUSHLOC AT PDL+0
R0761   ERASEABLE INITIALIZATION REQUIRED:
R0762           SDELF/2      =SIN(THETA)  /2,   IN MPAC                          LEFT BY TFF/TRIG
R0764           CDELF/2      =COS(THETA) /2, STORED IN PDL 14D                   LEFT BY TFF/TRIG
R0766           RONE    (-29) M                                                  LEFT BY USER
R0768           VONE    (-7)  M/CS                                               LEFT BY USER
R0770           URONE  UR/2                                                      LEFT BY USER
R0772           UNI          .5 UNIT( V*R)                                       LEFT BY ENTRY / P61
R0774           UNITW        UNIT NORTH POLE                                     LEFT BY PAD LOAD
R0776   DEBRIS:  QPRET,     PDL+0 ... PDL+5
R0777

A0778                                                                            -      -        -
 0779                            26,3033   47315 0  FISHCALC PDVL    VXV         URPR = UR CDELF + UHOR SDELF
 0780   REF   3  LAST  793       26,3034   02334 1                   URONE
 0781   REF   3  LAST  793       26,3035   03502 0                   UNI
 0782                            26,3036   76561 1           VXSC    VSL1
A0783                                                                            SIN(THETA) /2 FROM PDL+0
 0784                            26,3037   74315 0           PDVL    VXSC        TO PDL+0,  +5
 0785   REF   4  LAST  816       26,3040   02334 1                   URONE
 0786   REF   2  LAST  647       26,3041   00017 1                   CDELF/2     COS(THETA) /2
 0787                            26,3042   45455 1           VAD     STADR
 07871  REF   1                  26,3043   74235 0           STORE   URH         FOR USE IN RTGO FROM EMS DISPLAY
 0788                            26,3044   72441 0           DOT     SL1
 0789   REF   7  LAST  539       26,3045   01712 1                   UNITW       FULL UNIT VECTOR    UNIT NORTH
 0790   REF  15  LAST  806       26,3046   02156 1           STORE   ALPHAV +4    = .5 SIN(LAT)
 0791                            26,3047   77650 1  DUMPFISH GOTO
 0792   REF   2  LAST  635       26,3050   26570 1                   GETERAD     SAVES FISCHER RAD (-29) M IN ERADM AND
A0793                                                                            IN MPAC. RETURNS TO CALLER VIQ QPRET.
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R0794    SUBROUTINE NAME:   VGAMCALC              (USED BY  S61.2)                DATE:           01.21.67
R0796    MOD NO:    0                                                            LOG SECTION:    P61-P67
R0798    MOD BY:  MORTH / BAIRNSFATHER
R0799    MOD NO:  1            MOD BY:  RR BAIRNSFATHER       DATE:  11 APR 67
R0800    MOD NO:  2            MOD BY:  RR BAIRNSFATHER       DATE:  21 NOV 67     VARIABLE MU ADDED.
R0802    MOD NO:  3            MOD BY:  RR BAIRNSFATHER       DATE:  21 MAR  68    ACCEPT DIFFERENT EARTH/MOON SCALE
R0804    FUNCTIONAL DESCRIPTION:       EARTH CENTERED VIS VIVA CALCULATION OF TERMINAL VELOCITY AND GAMMA (REL TO
R0806              HORIZONTAL)  GIVEN  THE SCALAR QUANTITIES:   PRESENT RADIUS AND VELOCITY AND THE TERMINAL RADIUS.
R0808              THE USER MUST APPEND PROPER SIGN TO GAMMA, SINCE IT IS CALCULATED AS A POSITIVE NUMBER.
R0810              THE EQUATIONS ARE

R0811                       VGAM = SQRT(VN VN/MU + 2(RN-RTERM)/(RN RTERM)  )  RTMU

R0812                       COSGAM = H /RTERM VGAM  = SQRT(LCP)/ (RTERM VGAM/RTMU)

R0813              VGAMCALC ASSUMES THAT THE TERMINAL RADIUS IS LESS THAN THE PRESENT RADIUS. BOTH CALCTFF AND CALCTPER
R0815              MAKE THIS ASSUMPTION.

R0816    CALLING SEQUENCE:  CALL                                 STCALL RTERM
R0817                                VGAMCALC                           PREVGAM
R0818              PUSHLOC AT PDL+0, ARBITRARY  IF LEQ 12D
R0819              C(MPAC) UNSPECIFIED                         C(MPAC)=NEW RTERM

R0820    SUBROUTINES CALLED:  NONE
R0821    NORMAL EXIT MODE:     RVQ
R0822    ALARMS:     NONE
R0823    OUTPUT:     GAMMA / 360 IN MPAC, POSITIVE NUMBER
R0824                VGAM E:(-7)  M:(-5)     M/CS   IN PDL+0
R0825                PUSHLOC AT PDL+2
R0826    ERASABLE INITIALIZATION REQD:
R0827              TFF/RTMU E:(17) M:(14)    1/SQRT(MU)                                 LEFT BY TFFCONIC.
R0829              RMAG1  E:(-29) M:(-27)    M   PRESENT RADIUS LENGTH                  LEFT BY TFFCONIC
R0831              NRMAG  E: (-29+NR)        M  NORM LENGTH OF PRESENT POSITION      LEFT BY TFFCONIC
R0833                     M: (-27+NR)
R0834              RTERM  E:(-29) M:(-27)    M  TERMINAL RADIUS LENGTH                  LEFT BY CALCTFF
R0836              NRTERM E: (-29+NR)        M  NORM LENGTH OF TERMINAL RADIUS       LEFT BY CALCTFF
R0838                     M: (-27+NR)
R0839              TFFVSQ E:(20)  M:(18)  1/M    -(V SQ/MU): PRESENT VELOCITY,NORM LEFT BY TFFCONIC
R0841              TFFNP  E: (-38+2NR)       M  LCP, SEMI-LATUS RECTUM, WEIGHT NR  LEFT BY TFFCONIC
R0843                     M: (-36+2NR)
R0844    DEBRIS:  QPRET,    PDL+0 ... PDL+3
R0845              RTERM,  NRTERM  IF PREVGAM ENTERED.
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P0846
 0847                        26,3051   77657 0  PREVGAM  SL*                ENTER WITH NEW  RTERM IN MPAC
A0848                                                                       E: (-29)  M: (-27)
 0849                        26,3052   20201 0                    0,1       X1 = -NR
 0850   REF   1              26,3053   00021 1           STORE  NRTERM    RTERM  M          E:(-29+NR)   M:(-27+NR)

 0851                        26,3054   41345 0  VGAMCALC DLOAD  DMP
 0852   REF   1              26,3055   00041 1                  NRMAG     RMAG  M             E:(-29+NR)  M:(-27+NR)
 0853   REF   2  LAST  818   26,3056   00021 1                  NRTERM    RTERM  M            E:(-29+NR)  M:(-27+NR)
 0854                        26,3057   45325 1           PDDL   DSU       RMAG RTERM M        E:(-58+2NR) M:(-54+2NR)
 0855   REF   2  LAST  818   26,3060   00041 1                  NRMAG     RMAG  M             E:(-29+NR)  M:(-27+NR)
 0856   REF   3  LAST  818   26,3061   00021 1                  NRTERM    RTERM  M            E:(-29+NR)  M:(-27+NR)
 0857                        26,3062   56257 1           SL*    DDV       2(RN-RTERM)         E:(-30+NR)  M:(-28+NR)
 0858                        26,3063   20171 1                  0 -8D,1   (-8+NR)
A0859                                                                     PUSH UP PRODUCT.
 0860                        26,3064   77625 0           DSU
 0861   REF   1              26,3065   00025 0                  TFFVSQ    -(V SQ/MU)            E: (20)   M: (18)
 0862                        26,3066   41566 1           SQRT   PUSH      SAVE VGAM/RT(MU) FOR NOW. E:(10) M:(9)
 0863                        26,3067   65271 0           DDV    PDDL      XCH PDL+0, LEAVING VGAM FOR OUTPUT.
A0864                                                                     VGAM TO PDL M/CS    E: (-7)    M: (-2)
 0865   REF   3  LAST  522   26,3070   00037 0                  TFF/RTMU  E: (17)  M: (14)
 0866                        26,3071   65205 0           DMP    PDDL      RTERM VGAM/RTMU  E:(-19+NR)  M:(-18+NR)
 0867   REF   4  LAST  818   26,3072   00021 1                  NRTERM    RTERM  M            E:(-29+NR)  M:(-27+NR)
 0868   REF   1              26,3073   00035 1                  TFFNP     LC P =H.H/MU  M  E:(-38+2NR) M:(-36+2NR)
 0869                        26,3074   56366 1           SQRT   DDV                           E:(-19+NR)  M:(-18+NR)
A0870                                                                     PUSH UP DEN         E:(-19+NR)  M:(-18+NR)
A08701                                                                    USE DDV OVFL AS LIMITER (|COS| <1.0)
 0871                        26,3075   65542 1           SR1    ACOS
 0872                        26,3076   77616 0  CUMPVGAM RVQ

A08721                                                                    CALLER MUST SUPPLY OWN SIGN ...

A0873                                                                                           22W     27MS
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R0874   SUBROUTINE NAME:     TFF/TRIG            (USED BY  S61.2)                DATE     01.17.67
R0876   MOD NO:  0                                                               LOG SECTION:    P61-P67
R0878   MOD BY:  RR BAIRNSFATHER
R0879   MOD NO:  1            MOD BY:  RR BAIRNSFATHER       DATE:  14 APR 67
R0880   MOD NO:  2            MOD BY:  RR BAIRNSFATHER       DATE:  21 MAR  68    ACCEPT DIFFERENT EARTH/MOON SCALE
R0882   FUNCTIONAL DESCRIPTION:      USED BY ENTRY DISPLAY TO CALCULATE SIN(THETA), COS(THETA) FROM DATA LEFT IN
R0884            PDL BY TFF SUBROUTINES. THE EQNS ARE
R0886                   COS(THETA) = 1-2 ABS(ARG) /(RN RTERM (1+X)  )
R0886                                                    2
R0887                   SIN(THETA) = SGN(ARG) SQRT(1-COS (THETA) )
R0888            WHERE  THETA = TRANSFER ANGLE
R0889            AND    ARG = P Z ABS(Z)                                         IF ALFA ZZ   LEQ 1
R0891                   ARG = (P / ALFA)  SGN(Q1 + R 1/2)                        IF ALFA Z Z   G  1
R0893            AND  ARG  HAS BEEN AFFIXED WITH THE SIGN OF SIN(THETA).
R0894   CALLING SEQUENCE:  CALL
R0895                                TFF/TRIG
R0896            PUSHLOC AT PDL+0, ARBITRARY IF NOT EQ 140
R0897            C(MPAC) UNSPECIFIED

R0898   SUBROUTINES CALLED:  NONE
R0899   NORMAL EXIT MODES:   RVQ
R0900   ALARMS:  NONE
R0901   OUTPUT:  C(MPAC) = .5 SIN(THETA)
R0902            CDELF/2 = .5 COS(THETA)          (IN PDL 140)
R0903            PUSHLOC AT PDL+0
R0904    ERASABLE INITIALIZATION REQUIRED:
R0905            TFFX                       X                                    LEFT BY CALCTFF OR CALCTPER
R0907            TFFTEM E: (-59+2NR)        ARG                                  LEFT BY CALCTFF OR CALCTPER
R0909                   M: (-55+2NR)        WHERE ARG = LCP ZZ SGN(DELF) OR ARG = LCP/ALFA  SGN(DELF)
R0911            NRTERM E: (-29+NR)           M  NORM LENGTH OF TERMINAL RADIUS      LEFT BY CALCTFF OR CALCTPER
R0913                   M: (-27+NR)
R0914            NRMAG  E: (-29+NR)           M  NORM LENGTH OF PRESENT POSITION     LEFT BY TFFCONIC
R0916                   M: (-27+NR)
R0917   DEBRIS:  QPRET, CDELF/2

  09173  REF   1               27,2000                          SETLOC P60S5
  09175                        27,3052                          BANK
  09178  REF   1                                                COUNT* $$/S61.2
  0918                         27,3052  70545 1  TFF/TRIG DLOAD  SR1
  0919   REF   1               27,3053  00043 0                  TFFX
  0920                         27,3054  41215 1           DAD    DMP
  0921   REF   8  LAST  648    27,3055  15334 1                  RIDPHALF
  0922   REF   3  LAST  818    27,3056  00041 1                  NRMAG           RMAG  M           E:(-29+NR)  M:(-27+NR)
  0923                         27,3057  55205 0           DMP    BDDV
  0924   REF   5  LAST  818    27,3060  00021 1                  NRTERM          RTERM  M          E:(-29+NR)  M:(-27+NR)
  0925   REF   1               27,3061  00045 0                  TFFTEM          P ZSQ OR P/ALFA  E:(-59+2NR) M:(-55+2NR)
  0926                         27,3062  44246 1           ABS    BDSU            THE SIGN IS FOR SDELF.
  0927   REF   9  LAST  819    27,3063  15334 1                  RIDPHALF
  0928   REF   3  LAST  816    27,3064  00017 1           STORE  CDELF/2         .5 COS(THETA)
  0929                         27,3065  57516 1           DSQ    DCOMP           KEEP HONEST FOR SQRT.
```

```
 0930                          27,3066   75415 0               DAD    SQRT
 0931   REF   1                27,3067   15326 1                      HIDP1/4
 0932                          27,3070   43565 0   DUMPTRIG SIGN   RVQ
 0933   REF   2  LAST  819     27,3071   00045 0                      IFFTEM              AFFIX SIGN(DELE/2)
A0934                                                                                     RETURN WITH .5 SIN(THETA) IN MPAC

 09345  REF   1                04,2000                         SETLOC P60S6
 09346                         04,3731                         BANK

 09348  REF   1                                                COUNT* $$/S61.1
A0935                                                                                              16W            15 MS

 0936                          04,3731   77620 0   DISPTARG STQ                             C(MPAC) = TRGO  ESTIMATE
 0937   REF   4  LAST  809     04,3732   03373 0                      60GENRET
 0939                          04,3733   43205 1               DMP    DAD                 (TTE1 IS POSITIVE)
 0940   REF   1                04,3734   11752 1                      KTETA1
 0944   REF   3  LAST  812     04,3735   03733 0                      TTE1
 0945   REF   6  LAST  305     04,3736   37606 0               STCALL DTEAROT
 0946   REF   2  LAST  305     04,3737   46223 0                      EARROT2
 0947                          04,3740   77624 1               CALL
 0948   REF   2  LAST  812     04,3741   11744 0                      VRCALC
 0949                          04,3742   77650 1               GOTO
 0950   REF   5  LAST  820     04,3743   03373 0                      60GENRET
 0951                          04,3744   50375 0   VRCALC      VLOAD  DOT
 0952   REF   2  LAST  816     04,3745   03542 1                      URH
 0953   REF   3  LAST  305     04,3746   03474 0                      RT
 0954                          04,3747   65512 1               SL2    ACOS
 0956                          04,3750   77616 0               RVQ
 09563                         04,3751   00052 0   KTETA1      2DEC*  .421844723 E2 B-14*        1100 2PI/16384(163.84)
 09563                         04,3752   05716 1
R0957   END OF PROGRAM  S61.2
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P0958
R0959    PROGRAM DESCRIPTION S62.3        DATE 10JAN67
R0960    MOD NO 1           LOG SECTION P60-P67
R0961    MOD BY ZELDIN
R0962    MOD NO:  2              MOD BY:  RR BAIRNSFATHER       DATE: 15 MAY 67      CHANGED TO REF COORDS.
R0964    MOD NO:  3              MOD BY:  RR BAIRNSFATHER       DATE:  17 JAN 68     ALFAPAD CHANGES MADE.
R0966    FUNCTIONAL DESCRIPTION
R0967             COMPUTE  DESIRED GIMBOL ANGLES FOR ENTRY ATTITUDE
R0968             THE FOLLOWING TRAJECTORY TRIAD IS AVAILABLE IN MEMORY AND IS COMPUTED EACH 2 SECONDS BY  CM/POSE  IN
R0970             REFERENCE COORDINATES (V = VELOCITY RELATIVE TO EARTH) :

R0971                      UXA = -UNIT(V)
R0972                      UYA =  UNIT(V*R)
R0973                      UZA =  UXA*UYA

R0974             GENERATE A DESIRED BODY TRIAD FOR TRIMMED FLIGHT WITH RESPECT TO THE RELATIVE VELOCITY VECTOR, USING
R0976             ROLL COMMAND AND TRIM ANGLE OF ATTACK:

R0977                      UXD = UNIT(UYD*UXA) SIN(ALFATRIM) + UXA COS(ALFATRIM)
R0978                      UYD = UYA COS(ROLLC) + UZA SIN(ROLLC)
R0979                      UZD = UXD * UYD

R0980             USE THE DESIRED SET (IN REFERENCE COORDS) AND  REFSMMAT  TO CALL   CALCGA   AND OBTAIN GIMBAL ANGLES
R0982             IN 2S,C IN MPAC, +2 AND THETAD, +2.

R0983    CALLING SEQUENCE
R0984          L    CALL
R0985         L+1          S62.3
R0986    NORMAL EXIT MODE
R0987             RETURN VIA QPRET DIRECTLY FROM CALCGA.
R0988    SUBROUTINES CALLED
R0989             CALCGA
R0990    ALARM OR ABORT MODES
R0991             NONE
R0992    ERASABLE INITIALIZATION REQUIRED
R0993             ROLLC  ROLL COMMAND                             DP 1:S COMP AT 1REV
R0994             ALFAPAD   SP 1S,C     /180                        LEFT BY PAD LOAD    ALFATRIM IS NEGATIVE.
R0996             UXA/2  REF COORDS                               LEFT BY CM/POSE
R0997             UYA/2  REF COORDS                               LEFT BY CM/POSE
R0998             UZA/2  REF COORDS                               LEFT BY CM/POSE
R0999    OUTPUT
R1000             CPHI   GIMBAL ANGLES (O,I,M) 2:S COMP TP (O,I,M)/180
R1001    DEBRIS
R1002          QTEMP, QPRET,PUSHLIST
R1003

 1005    REF   1             10,2000                          SETLOC P60S4
 1006                        10,2412                          BANK

 1007    REF   1                                              COUNT* $$/S62.3
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  1008                            10,2412   67201 0   562.3   SETPD   SLOAD
  1009                            10,2413   00001 0                   0
  1010   REF   2  LAST  796       10,2414   03012 1                   ALFAPAD           ALFATRIM /180 , ALFA IS NEG.
  1011                            10,2415   41542 1           SR1     PUSH
  1012                            10,2416   65346 0           COS     PDDL              XCH PDL, CCS TO PDL0
  1013                            10,2417   65356 1           SIN     PDDL              SIN TO PDL2
  1014   REF   9  LAST  796       10,2420   03316 0                   ROLLC
  1015                            10,2421   74346 0           COS     VXSC
  1016   REF   2  LAST  122       10,2422   03550 1                   UYA/2                                   REF COORDS
  1017                            10,2423   73525 1           PDDL    SIN               PUSH VECTOR INTO PDL4,.9
  1018   REF  10  LAST  822       10,2424   03316 0                   ROLLC
  1019                            10,2425   53361 0           VXSC    VAD
  1020   REF   2  LAST  122       10,2426   03556 1                   UZA/2                                   REF COORDS
A 1021                                                                                  VECTOR FROM PDL4, 9
  1022                            10,2427   77772 0           VSL1
  1023   REF   5  LAST  770       10,2430   02722 1           STORE   YNB               = UYD                 REF COORDS

  1024                            10,2431   76435 1           VXV     VSL1
  1025   REF   3  LAST  122       10,2432   03542 1                   UXA/2                                   REF COORDS
  1026                            10,2433   65361 0           VXSC    PDDL
A 1027                                                                                  SIN TRIM FROM PDL2
A 1028                                                                                  XCH PDL0 FOR COS TRIM
  1029                            10,2434   53361 0           VXSC    VAD
  1030   REF   4  LAST  822       10,2435   03542 1                   UXA/2                                   REF COORDS
A 1031                                                                                  FROM PDL0
  1032                            10,2436   77772 0           VSL1
  1033   REF  10  LAST  782       10,2437   02714 1           STORE   XNB               X SC AXIS (.5 UNIT)         REF COORDS

  1034                            10,2440   76435 1           VXV     VSL1
  1035   REF   6  LAST  822       10,2441   02722 1                   YNB
  1036   REF   6  LAST  770       10,2442   26730 1           STOVL   ZNB               Z SC IN REF COOR. SCALED AT 2
  1037   REF  42  LAST  808       10,2443   01734 0                   REFSMMAT
  1038   REF  30  LAST  782       10,2444   26672 0           STOVL   XSM
  1039   REF  43  LAST  822       10,2445   01742 1                   REFSMMAT +6
  1040   REF   5  LAST  629       10,2446   26700 1           STOVL   YSM
  1041   REF  44  LAST  822       10,2447   01750 1                   REFSMMAT +12D
  1042   REF   6  LAST  629       10,2450   02706 1           STORE   ZSM

  1043                            10,2451   77650 1           GOTO
  1045   REF   4  LAST  782       10,2452   47344 1                   CALCGA
A 1046                                                                                  CALCGA WILL RETURN TO ORIGINAL CALLER
A 1047                                                                                  VIA QPRET WITH 2,S COMP. ANGLES IN CPHI
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L        SERVICER207                                                                  USER'S PAGE NO.   1      E0 S3

R0001    PROGRAM NAME - PREREAD, READACCS, SERVICER, AVERAGE G.

R0002    MOD NO.  00   BY M.HAMILTON   DEC.12, 1966

R0003    FUNCTIONAL DESCRIPTION

R0004    THE ROUTINES DESCRIBED BELOW ARE USED TO CALCULATE VALUES OF RN, VN, AND GDT/2 DURING ACCELERATED FLIGHT.
R0006    THE SEVERAL ROUTINES COMPRISE A PACKAGE AND ARE NOT MEANT TO BE USED AS SEPARATE SUBROUTINES.

R0008    GENERAL REFERENCES TO  SERVICER  OR  AVERAGE G  ARE UNDERSTOOD TO REFER TO THE ENTIRE SET OF ROUTINES INCLUDING
R0010    READACCS, SERVICER, AVERAGE G, INTEREAD, SMOOTHER, AND ANY ADDITIONAL ROUTINES ATTACHED AT AVGEXIT (SEE BELOW).

R0012    PROGRAMS INITIATING SERVICER ARE REQUIRED TO MAKE A WAITLIST CALL FOR PREREAD (OR, IF LIFTOFF, FOR BIBIBIAS)
R0014    AT 2 SECONDS BEFORE THE FIRST AVERAGE G UPDATE IN ORDER TO INITIALIZE THE SEQUENCE, WHICH WILL RECUR EVERY
R0016    2 SECONDS FROM THAT TIME ON AS LONG AS AVEGFLAG REMAINS SET.

R0017    THE USE OF ERASABLE AVGEXIT ALLOWS VARIOUS ROUTINES TO BE PERFORMED AS PART OF THE NORMAL CYCLE (SEE
R0019    EXPLANATION OF AVGEXIT BELOW).

R0020    DESCRIPTIONS OF INDIVIDUAL ROUTINES FOLLOW.

R0021        PREREAD

R0022                PREVIOUSLY EXTRAPOLATED VALUES COPIED FROM RN1, VN1, AND PIPTIME1 INTO RN, VN, AND PIPTIME.
R0024                LASTBIAS JOB SCHEDULED.
R0025                PIPS READ AND CLEARED VIA PIPASR SUBROUTINE.
R0026                AVERAGE G FLAG SET ON.
R0027                DRIFT FLAG SET OFF.
R0028                V37 FLAG SET ON.
R0029                INITIALIZATION OF    1) THRUST MONITOR (DVMON) - DVCNTR SET TO ONE.
R0031                                     2) TOTAL ACCUMULATED DELV VALUE (DVTOTAL) - SET TO ZERO.
R0033                                     3) AXIS VECTOR (AXIS) - SET TO (.5,0,0).
R0034                NORMLIZE JOB SCHEDULED.
R0035                READACCS TASK CALLED IN 2 SECONDS.

R0036        NORMLIZE

R0037                GDT/2 INITIALIZED VIA CALCGRAV SUBROUTINE.

R0038        READACCS

R0039                IF ONMON FLAG SET QUIKREAD ROUTINE IS PERFORMED BEFORE PIPASR ZEROS THE PIPA REGISTERS, AND THE 1/2 SEC
R0041                ONMONITOR LOOP IS INITIATED TO PROVIDE DOWNLINK INFORMATION DURING ENTRY.
R0043                PIPS READ AND CLEARED BY PIPASR SUBROUTINE.
R0044                IF CM/DSTBY IS ON, ENTRY VARIABLES INITIALIZED AND SETJTAG TASK CALLED.
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L       SERVICER207                                                              USER'S PAGE NO.   2       EC S3

R0047            IF AVERAGEG FLAG ON     READACCS CALLED TO RECYCLE IN 2 SECONDS.
R0048            IF AVERAGEG FLAG OFF    AVERAGE G EXIT (AVGEXIT) SET TO 2CADR AVGEND FOR FINAL PASS.
R0050            SERVICER JOB SCHEDULED.


R0051            TEST CONNECTOR OUTBIT TURNED ON.


R0052   ONMNITOR

R0053            A SEQUENCE OF THREE PASSES THROUGH QUICKREAD FOLLOWING A CALL TO READACCS WITH ONMONFLG SET AT 1/2
R0055            SEC INTERVALS. INTERVALS ARE COUNTED OUT BY PIPCTR, INITIALISED AT 3 BY READACCS

R0057       QUIKREAD

R0058          READS CURRENT PIPS INTO X,Y,ZPIPBUF. READS OLD X,Y,ZPIPBUF INTO X,Y,ZOLDBUF. VALUES ARE SENT TO
R0060            DOWNLIST DURING ENTRY.
R0061       SERVICER
R0062            DELV VALUES CHECKED TO DETECT RUNAWAY PIP -
R0063                   IF BAD PIP   1) ALARM SENT.
R0064                                2) COMPENSATION, DVTOTAL ACCUMULATION, AND DVMON BYPASSED.  CONTROL
R0066                                   TRANSFERRED TO AVERAGE G.
R0067            PIPS COMPENSATED VIA 1/PIPA SUBROUTINE.
R0068            DVTOTAL INCREMENTED BY ABSOLUTE VALUE OF DELV.
R0069            THRUST MONITOR (DVMON) PERFORMED UNLESS IDLE FLAG IS ON.
R0070            CONTROL TRANSFERRED TO AVERAGE G.


R0071            DVMON

R0072               THRESHOLD VALUE (PLACED IN DVTHRUSH BY USER) CHECKED AGAINST ABSOLUTE VALUE OF DELV TO CHECK
R0074               THRUST LEVEL.
R0075                   IF THRUST    1) ULLAGE OFF ROUTINE PERFORMED.
R0076                                2) STEERING FLAG TURNED ON AT FIRST DETECTION OF THRUST.
R0078                                3) CONTROL TRANSFERRED TO AVERAGE G.
R0079                   IF NO THRUST 1) ON FIRST PASS THROUGH MONITOR, CONTROL TRANSFERRED TO AVERAGE G.
R0081                                2) ON SUBSEQUENT PASSES, CONTROL TRANSFERRED TO ENGINE FAIL ROUTINE IF THRUST
R0083                                   HAS FAILED FOR 3 CONSECUTIVE PASSES.


R0084            ENGINE FAIL

R0085               ENGFAIL1 TASK CALLED IN 2.5 SECONDS.  THIS WILL RETURN CONTROL TO TIG-5 SO THAT THE IGNITION
R0087                   SEQUENCE MAY BE REPEATED.
R0088               ENGINOF3 PERFORMED.
R0089               DAP SET UP FOR RCS.


R0090       AVERAGE G
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R0091          RN1, VN1, GDT1/2 CALCULATED VIA CALCRVG ROUTINE BY UPDATING RN, VN WITH DELV AND AN AVERAGED VALUE
R0093          OF GDT/2.
R0094          RN1, VN1, GDT1/2, PIPTIME1 COPIED INTO RN, VN, GDT/2, PIPTIME FOR RESTART PROTECTION.
R0096          CONTROL TRANSFERRED TO ADDRESS SPECIFIED BY USER (OR BY READACCS FOR LAST PASS) IN AVGEXIT.
R0098          LAST PASS (AVGEND)  1) FREE FALL GYRO COMPENSATION SET UP.
R0099                              2) DRIFT FLAG TURNED ON.
R0100                              3) STATE VECTOR TRANSFERRED VIA AVETOMID ROUTINE.
R0102                              4) ONMONITOR FLAG RESET.
R0103                              5) V37 FLAG RESET.
R0104                              6) TEST CONNECTOR OUTBIT RESET.
R0105                              7) CONTROL TRANSFERRED TO CANV37 TO CONTINUE MM CHANGE ROUTINE (R00).


R0108   CALLING SEQUENCE

R0109          PREREAD ENTERED DIRECTLY FROM TIG-30 VIA POSTJUMP.
R0110          READACCS CALLED AS WAITLIST TASK.


R0112   SUBROUTINES CALLED

R0113          UTILITY ROUTINES - PHASCHNG FLAGUP FLAGDOWN NOVAC FINDVAC WAITLIST ALARM NEWPHASE 2PHSCHNG

R0115          OTHER - PIPASR  1/PIPA  CALCGRAV  CALCRVG  AVETOMID


R0116   NORMAL EXIT MODES

R0117          ENDOFJOB  TASKOVER  CANV37

R0118          AVGEXIT - THIS IS A DOUBLE PRECISION ERASABLE LOCATION BY WHICH CONTROL IS TRANSFERRED AT THE END
R0120                    OF EACH CYCLE OF AVERAGE G.
R0121                    THE 2CADR OF A ROUTINE TO BE PERFORMED AT THAT TIME (E.G., STEERING EQUATIONS TO BE PERFORMED
R0123                    AT 2 SECOND INTERVALS) MAY BE SET BY THE USER INTO AVGEXIT.
R0125                    ALL SUCH ROUTINES SHOULD RETURN TO SERVEXIT, WHICH IS THE NORMAL EXIT FROM AVERAGE G.

R0127          SERVEXIT - DOES A PHASE CHANGE FOR RESTART PROTECTION AND GOES TO ENDOFJOB.
R0129                    THE 2CADR OF SERVEXIT IS SET INTO AVGEXIT BY THE USER IF NO OTHER ROUTINE (SEE ABOVE).

R0131          AVGEND - LAST PASS OF AVERAGE G EXITS HERE, BYPASSING SPECIAL ROUTINE (SEE ABOVE UNDER READACCS).
R0133                    FINAL EXIT IS TO CANV37.                                 F AVERAGE G).


R0135   OUTPUT

R0136      DVTOTAL(2)  PIPTIME(2)  XPIPBUF(2)  YPIPBUF(2)  ZPIPBUF(2)
R0137      RN(6)        REFERENCE COORD.   SCALED AT 2(+29)M/CS
R0138      VN(6)        REFERENCE COORD.   SCALED AT 2(+7)M/CS
R0139      GDT/2(6)     REFERENCE COORD.   SCALED AT 2(+7)M/CS
R0140      DELV(6)      STABLE MEMB. COORD.SCALED AT 2(+14)*5.85*10(-4)M/CS (KPIP1 USED TO GET DV/2 AT 2(+7))
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L       SERVICER207                                                               USER'S PAGE NO.   4      E0 S3

R0142      DELVREF(6)   REFERENCE COORD.   SCALED AT 2(+7)M/CS

R0143   INITIALIZATION

R0144            UNMONITOR FLAG SET BY ENTRY TO SHOW PIPBUF VALUES REQUIRED.
R0145            IDLE FLAG ON IF DVMON TO BE BYPASSED.
R0146            DVTHRUSH SET TO APPROPRIATE VALUE FOR DVMON.
R0147            AVGEXIT SET TO 2CADR OF ROUTINE, IF ANY, TO BE PERFORMED AFTER EACH CYCLE OF AVERAGE G.  IF NO ROUTINE
R0149                   TO BE DONE, AVGEXIT SET TO SERVEXIT.
R0150            VALUES NEEDED
R0151                   REFSMMAT
R0152                   UNITW - FULL UNIT VECTOR, IN REFERENCE COORD., OF EARTH S ROTATIONAL VECTOR
R0154                   RN1, VN1, PIPTIME1 - IN REFERENCE COORD., CONSISTENT WITH TIME OF EXECUTION OF PREREAD


R0156   DEBRIS

R0157      CENTRALS     A, L, Q
R0158      OTHER        INTERNAL - DVCNTR(1)  PIPAGE(1)  PIPCTR(1)  AVGEXIT(2)
R0159                   EXTERNAL - ITEMP1(1)  ITEMP2(1)  RUPTREG1(1)  TEMX(1)  TEMY(1)  TEMZ(1)
R0161                   USEFUL DEBRIS
R0162                      RN1(6)  VN1(6)  GDT1/2  PIPTIME1(2)
R0163                          THESE LOCATIONS USED AS BUFFER STORAGE FOR NEWLY CALCULATED VALUES OF RN, VN, GDT/2,
R0165                          AND PIPTIME DURING PERFORMANCE OF SERVICER ROUTINES.
R0167                      UNITR - HALF UNIT VECTOR OF RN, REFERENCE COORD.
R0168                      RMAG SCALED AT 2(+58) IN 36D.
R0169                      RMAGSQ SCALED AT 2(+58) IN 34D.
R0170                      (RE/RMAG)SQ IN 32D.


  0172  REF   1                  37,2000                   SETLOC  SERVICES
  0173                           37,2607                   BANK

  0174  REF  11  LAST  809     E7,1425                     EBANK=  DVTOTAL
R0175   *************************************     PREREAD   ****************************************************************
R0177

  0178  REF   1                                            COUNT*  $$/SERV
  0185  REF   2  LAST  312     37,2607  3 5057 0  PREREAD  CAF     PR1021          CALLER MUST PROTECT PREREAD
  0186  REF  17  LAST  801     37,2610  0 5121 0           TC      NOVAC
  0187  REF   5  LAST  315     E3,1460                     EBANK=  N8DX
  0188  REF   1                37,2611   03655 1           2CADR   LASTBIAS        DO LAST GYRO COMPENSATION IN FREE FALL
  0188  REF   1                37,2612   14063 1

A01882                                                                           CALL-TO ANC LASTBIAS ITSELF ARE NOT
A01883                                                                                PROTECTED. REREADAC SETS 1/PIPADT
A01884                                                                                TO 2.0 SECS IN CASE LASTBIAS LOST.
A01885                                                                                (REDUNDANT IF LASTBIAS IS AOK)

  0189  REF   2  LAST  537     37,2613  0 2630 0  REDO5.31 TC      PREREAD1
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L        SERVICER207                                                                             USER'S PAGE NO.   5      E7 S3

 0190    REF   1               37,2614  3 7654 1            CAF     PRIO32
 0191    REF  34  LAST  808    37,2615  0 5135 0            TC      FINDVAC         SET UP NORMLIZE JOB REQUIRED PRIOR TO
 0192    REF  12  LAST  826    E7,1425                      EBANK=  DVTOTAL
 0193    REF   3  LAST  540    37,2616   03154 1            2CADR   NORMLIZE
 0193                          37,2617   76067 1
 0194    REF   4  LAST  712    37,2620  3 5017 1            CAF     2SECS
 0195    REF  22  LAST  808    37,2621  0 5233 0            TC      WAITLIST
 0196    REF  17  LAST  808    E6,1661                      EBANK=  AOG
 0197    REF   2  LAST  540    37,2622   02652 1            2CADR   READACCS
 0197                          37,2623   76066 0
 0198    REF  29  LAST  599    37,2624  4 4767 1            CS      TWO
 0199    REF   6  LAST  703    37,2625  0 4126 0            TC      NEWPHASE
 0200                          37,2626   00005 1            OCT     5

 02005   REF   3  LAST  540    01,2234             5P2SPT2  =       5.2SPOT
 0201    REF  39  LAST  797    37,2627  1 5314 0            TCF     TASKOVER


 0202                          37,2630  0 0006 1   PREREAD1 EXTEND
 0203    REF  18  LAST  248    37,2631  22 070 0            QXCH    RUPTREG1

 0204    REF   1               37,2632  0 3171 0            TC      PIPASR          CLEAR + READ PIPS LAST TIME IN FREE FALL

 02042   REF  88  LAST  798    37,2633  3 4770 0            CAF     ONE             SET UP PIPAGE FOR REREADAC IN CASE A
 02043   REF   2  LAST   79    37,2634  55'067 0            TS      PIPAGE               RESTART OCCURS BEFORE READACCS

 0205    REF  35  LAST  760    37,2635  4 0075 1            CS      FLAGWRD1        SET AVEG FLAG
 0206    REF   3  LAST  210    37,2636  7 4770 1            MASK    AVEGBIT
 0207    REF  36  LAST  827    37,2637  26 075 1            ADS     FLAGWRD1

 0208    REF   2  LAST  315    37,2640  4 4752 1            CS      DRFTBIT
 0209    REF  21  LAST  762    37,2641  7 0076 1            MASK    FLAGWRD2
 0210    REF  22  LAST  827    37,2642  54 076 1            TS      FLAGWRD2        KNOCK DOWN DRIFT FLAG

 0211    REF  18  LAST  760    37,2643  4 0103 1            CS      FLAGWRD7        SET V37 FLAG
 0212    REF   2  LAST  210    37,2644  7 4763 0            MASK    V37FLBIT
 0213    REF  19  LAST  827    37,2645  26 103 1            ADS     FLAGWRD7

 0218    REF 142  LAST  785    37,2646  3 4772 1            CAF     ZERO
 0224    REF  13  LAST  827    37,2647  55'425 1            TS      DVTOTAL         CLEAR DVTOTAL
 0225    REF  14  LAST  827    37,2650  55'426 1            TS      DVTOTAL +1

 0226    REF  19  LAST  827    37,2651  0 0070 0            TC      RUPTREG1
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P0227    ********************************   READACCS   **************************************************
 0229    REF  18  LAST  827   E6,1661                       EBANK= ADG
 0242    REF   2  LAST  827   37,2652  0 3171 0  READACCS TC      PIPASK

 0243    REF  18  LAST  776   37,2653  3 4773 0  PIPSDONE CAF     FIVE
 0244    REF  79  LAST  787   37,2654  54 0001 1          TS      L
 0245                         37,2655  4 0000 0           COM
 0246    REF   3  LAST  536   37,2656  53'166 0           DXCH    -PHASE5

 02465   REF   1              01,2253            5P5SPT1  =       5.5SPOT
 0247    REF  89  LAST  827   37,2657  3 4770 0  REDO5.5  CAF     ONE                SHOW PIPS HAVE BEEN READ
 0248    REF   3  LAST  827   37,2660  55'067 0           TS      PIPAGE

 0249    REF  30  LAST  827   37,2661  3 4767 0           CA      TWO                SET PIPCTR FOR ONMINTOR
 0250    REF   2  LAST   79   37,2662  55'066 1           TS      PIPCTR             AFTER ABOVE PHASCHNG

 0251    REF   3  LAST  804   37,2663  4 0102 0           CS      CM/FLAGS
 0252    REF   2  LAST  804   37,2664  7 4767 1           MASK    CM/DSBIT           103D BIT2
 0253    REF 182  LAST  787   37,2665  10 000 0           CCS     A
 0254    REF   2  LAST  236   37,2666  0 2740 0           TC      CHEKAVEG

 0255    REF   6  LAST  699   37,2667  4 1105 0           CS      PIPTIME1 +1
 0256    REF   2  LAST  709   37,2670  55'271 0           TS      TBASE6             FOR RESTARTS
 0260                         37,2671  0 0006 1           EXTEND                     CONTINUE FOR ENTRY DAP
 0261    REF  19  LAST  828   37,2672  3 1662 1           DCA     ADG
 0262    REF   2  LAST  115   37,2673  53'670 0           DXCH    ADG/PIP
 0263    REF   2  LAST  115   37,2674  3 1663 0           CA      AMG
 0264    REF   2  LAST  115   37,2675  57'671 0           XCH     AMG/PIP
 0265                         37,2676  0 0006 1           EXTEND
 0266    REF   2  LAST  115   37,2677  3 1665 0           DCA     ROLL/180
 0267    REF   2  LAST  115   37,2700  53'673 0           DXCH    ROLL/PIP
 0268    REF   3  LAST  188   37,2701  3 1666 0           CA      BETA/180
 0269    REF   2  LAST  115   37,2702  57'674 0           XCH     BETA/PIP
 0270    REF   4  LAST  828   37,2703  3 0102 1           CA      CM/FLAGS
 0271    REF   1              37,2704  7 4755 0           MASK    CMARMBIT           93D BIT12
 0272                         37,2705  0 0006 1           EXTEND                     DURING ENTRY, WHEN RCS DAP IS INACTIVE,
 0273    REF   1              37,2706  1 2723 1           BZF     NOSAVPIP           SAVE PIPAS EACH 0.5 SEC FOR TM.

 0274    REF   7  LAST  760   37,2707  3 5011 1           CAF     .5SEC
 0275    REF  16  LAST  740   37,2710  0 5223 1           TC      TWIDDLE
 0276    REF   1              37,2711   02773 0           ADRES   QUIKREAD
A0278                                                                                NO NEED TO RESTART PROTECT THIS.
 0279    REF   9  LAST  439   37,2712  3 1314 0           CA      DELVX              SAVE PIPAS AS READ (BUT NOT COMPENSATED)
 0280    REF   3  LAST  137   37,2713  57'533 0           XCH     XPIPBUF
 0281    REF   3  LAST  137   37,2714  55'536 1           TS      XOLDBUF

 0282    REF   5  LAST  438   37,2715  3 1316 1           CA      DELVY
 0283    REF   3  LAST  137   37,2716  57'534 1           XCH     YPIPBUF
 0284    REF   3  LAST  137   37,2717  55'537 0           TS      YOLDBUF
 0285   REF   4  LAST  438   37,2720  3 1320 1              CA       DELVZ
 0286   REF   3  LAST  137   37,2721  57'535 0              XCH      ZPIPBUF
 0287   REF   1              37,2722  55'540 0              TS       ZOLDBUF

 0288   REF  19  LAST  828   37,2723  3 4773 0   NOSAVPIP   CA       FIVE
 0289   REF   4  LAST  236   37,2724  55'725 1              TS       CM/GYMDT

 0290   REF   1              37,2725  3 3153 0              CA       JTAGTIME        ACTIVATE CM/RCS AFTER PIPUP TO GO
A0291                                                                                IN JTAGTIME +5 CS.
 0292   REF  23  LAST  827   37,2726  0 5233 0              TC       WAITLIST
 0293   REF  20  LAST  828   E6,1661                        EBANK=   AOG
 0294   REF   2  LAST  230   37,2727   02636 0              2CADR    SETJTAG
 0294                        37,2730   32066 0

 0295   REF  29  LAST  744   37,2731  4 6214 1              CS       THREE           1.3SPOT FOR SETJTAG
 0296   REF   7  LAST  827   37,2732  0 4126 0              TC       NEWPHASE
 0297                        37,2733   00001 0              OCT      1

 02975  REF   2  LAST  230   01,2014             1P3SPT1    =        1.3SPOT
 0298   REF   4  LAST  546   37,2734  3 4125 0              CAF      OCT31           5.31SPOT FOR CHEKAVEG
 0299   REF  80  LAST  828   37,2735  54 0001 1             TS       L
 0300                        37,2736  4 0000 0              COM
 0301   REF   4  LAST  828   37,2737  53'166 0              DXCH     -PHASE5

 03015  REF   1              01,2311             5P31SPT1   =        5.31SPOT
 0302   REF  37  LAST  827   37,2740  4 0075 1   CHEKAVEG   CS       FLAGWRD1
 0303   REF   4  LAST  827   37,2741  7 4770 1              MASK     AVEGBIT
 0304   REF 183  LAST  828   37,2742  10 0000 0             CCS      A               IF AVEG FLAG DOWN SET FINAL EXIT AVEG
 0305   REF   1              37,2743  0 2762 0              TC       AVEGOUT

 0306   REF   5  LAST  827   37,2744  3 5017 1              CAF      2SECS
 0307   REF  17  LAST  828   37,2745  0 5223 1              TC       TWIDDLE
 0308   REF   3  LAST  827   37,2746   02652 1              ADRES    READACCS
 0310   REF   3  LAST  737   37,2747  3 4753 1   MAKESERV   CAF      PRIO20          ESTABLISH SERVICER ROUTINE
 0311   REF  35  LAST  827   37,2750  0 5135 0              TC       FINDVAC
 0312   REF  15  LAST  827   E7,1425                        EBANK=   DVTOTAL
 0313   REF   2  LAST  235   37,2751   03010 0              2CADR    SERVICER
 0313                        37,2752   76067 1

 0314   REF   9  LAST  780   37,2753  4 4766 0              CS       FOUR            RESTART SERVICER AND READACCS
 0315   REF   8  LAST  829   37,2754  0 4126 0              TC       NEWPHASE
 0316                        37,2755   00005 1              OCT      5

 03165  REF   1              01,2242             5P4SPT1    =        5.4SPOT
 0317   REF  21  LAST  711   37,2756  3 4760 1              CAF      BIT9
 0318                        37,2757  0 0006 1              EXTEND
 0319   REF  22  LAST  705   37,2760  05 0011 1             WOR      DSALMOUT        TURN TEST CONNECTOR OUTBIT ON

 0320   REF  40  LAST  827   37,2761  1 5314 0              TCF      TASKOVER        END PREVIOUS READACCS WAITLIST TASK
 0321                          37,2762  0 0006 1  AVEGOUT  EXTEND
 0322     REF    1             37,2763  3 2767 0           DCA      AVOUTCAD
 0323     REF    2  LAST  539  37,2764  53'062 0           DXCH     AVGEXIT
 0324     REF    1             37,2765  1 2747 0           TCF      MAKESERV

 0325     REF   16  LAST  829  E7,1425                     EBANK=   DVTOTAL
 0326     REF    1             37,2766   03100 0  AVOUTCAD 2CADR    AVGEND
 0326     REF    1             37,2767   76067 1
```

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P0327   ROUTINE NAME: ONMNITOR
R0328   MOD 04 BY BAIRNSFATHER  30 APR 1968                                   REDO ONMNITOR TO SAVE PIPS EACH 0.5 SEC FOR TM,ENTRY.
R0330   MOD 03 BY FISHER DECEMBER 1967
R0331   MOD 02 BY RYE SEPT 1967
R0332   MOD 01 BY KOSMALA 23 MAR 1967
R0333   MOD 00 BY KOSMALA 27 FEB 1967

R0334   FUNCTIONAL DESCRIPTION

R0335             THE PURPOSE OF ONMONITOR IS TO PROVIDE 1/2 SEC.READING OF PIPAS FOR DOWNLIST DURING ENTRY.
R0337             X,Y,ZPIPBUF CONTAIN PRESENT VALUES X,Y,ZOLDBUF CONTAIN VALUES FROM PREVIOUS READING.

R0339   CALLING SEQUENCE

R0340             CALL AS WAITLIST TASK. TERMINATES ITSELF IN TASKOVER

R0341   INITIALISATION

R0342             PIPCTR = 2 (FOR DT = 0.5 SEC)
R0343             X,Y,ZPIPBUF SET TO PREVIOUS PIPAX,Y,Z

R0344   OUTPUT

R0345             X,Y,ZPIPBUF, X,Y,ZOLDBUF
R0346   DEBRIS

R0347             X,Y,ZPIPBUF CONTAIN LAST PIPAX,Y,Z VALUES
R0348                     X,Y,ZOLDBUF CONTAIN LAST-BUT-ONE PIPAX,Y,Z VALUES
R0349             RUPTREG1
R0350             PIPCTR

 0351   REF   3  LAST  828   37,2770  55'066 1  ONMNITOR TS      PIPCTR

 0352   REF   9  LAST  719   37,2771  0 5255 0           TC      FIXDELAY          WAIT
 0353                        37,2772   00062 0  0.5SEC   DEC     50

 0354   REF  31  LAST  828   37,2773  3 4767 0  QUIKREAD CAF     TWO
 0355   REF  20  LAST  827   37,2774  54 070 1    +1     TS      RUPTREG1
 0356   REF 184  LAST  829   37,2775  50 000 1           INDEX   A
 0357   REF   6  LAST  438   37,2776  3 0037 0           CA      PIPAX             SAVE ACTUAL PIPAS FOR TM.
 0358   REF  21  LAST  831   37,2777  50 070 0           INDEX   RUPTREG1
 0359   REF   4  LAST  828   37,3000  57'533 0           XCH     XPIPBUF           UPDATE X,Y,ZPIPBUF
 0360   REF  22  LAST  831   37,3001  50 070 0           INDEX   RUPTREG1
 0361   REF   4  LAST  828   37,3002  55'536 1           TS      XOLDBUF           AND X,Y,ZOLDBUF
 0362   REF  23  LAST  831   37,3003  10 070 1  CHKCTR   CCS     RUPTREG1
 0363   REF   2  LAST  828   37,3004  1 2774 0           TCF     QUIKREAD +1       LOOP AGAIN
 0364   REF   4  LAST  831   37,3005  11'066 1           CCS     PIPCTR
 0365   REF   1              37,3006  1 2770 1           TCF     ONMNITOR
 0366   REF  41  LAST  829   37,3007  0 5314 1           TC      TASKOVER
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P0367     **********************************   SERVICER   **************************************************************
R0369

 03693   REF    2  LAST   826    37,2000                          SETLOC SERVICES
 03695                           37,3010                          BANK

 0370    REF   17  LAST   830    E7,1425                          EBANK= DVTOTAL

 03705   REF    2 LAST   826 TO   832:     129    129*            COUNT* $$/SERV
 0371    REF   32  LAST   831    37,3010   3 4767 0  SERVICER CAF     TWO
 0372                            37,3011   0 0004 0           INHINT
 0373    REF   24  LAST   831    37,3012   54 070 1  PIPCHECK TS      RUPTREG1

 0374                            37,3013   6 0000 1           DOUBLE
 0375    REF 185   LAST   831    37,3014   50 000 1           INDEX   A
 0376    REF   10  LAST   828    37,3015   11'314 1           CCS     DELVX
 0377                            37,3016   0 3020 0           TC      +2
 0378    REF    1                37,3017   0 3026 0           TC      PIPLOOP

 0379    REF    1                37,3020   6 3152 1           AD      -MAXDELV          DO PIPA-SATURATION TEST BEFORE
 0380                            37,3021   0 0006 1           EXTEND
 0381    REF    2  LAST   832    37,3022   6 3026 0           BZMF    PIPLOOP           COMPENSATION.

 0382    REF   30  LAST   809    37,3023   0 5671 1           TC      ALARM
 0383                            37,3024    00205 0           OCT     00205             SATURATED-PIPA ALARM  ***CHANGE LATER
 0384    REF    1                37,3025   0 3056 1           TC      AVERAGEG

 0385    REF   25  LAST   832    37,3026   10 070 1  PIPLOOP  CCS     RUPTREG1
 0386    REF    1                37,3027   1 3012 0           TCF     PIPCHECK

 0387    REF   84  LAST   808    37,3030   0 5402 1           TC      PHASCHNG          RESTART REREADAC + SERVICER
 0388                            37,3031    16035 0           OCT     16035
 0389                            37,3032    20000 0           OCT     20000
 03895   REF   11  LAST   801    01,2250             5P3SPT9  =       5.3SPOT
 0390    REF   18  LAST   832    E7,1425                      EBANK=  DVTOTAL

 0391    REF    1                37,3033    03037 0           2CADR   DVTOTUP
 0391    REF    1                37,3034    76067 1

 0392    REF 205   LAST   809    37,3035   0 4636 0           TC      BANKCALL          PIPA COMPENSATION CALL
 0393    REF    2  LAST   439    37,3036    15276 0           CADR    1/PIPA

 0394    REF 204   LAST   808    37,3037   0 6006 1  DVTOTUP  TC      INTPRET
A039405                                                                 THE FOLLOWING SECTION DECREMENTS 'TTE' DURING P61
A03941                                                                  THROUGH P63 ONLY. (IE: IN P60'S IF DRAG< 0.05 G)
 03942                           37,3040    71214 0  TICKTTE  BON     DLOAD             .05GSW IS SET =1 IN FRESH START.
 039425  REF    2  LAST   793    37,3041    03314 1                   .05GSW            FLAG IS ASSIGNED ONLY TO P61-P67.
 03943                           37,3042    77047 1                   +5                DO NOT COUNT 'TTE' IF DRAG > 0.05 G.
 039435  REF    3  LAST   812    37,3043    03735 0                   TTE2
 03944                           37,3044    77615 0           DAD
 039445 REF   7 LAST  828   37,3045   01105 1                    PIPTIME1        DECREMENT 'TTE' BY 'PIPTIME1'.(BY 2 SEC)
 03945  REF   7 LAST  812   37,3046   03727 0           STORE    TTE             NEGATIVE AS IN A COUNTDOWN.
A03946                                                                           DURING P61 THRU P63,'TTE' IS DECREMENTED
A039465                                                                          AND IS ON CALL AND ON ENTRY ONLIST.

 0395                       37,3047   51575 1           VLOAD    ABVAL           GET ABS VALUE OF DELV
 0396   REF  11 LAST  188   37,3050   01315 1                    DELV
 0397                       37,3051   77405 0           DMP      EXIT
 0398   REF   1             37,3052   37365 0                    KPIP1           SCALE AT 2(+7)

 0399                       37,3053 0 0006 1            EXTEND
 0400   REF 279 LAST  814   37,3054 3 0155 0            DCA      MPAC
 0401   REF  19 LAST  832   37,3055  21'426 1           DAS      DVTOTAL         ACCUMULATE DVTOTAL
 0402   REF  85 LAST  832   37,3056 0 5402 1  AVERAGEG  TC       PHASCHNG
 0403                       37,3057   10035 0           OCT      10035

 04035  REF  12 LAST  832   01,2250           5P3SPT10  =        5.3SPOT
 0404   REF 205 LAST  832   37,3060 0 6006 1            TC       INTPRET
 0405                       37,3061   77624 1           CALL
 0406   REF   1             37,3062   77336 1                    CALCRVG
 0407                       37,3063   77776 1           EXIT

 0408   REF  86 LAST  833   37,3064 0 5402 1            TC       PHASCHNG
 0409                       37,3065   10035 0           OCT      10035

 04095  REF  13 LAST  833   01,2250           5P3SPT11  =        5.3SPOT
 0410   REF   5 LAST  829   37,3066 3 4125 0            CAF      OCT31           COPY RN1,VN1,GDT1/2,GOBL1/2,PIPTIME1
 0411   REF   9 LAST  740   37,3067 0 5607 0            TC       GENTRAN         INTO RN ,VN ,GDT/12 ,GOBL/2 ,PIPTIME
 0412   REF   4 LAST  539   37,3070   01070 1           ADRES    RN1
 0413   REF  13 LAST  808   37,3071   01027 0           ADRES    RN
 04131                      37,3072 0 0003 1  ENDCOPY   RELINT
 0414   REF  87 LAST  833   37,3073 0 5402 1            TC       PHASCHNG
 0415                       37,3074   10035 0           OCT      10035

 04155  REF  14 LAST  833   01,2250           5P3SPT12  =        5.3SPOT
 0416                       37,3075 0 0006 1            EXTEND
 0417   REF   3 LAST  830   37,3076 3 1062 1            DCA      AVGEXIT
 0418   REF  13 LAST  358   37,3077  52 006 0           DXCH     Z               AVERAGEG EXIT

 0419   REF  14 LAST  812   37,3100 3 1044 0  AVGEND    CA       PIPTIME +1      FINAL AVERAGE G EXIT
 0420   REF   1             37,3101  55'277 0           TS       OLDBT1          SET UP FREE FALL GYRO COMPENSATION

 0421   REF  65 LAST  804   37,3102 0 5547 1            TC       UPFLAG          SET DRIFTFLG
 0422   REF   5 LAST  775   37,3103   00036 1           ADRES    DRIFTFLG        BIT 15  FLAG 2
 0425   REF  31 LAST  808   37,3104 0 5362 0            TC       2PHSCHNG
 0426                       37,3105   00005 1           OCT      5               GROUP 5 OFF
 0427                       37,3106   05022 1           OCT      05022           GROUP 2 ON FOR AVETOMID
 0428                       37,3107   20000 0           OCT      20000

 0429   REF 206 LAST  833   37,3110 0 6006 1            TC       INTPRET
 0430                          37,3111   77624 1              CALL
 0431    REF    1              37,3112   73677 0                       AVETOMID           CONVERT STATE VECTOR TO REFERENCE SCALE.
 0432                          37,3113   77776 1              EXIT

 04321   REF 206  LAST  832    37,3114  0 4636 0              TC       BANKCALL
 04322   REF   1               37,3115   17231 1              CADR     PIPFREE

 04323   REF  22  LAST  829    37,3116  4 4760 0              CS       BIT9
 043235  REF  58  LAST  786    37,3117  55'722 0              TS       MRKBUF1            INVALIDATE MARK BUFFER
 04324                         37,3120  0 0006 1              EXTEND
 04325   REF  23  LAST  829    37,3121  03 011 1              WAND     DSALMOUT

 043255  REF  59  LAST  801    37,3122  0 5561 0              TC       DOWNFLAG
 043256  REF   1               37,3123   00147 0              ADRES    CM/DSTBY

 04326   REF  60  LAST  834    37,3124  0 5561 0              TC       DOWNFLAG
 04327   REF   5  LAST  648    37,3125   00162 1              ADRES    V37FLAG

 04328   REF  21  LAST  744    37,3126  3 0104 1              CA       FLAGWRD8
 043285  REF  11  LAST  744    37,3127  7 4760 0              MASK     UTBIT
 04329   REF 186  LAST  832    37,3130  10 000 0              CCS      A
 043295  REF   1               37,3131  1 3146 0              TCF      UTAVEND

 0433    REF   8  LAST  268    37,3132  3 4762 0              CAF      RNDVZBIT           RESTORE GROUP 1 + 2 IF P20 IS RUNNING
 0434    REF  19  LAST  761    37,3133  7 0074 0              MASK     FLAGWRD0
 0435                          37,3134  0 0006 1              EXTEND
 0436                          37,3135  1 3141 1              BZF      +4

 0437    REF  32  LAST  833    37,3136  0 5362 0              TC       2PHSCHNG
 0438                          37,3137   00111 0              OCT      111                1.11SPOT
 0439                          37,3140   00132 1              OCT      132                2.13SPOT

 0440    REF   6  LAST  572    01,2025              1P11SPT7 =         1.11SPOT
 0441    REF   2  LAST  558    01,2030              2P13SPT2 =         1.13SPOT
 0445    REF  48  LAST  808    37,3141  0 4655 0    ENDAVEG   TC       POSTJUMP
 0446    REF   2  LAST  210    37,3142   10162 0              CADR     CANV37

 0447    REF  88  LAST  833    37,3143  0 5402 1    SERVEXIT TC        PHASCHNG
 0448                          37,3144   00035 1              OCT      00035              A, 5.3 = REREADAC  (ONLY)

 04485   REF  15  LAST  833    01,2250              5P3SPT13 =         5.3SPOT
 0449    REF  83  LAST  808    37,3145  1 5205 1              TCF      ENDOFJOB

 04491   REF  33  LAST  834    37,3146  0 5362 0    UTAVEND   TC       2PHSCHNG
 04492                         37,3147   00111 0              OCT      111
 04493                         37,3150   00002 0              OCT      2

 044935  REF   7  LAST  834    01,2025              1P11SPT8 =         1.11SPOT
 04494   REF   1               37,3151  1 3141 1              TCF      ENDAVEG
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 0450   REF   5  LAST  390      4775             DVTHRUSH EQUALS ELEVEN           15 PERCENT OF 2SEC PIPA ACCUMULATION,
A0451                                                                                 FOR 503-FULL CSM/LEM....DELV SC.AT
A0452                                                                                 5.85 CM/SEC.

 0453                         37,3152   63401 1  -MAXDELV DEC     -6398           3200 PPS FOR 2 SEC  CCS TAKES 1

 0454                         37,3153   00170 1  JTAGTIME DEC     120             = 1 SEC + T CDU, T CDU = .1 SEC

A0457                                                                             SHOULD BE 2-4 SECS FOR NO START
A0458                                                                                       6-8 SECS FOR FAILURE
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P0459       NORMLIZE PERFORMS THE INITIALIZATION REQUIRED PRIOR TO THE FIRST ENTRY TO AVERAGEG, AND SCALES RN SO THAT IT
R0461   HAS 1 LEADING BINARY ZERO. IN MOST MISSIONS, RN WILL BE SCALED AT 2(+29), BUT IN THE 206 MISSION, RN WILL BE
R0463   SCALED AT 2(+24)M.

 0464   REF   1              37,3154  3 4776 0  NORMLIZE CAF     THIRTEEN        SET UP TO COPY 14 REGS- RN1,VN1,PIPTIME1
 0465   REF  10  LAST  833   37,3155  0 5607 0           TC      GENTRAN         INTO RN,VN, PIPTIME
 0466   REF   5  LAST  833   37,3156   01070 1           ADRES   RN1             FROM HERE
 0467   REF  14  LAST  833   37,3157   01027 0           ADRES   RN              TO HERE

 0468                        37,3160  0 0003 1           RELINT
 0469   REF 207  LAST  833   37,3161  0 6006 1           TC      INTPRET
 0470                        37,3162   45175 0           VLOAD   CALL            LOAD RN FOR CALCGRAV
 0471   REF  15  LAST  836   37,3163   01030 0                   RN
 0472   REF   2  LAST  723   37,3164   77270 1                   CALCGRAV        INITIALISE UNITR RMAG GDT1

 0473   REF   3  LAST  730   37,3165   25046 1           STOVL   GDT/2
 0474   REF   3  LAST   80   37,3166   01115 0                   GOBL1/2
 0475   REF   3  LAST  730   37,3167   35054 0           STCALL  GOBL/2
 0476   REF   4  LAST  588   37,3170   31263 1                   ENDPLAC
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L        SERVICER207                                                              USER'S PAGE NO. 15      E7 S3

P0478    ***** PIPA READER *****

R0479                       MOD NO. 00  BY D. LICKLY  DEC.9 1966

R0480    FUNCTIONAL DESCRIPTION

R0481        SUBROUTINE TO READ PIPA COUNTERS, TRYING TO BE VERY CAREFUL SO THAT IT WILL BE RESTARTABLE.
R0483        PIPA READINGS ARE STORED IN THE VECTOR DELV. THE HIGH ORDER PART OF EACH COMPONENT CONTAINS THE PIPA READING,
R0485        RESTARTS BEGIN AT REREADAC.

R0486        AT THE END OF THE PIPA READER THE CDUS ARE READ AND STORED AS A
R0487    VECTOR IN CDUTEMP.  THE HIGH ORDER PART OF EACH COMPONENT CONTAINS
R0488    THE CDU READING IN 2S COMP IN THE ORDER CDUX,Y,Z.  THE THRUST
R0489    VECTOR ESTIMATOR IN FINDCDUD REQUIRES THE CDUS BE READ AT PIPTIME.

R0490    CALLING SEQUENCE AND EXIT

R0491        CALL VIA TC, ISWCALL, ETC.

R0492        EXIT IS VIA Q.

R0493    INPUT

R0494        INPUT IS THROUGH THE COUNTERS PIPAX, PIPAY, PIPAZ, AND TIME2.

R0495    OUTPUT

R0496        HIGH ORDER COMPONENTS OF THE VECTOR DELV CONTAIN THE PIPA READINGS.
R0497        PIPTIME CONTAINS TIME OF PIPA READING.

R0498    DEBRIS (ERASABLE LOCATIONS DESTROYED BY PROGRAM)

R0499                  LOW ORDER DELV'S ARE ZEROED FOR TM INDICATION.
R0500                  TEMX    TEMY    TEMZ    PIPAGE


 0501                          37,3171  0 0006 1  PIPASR    EXTEND
 0502  REF  32  LAST  786      37,3172  3 0025 0            DCA     TIME2
 0503  REF   3  LAST  833      37,3173  53'105 0            DXCH    PIPTIME1          CURRENT TIME  POSITIVE VALUE
 0504  REF 143  LAST  827      37,3174  4 4772 0            CS      ZERO              INITIALIZE THESE AT NEG ZERO.
 0505  REF   2  LAST   79      37,3175  55'063 1            TS      TEMX
 0506  REF   2  LAST   79      37,3176  55'064 0            TS      TEMY
 0507  REF   2  LAST   79      37,3177  55'065 1            TS      TEMZ
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  0508    REF 144  LAST  837    37,3200  3 4772 1              CA       ZERO
  0509    REF   5  LAST  829    37,3201  55'320 0              TS       DELVZ            OTHER DELVS OK INCLUDING LOW ORDER
  0510    REF   6  LAST  828    37,3202  55'316 0              TS       DELVY

  0511    REF  11  LAST  832    37,3203  55'315 0              TS       DELVX +1         LOW ORDER DELV'S ARE ZEROED FOR TM: THUS
  0512    REF   7  LAST  838    37,3204  55'317 1              TS       DELVY +1         IF DNLNK'D LOW ORDER DELVS ARE NZ, THEY
  0513    REF   6  LAST  838    37,3205  55'321 1              TS       DELVZ +1         CONTAIN PROPER COMPENSATION. IF=0, THEN
 A0514                                                                                   THE TM VALUES ARE BEFORE COMPENSATION.

  0515    REF   4  LAST  828    37,3206  55'067 0              TS       PIPAGE           SHOW PIPA READING IN PROGRESS

  0516                          37,3207  0 0006 1   REPIP1     EXTEND
  0517    REF   7  LAST  831    37,3210  4 0040 1              DCS      PIPAX            X AND Y PIPS READ
  0518    REF   3  LAST  837    37,3211  53'064 0              DXCH     TEMX
  0519    REF   8  LAST  838    37,3212  52 040 1              DXCH     PIPAX            PIPAS SET TO NEG ZERO AS READ.
  0520    REF  12  LAST  838    37,3213  55'314 1              TS       DELVX
  0521    REF   8  LAST  838    37,3214  23'316 1              LXCH     DELVY

  0522    REF   4  LAST  438    37,3215  4 0041 0   REPIP3     CS       PIPAZ            REPEAT PROCESS FOR Z PIP
  0523    REF   3  LAST  837    37,3216  57'065 0              XCH      TEMZ
  0524    REF   5  LAST  838    37,3217  56 041 1              XCH      PIPAZ
  0525    REF   7  LAST  838    37,3220  55'320 0   DODELVZ    TS       DELVZ

  0526    REF 147  LAST  788    37,3221  0 0002 0              TC       Q


  0527    REF  21  LAST  829    E6,1661                        EBANK=   ACG

  0528    REF   3  LAST  700    37,3222  11'166 0   REREADAC   CCS      PHASE5           LAST PASS CHECK
  0529                          37,3223  1 3225 0              TCF      +2
  0530    REF  42  LAST  831    37,3224  1 5314 0              TCF      TASKOVER

  05302   REF   3  LAST  539    37,3225  3 7652 1              CAF      PRIO31           RESTART MAY HAVE WIPED OUT LASTBIAS, AN
  05303   REF  10  LAST  776    37,3226  55'277 0              TS       1/PIPADT               UNPROTECTED NOVAC FROM PREREAD,
 A05304                                                                                        WHICH SET(S) UP 1/PIPADT (THUSLY)
 A05305                                                                                        FOR NON-COASTING COMPENSATION....BE
 A05306                                                                                        SURE 1/PIPADT IS AOK. (PRIO31 IS
 A05307                                                                                        2.0SEC SC.AT B+8CS)

  0531    REF   5  LAST  838    37,3227  11'067 0              CCS      PIPAGE
  0532    REF   4  LAST  829    37,3230  1 2652 0              TCF      READACCS         PIP READING NOT STARTED. GO TO BEGINNING

  0533    REF   1               37,3231  3 3267 1              CAF      DONEADR          SET UP RETURN FROM PIPASR
  0534    REF 148  LAST  838    37,3232  54 0002 1             TS       Q

  0535    REF   8  LAST  838    37,3233  11'320 0              CCS      DELVZ
  0536    REF 149  LAST  838    37,3234  0 0002 0              TC       Q                Z DONE, GO DO CDUS
  0537                          37,3235  1 3240 0              TCF      +3               Z NOT DONE, CHECK Y.
  0538    REF 150  LAST  838    37,3236  0 0002 0              TC       Q
  0539    REF 151  LAST  838    37,3237  0 0002 0              TC       Q
```

```
0540                            37,3240  22 007 0             ZL
0541  REF   9  LAST  838        37,3241  11'316 0             CCS     DELVY
0542                            37,3242  1 3245 0             TCF     +3
0543  REF   1                   37,3243  1 3254 0             TCF     CHKTEMX             Y NOT DONE, CHECK X.
0544                            37,3244  1 3245 0             TCF     +1
0545  REF   6  LAST  838        37,3245  22 041 1             LXCH    PIPAZ               Y DONE, ZERO Z PIP.

0546  REF   4  LAST  838        37,3246  11'065 1             CCS     TEMZ
0547  REF   5  LAST  839        37,3247  4 1065 1             CS      TEMZ                TEMZ NOT = -0, CONTAINS -PIPAZ VALUE.
0548  REF   1                   37,3250  1 3220 0             TCF     DODELVZ
0549                            37,3251  1 3247 1             TCF     -2
0550  REF   9  LAST  838        37,3252  23'320 1             LXCH    DELVZ               TEMZ = -0, L HAS ZPIP VALUE.
0551  REF 152  LAST  838        37,3253  0 0002 0             TC      Q

0552  REF   4  LAST  838        37,3254  11'063 1  CHKTEMX    CCS     TEMX                HAS THIS CHANGED
0553  REF   5  LAST  839        37,3255  4 1063 1             CS      TEMX                YES
0554                            37,3256  1 3261 0             TCF     +3                  YES
0555                            37,3257  1 3255 1             TCF     -2                  YES
0556  REF   1                   37,3260  1 3207 0             TCF     REPIP1              NO
0557  REF  13  LAST  838        37,3261  55'314 1             TS      DELVX

0558  REF   3  LAST  837        37,3262  4 1064 0             CS      TEMY
0559  REF  10  LAST  839        37,3263  55'316 0             TS      DELVY

0560  REF 145  LAST  838        37,3264  4 4772 0             CS      ZERO                ZERO X AND Y PIPS
0561  REF   9  LAST  838        37,3265  52 040 1             DXCH    PIPAX               L STILL ZERO FROM ABOVE

0562  REF   1                   37,3266  1 3215 0             TCF     REPIP3

0563  REF   1                   37,3267   02653 0  DONEADR    GENADR  PIPSDONE
```

```
R0564    *********************************************************************************************************

R0566             ROUTINE CALCRVG INTEGRATES THE EQUATIONS OF MOTION BY AVERAGING THE THRUST AND GRAVITATIONAL
R0568    ACCELERATIONS OVER A TIME INTERVAL OF 2 SECONDS.

R0569             FOR THE EARTH-CENTERED GRAVITATIONAL FIELD, THE PERTURBATION DUE TO OBLATENESS IS COMPUTED TO THE FIRST
R0571    HARMONIC COEFFICIENT J.

R0572             ROUTINE CALCRVG REQUIRES...
R0573                    1) THRUST ACCELERATION INCREMENTS IN DELV SCALED SAME AS PIPAX,Y,Z IN STABLE MEMBER COORDS.
R0575                    2) VN SCALED 2(+7)M/CS IN REFERENCE COORDS.
R0576                    3) RN SCALED AT 2(+29) METERS IN REFERENCE COORDS.
R0577                    4) UNITW THE EARTH S UNIT ROTATIONAL VECTOR (SCALED AS A FULL UNIT VECTOR) IN REFERENCE COORDS.

R0579    IT LEAVES RN1 UPDATED (SCALED AT 2(+29)M, VN1 (SCALED AT 2(+7)M/CS), AND GDT1/2 (SCALED AT 2(+7)M/CS). ALSO HALF
R0581    UNIT VECTOR UNITR, RMAG IN 36D SCALED AT 2(+29)M, R MAG SQ. IN 34D SCALED AT 2(+58) M SQ.
R0583

 0584                          37,3270   41456 0  CALCGRAV UNIT    PUSH             ENTER WITH RN IN MPAC
 0585    REF   2  LAST   91    37,3271   01756 1           STORE   UNITR
 0586                          37,3272   67340 1           LXC,1   SLOAD
 0587    REF  15  LAST  730    37,3273   03746 1                   RTX2
 05871   REF  31  LAST  791    37,3274   00047 1                   X1
 0588                          37,3275   77240 1           BMN     VLOAD
 05881   REF   1               37,3276   77324 1                   ITISMOON
 0589                          37,3277   41441 0           DOT     PUSH
 0590    REF   8  LAST  816    37,3300   01712 1                   UNITW
 0591                          37,3301   44316 0           DSQ     BDSU
 0592    REF   1               37,3302   37375 1                   DP1/20
 0593                          37,3303   56325 0           PDDL    DDV
 0594    REF   1               37,3304   37377 0                   RESQ
 0595                          37,3305   00043 0                   34D              (RN)SQ
 0596                          37,3306   00041 1           STORE   32D              TEMP FOR (RE/RN)SQ
 0597                          37,3307   41205 0           DMP     DMP
 0598    REF   1               37,3310   37401 0                   20J
 0599                          37,3311   65361 0           VXSC    PDDL
 0600    REF   3  LAST  840    37,3312   01756 1                   UNITR
 0601                          37,3313   41205 0           DMP     DMP
 0602    REF   1               37,3314   37403 1                   2J
 0603                          37,3315   00041 1                   32D
 0604                          37,3316   53361 0           VXSC    VAD
 0605    REF   9  LAST  840    37,3317   01712 1                   UNITW
 0606                          37,3320   77626 0           STADR
 0607    REF   4  LAST  836    37,3321   76662 1           STORE   GOBL1/2
 0608                          37,3322   41455 0           VAD     PUSH
 0609    REF   4  LAST  840    37,3323   01756 1                   UNITR
 0610                          37,3324   63545 0  ITISMOON DLOAD   DSQ
 0611                          37,3325   00045 0                   36D
 06112                         37,3326   77701 1           NORM
 0612    REF  18  LAST  726    37,3327   00050 1                   X2
 06121                       37,3330   53663 1            BDDV*  SLR*
 06122  REF   1              37,3331   37367 1                   -MUDT(E),1
 0613                        37,3332   56623 0                   0 -21D,2
 0614                        37,3333   45561 1            VXSC   STADR
 0615   REF   2  LAST   79   37,3334   76670 1            STORE  GDT1/2             SCALED AT 2(+7) M/CS
 0616                        37,3335   77616 0            RVQ

 0622                        37,3336   74375 0  CALCRVG   VLOAD  VXSC
 0623   REF  12  LAST  833   37,3337   01315 1                   DELV
 0624   REF   2  LAST  833   37,3340   37365 0                   KPIP1
 0625                        37,3341   76505 0            VXM    VSL1
 0626   REF  45  LAST  822   37,3342   01734 0                   REFSMMAT
 0627   REF   7  LAST  740   37,3343   03432 1            STORE  DELVREF            DELV IN REF COORDS AT 2(+7)
 0628                        37,3344   41562 0            VSR1   PUSH
 0629                        37,3345   41455 0            VAD    PUSH               (DV-OLDGDT)/2 TO PD SCALED AT 2(+7)M/CS
 0630   REF   4  LAST  836   37,3346   01046 1                   GDT/2
 0631                        37,3347   74255 0            VAD    VXSC
 0632   REF  12  LAST  808   37,3350   01036 0                   VN
 0633   REF   1              37,3351   37373 1                   2SEC(22)
 0634                        37,3352   44055 1            VAD    STQ
 0635   REF  16  LAST  836   37,3353   01030 0                   RN
 0636                        37,3354   00037 0                   31D
 0637   REF   6  LAST  836   37,3355   35071 1            STCALL RN1                TEMP STORAGE OF RN SCALED 2(+29)M
 0638   REF   3  LAST  836   37,3356   77270 1                   CALCGRAV

 0639                        37,3357   53255 0            VAD    VAD
 0640                        37,3360   77655 1            VAD
 0641   REF  13  LAST  841   37,3361   01036 0                   VN
 0642   REF   3  LAST  539   37,3362   35077 1            STCALL VN1                TEMP STORAGE OF VN SCALED 2(+7)M/CS
 0643                        37,3363   00037 0                   31D

 0645                        37,3364   02312 0  KPIP1     2DEC   0.074880           207 DELV SCALING. 1 PULSE = 5.85 CM/SEC.
 0645                        37,3365   32537 1
 0646                        37,3366   61377 0  -MUDT(E)  2DEC*  -7.9720645 E+12 B-44*
 0646                        37,3367   55754 1
 0647                        37,3370   77644 1  -MUDT(M)  2DEC*  -9.805556 E+10 B-44*
 0647                        37,3371   65556 1
 0648                        37,3372   00000 1  2SEC(22)  2DEC   200 B-22
 0648                        37,3373   31000 0

 0649                        37,3374   01463 1  DP1/20    2DEC   0.05
 0649                        37,3375   06315 0
 0650                        37,3376   00001 0  RESQ      2DEC*  40.6809913 E12 B-59*
 0650                        37,3377   05000 1
 0651                        37,3400   02047 0  20J       2DEC*  3.24692010 E-2 B1*
 0651                        37,3401   36332 0
 0652                        37,3402   00152 1  2J        2DEC*  3.24692010 E-3 B1*
 0652                        37,3403   14511 1
```

```
L       ENTRY LEXICON                                                                 USER'S PAGE NO.   1      ED S3

R0001            VARIABLE    DESCRIPTION                         MAXIMUM VALUE *          COMPUTER NAME
R0003            --------    -----------                         ------- -----            -------- ----

R0005            -
R0006            URT0        INITIAL TARGET VECTOR               2 (UNIT VECTOR)          = RTINIT
R0008            -
R0009            UZ          UNIT VECTOR NORTH                   1                        = UNITW
R0011            -
R0012            V           VELOCITY VECTOR                     2 VSAT                   = VEL
R0014            -
R0015            R           POSITION VECTOR                     2 EXP 29 METERS          = RN
R0017            -
R0018            VI          INERTIAL VELOCITY                   128 M/CENTISEC           = VN
R0020            -
R0021            RTE         VECTOR EAST AT INITIAL TARGET       2                        = RTEAST
R0023            -                     -       -
R0024            UTR         NORMAL TO RTE AND UZ                2                        = RTNORM
R0026            -
R0027            URT         TARGET VECTOR                       2                        = RT
R0029            -
R0030            UNI         UNIT NORMAL TO TRAJECTORY PLANE     2
R0031            -
R0032            DELV        INTEGRATED ACCEL. FROM PIPAS        5.85 16384 CM/S
R0033            -
R0034            G           GRAVITY VECTOR                      128 M/CENTISEC           = GDT/2

R0036            A0          INITIAL DRAG FOR UPCONTRL           805 FPSS                 FPSS=FT/SEC/SEC
R0038            AHOOKDV     TERM IN GAMMAL CALC. = AHOOK DVL    8
R0039            A1          DRAG VALUE IN FACTOR CALCULATION    805 FPSS
R0040            ALP         CONST FOR UPCONTRL                  1
R0041            ASKEP       KEPLER RANGE                        21600 NM                 NM = NAUTICAL MILE
R0043            ASP1        FINAL PHASE RANGE                   21600 NM
R0044            ASPUP       UP-RANGE                            21600 NM
R0045            ASP3        GAMMA CORRECTION                    21600 NM
R0046            ASPDWN      RANGE DOWN TO PULL-UP               21600 NM
R0047            ASP         PREDICTED RANGE                     21600 NM                   NOT STORED
R0049            COSG        COSINE(GAMMAL)                      2                        = COSG/2
R0051    *       C/D0        RECIPROCAL DRAG, -4/D0 B-8          64/FPSS                  AGC ONLY
R0053            D           TOTAL ACCELERATION                  805 FPSS
R0054            D0          CONTROLLED CONSTANT D               805 FPSS
R0055            DHOOK       TERM IN GAMMAL COMPUTATION          805 FPSS
R0056            DIFF        THETNM-ASP  (RANGE DIFFERENCE)      21600     NM
R0057            DIFFOLD     PREVIOUS VALUE OF DIFF              21600     NM
R0058            DLEWD       CHANGE IN LEWD                      1
R0059            DR          REFERENCE DRAG FOR DOWNCONTROL      805 FPSS                   NOT STORED
R0061            DREFR( )    REFERENCE DRAG (FINAL PHASE TABLE)  805 FPSS                   NOT SAVED
R0063            DVL         VS1-VL                              2 VSAT
R0064            E           ECCENTRICITY                        4                          NOT STORED
R0066            F1( )       DRANGE/D DRAG (FINAL PHASE TABLE)   2700/805                 = FX +5
R0068            F2( )       DRANGE/D ROOT (FINAL PHASE TABLE)   2700/2VS NM/FPS          = FX +4   /8
```

```
L       ENTRY LEXICON                                                                         USER'S PAGE NO.  2      E0 S3

R0070             F3( )        ORANGE/D (L/D) (FINAL PHASE TABLE) 2700 NM                        = FX
R0072                                                                                       * MAXIMUM VALUE DENOTES UNSCALED
R0074                                                                                         VARIABLE VALUE WHEN SCALED
R0076   FIGURE    7.0-2        COMPUTER VARIABLES                                             VARIABLE HAS MAXIMUM VALUE OF ONE.
```

```
L        ENTRY LEXICON                                                    USER'S PAGE NO.  3      E0 53

P0078             VARIABLE    DESCRIPTION                          MAXIMUM VALUE          COMPUTER NAME
R0080             --------    -----------                          ------- -----          -------- ----

R0082             FACT1       CONST FOR UPCONTRL                   2 VSAT
R0083             FACT2       CONST FOR UPCONTRL                   1/805 FPSS
R0084             FACTOR      USED IN UPCONTRL                     1
R0085             GAMMAL      FLIGHT PATH ANGLE AT VL              1 RADIAN
R0086             GAMMAL1     SIMPLE FORM OF GAMMAL                1 RADIAN
R0087             HEADSUP     INDICATOR FOR INITIAL ROLL           1
R0088             KA          DRAG TO LIFT UP IF DOWN              805 FPSS                = KAT
R0090             KLAT        LATERAL SWITCH GAIN                  1              (NOM = .0125)
R0092             K2ROLL      INDICATOR FOR ROLL SWITCH
R0093             LAD         MAX L/D (MIN ACTUAL VEHICLE L/D)     1
R0094             LADPAD      NOMINAL VEHICLE L/D, SP PAD LOAD     1              (NOM = 0.3)
R0096             LATANG      LATERAL RANGE                        4 RADIANS
R0097             LAT(SPL)    GEODETIC LATITUDE OF TARGET          1 REVOLUTION
R0098             LNG(SPL)    LONGITUDE OF TARGET                  1 REVOLUTION
R0099             LEQ         EXCESS C.F. OVER GRAV=(VSQ-1)GS      128.8 FPSS
R0100             LEWD        UPCONTROL REFERENCE L/D              1
R0101             LOD         FINAL PHASE L/D                      1              (NOM = 0.18)
R0103             LODPAD      FINAL PHASE L/D, SP PAD LOAD         1
R0104             L/D         DESIRED LIFT TO DRAG RATIO           1
R0105                         (VERTICAL PLANE)
R0106             L/D1        TEMP STORAGE FOR L/D IN LATERAL      1
R0107             L/DCMINR    LAD COS(15DEG)                       1              (NOM = 0.2895)
R0109             PREDANGL    PREDICTED RANGE  (FINAL PHASE)       2700 NM                 = PREDANG
R0111             Q2          FINAL PHASE RANGE                    21600  NM
R0112             Q7          MINIMUM DRAG FOR UPCONTROL           805 FPSS
R0113             RDOT        ALTITUDE RATE                        2 VSAT
R0114             RDOTREF     REFERENCE RDOT FOR UPCONTROL         2 VSAT
R0115             RDOTREF( )  REFERENCE RDOT (FINAL PHASE TABLE)   2 VSAT                  = FX +3   /8
R0117             RDTR        REFERENCE RDOT FOR DOWNCONT          2 VSAT                    NOT SAVED
R0119             ROLLC       ROLL COMMAND                         1 REVOLUTION
R0120             RTOGO( )    RANGE TO GO   (FINAL PHASE TABLE)    2700 NM                 = FX +2
R0122             SL          SINE OF LATITUDE                     1                         NOT SAVED
R0124             T           TIME                                 8 28 CENTISEC           = PIPTIME-TIME/RTO
R0126             THETA       DESIRED RANGE (RADIANS)              2 PI RADIANS            = THETAH
R0128             THETNM      DESIRED RANGE (NM)                   21600 NM                  NON EXISTENT
R0130             V           VELOCITY MAGNITUDE                   2 VSAT
R0131             V1          INITIAL VELOCITY FOR UPCONTROL       2 VSAT
R0132             VL          EXIT VELOCITY FOR UPCONTROL          2 VSAT
R0133             VMAGI       INERTIAL VELOCITY MAGNITUDE,|VI|     128 M/CENTISEC
R0134             VREF        REFERENCE VELOCITY FOR UPCONTROL     2 VSAT
R0135             VREF( )     REFERENCE V   (FINAL PHASE TABLE)    2 VSAT                    NOT STORED
R0137             VS1         VSAT OR V1, WHICHEVER IS SMALLER     2 VSAT
R0138                           2     2
R0139             VBARS       VL /VSAT                             4
R0140                                                    2     2
R0141             VSQ         NORMALISED VEL. SQUARED = V /VSAT    4                       = VSQUARE
R0143             WT          EARTH RATE TIMES TIME                1 REVOLUTION              NOT SAVED
```

```
L       ENTRY LEXICON                                                       USER'S PAGE NO.   4      E0 53

R0145                                                                        = WIE (DTEAROT)
R0147               X          INTERMEDIATE VARIABLE IN G-LIMITER 2 VSAT      NOT SAVED
R0149               Y          LATERAL MISS LIMIT                4 RADIANS    NOT SAVED

R0151   FIGURE   7.0-2A        COMPUTER VARIABLES  (CONTINUED)
```

```
L       ENTRY LEXICON                                                                  USER'S PAGE NO.   5       E  53

R0152            EXTRA COMPUTER ERASABLE LOCATIONS NOT SHOWN ON FLOW CHARTS
R0153            -----------------------------------------------------------

R0154            VARIABLE    DESCRIPTION                            MAXIMUM VALUE
R0155            --------    -----------                            ------- -----

R0156            GOTOADDR    ADDRESS SELECTED BY SEQUENCER
R0157            XPIPBUF     BUFFER TO STORE X PIPA COUNTS
R0158            YPIPBUF     BUFFER TO STORE Y PIPA COUNTS
R0159            ZPIPBUF     BUFFER TO STORE Z PIPA COUNTS
R0160            PIPCTR      COUNTS PASSES THRU PIPA READ ROUTINE
R0161            JJ          INDEX IN FINAL PHASE TABLE LOOK-UP
R0162            MM          INDEX IN FINAL PHASE TABLE LOOK-UP
R0163            GRAD        INTERPOLATION FACTOR IN FINAL PHASE
R0164            FX          DRANGE/D L/D = F3                      2700 NM
R0165            FX + 1      AREF                                   805 FPSS
R0166            FX + 2      RTOGO                                  2700 NM
R0167            FX + 3      RDOTREF                                VSAT/4
R0168            FX + 4      DRANGE/D RDOT = F2                     21600/2VS NM/FPS
R0169            FX + 5      DRANGE/D DRAG = F1                     2700/805 NM/FPSS
R0170            TEM1B       TEMPORARY LOCATION
R0171            TIME/RTO    TIME OF INITIAL TARGET RTINIT          B 28 CENTISEC
R0172            DTEAROT     EST TIME BETWEEN RTINIT AND RT         B 28 CENTISEC

R0173            -
R0174            UNITV       UNIT  V VECTOR                         2
R0175            -
R0176            UNITR       UNIT R VECTOR                          2
R0177             -
R0178            -VREL       NEGATIVE VELOCITY REL TO ATMOSP        2 VSAT

R0179            COMPUTER SWITCHES                                  INITIAL STATE           CM/FLAGS = STATE +6
R0181            -------- --------                                  -------------           -------------------

R0183   *        ENTRYDSP    DO ENTRY DISPLAY, IF SET               NON-BRANCH (1)           92D, BIT13
R0185            GONEPAST    INDICATES OVERSHOOT OF TARGET              BRANCH (1)           95D, BIT10
R0187            RELVELSW    RELATIVE VELOCITY SWITCH               NON-BRANCH (0)           96D, BIT 9
R0189            EGSW        FINAL PHASE SWITCH                     NON-BRANCH (0)           97D, BIT 8
R0191            NOSWITCH    INHIBIT LATERAL SWITCH                 NON-BRANCH (0)           98D, BIT 7
R0193            HIND        INDICATES ITERATION IN HUNTEST         NON-BRANCH (0)           99D, BIT 6
R0195            INRLSW      INDICATES INIT ROLL ATTITUDE SET       NON-BRANCH (0)          100D, BIT 5
R0197            LATSW       INHIBIT DOWNLIFT SWITCH IF NOT SET         BRANCH (1)          101D, BIT 4
R0199            .05GSW      INDICATES DRAG EXCEEDS .05 GS          NON-BRANCH (0)          102D, BIT 3

R0201            GONEBY      INDICATES GONE PAST TARGET (SET)       SELF-INITIALIZING       112D, BIT 8  IN STATE + 7

R0203   FIGURE   7.0-28      COMPUTER VARIABLES  (CONTINUED)
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```
L        ENTRY LEXICON                                                      USER'S PAGE NO.  6      E0 S3

R0204              BODY ATTITUDE QUANTITIES  (CM/POSE)
R0205              -----------------------------------

R0206              VARIABLE   DESCRIPTION                    MAXIMUM VALUE
R0207              --------   -----------                    ------- -----

R0208               -
R0209              -VREL      NEGATIVE VELOCITY REL TO ATMOS.  2 VSAT
R0210              -              -
R0211              OLDUYA     USED FOR UYA BELOW 1000 FPS       2


R0212              -
R0213              UXA/2      UNIT VECTOR TRIAD                 2
R0214              -
R0215              UYA/2          BASED ON                      2
R0216              -
R0217              UZA/2                THE TRAJECTORY.         2


R0218              -
R0219              UBX/2      UNIT VECTOR                       2
R0220              -
R0221              UBY/2          BODY TRIAD                    2
R0222              -
R0223              UBZ/2                FOR CM.                 2

R0224    FIGURE    7.0-2C     COMPUTER VARIABLES  (CONTINUED)
```

```
L      ENTRY LEXICON                                                   USER'S PAGE NO.   7     E0 53

P0225        DISPLAY QUANTITIES       (FOR USAGE,SEE SECTION 4: P 61 THROUGH P 67)
R0227        ------------------

R0228         THIS TABLE PROVIDES THE READER WITH DISPLAY QUANTITY INFORMATION. THE VARIABLE NAMES REFLECT
R0230        SECTION 5 USAGE.  EXCEPTING IMBEDDED BLANKS, THE SECTION 4 NAMES ARE PARENTHESIZED,IF DIFFERENT.
R0232        SIGN CONVENTIONS ARE FOUND IN SECTION 4. IF THE DISPLAY VARIABLE NAME DIFFERS FROM SECTION 5 USAGE,
R0234        SAY BECAUSE OF SCALE FACTOR, THE ALTERNATE SECTION 5 NAME IS ENCLOSED IN ANGULAR BRACKETS: < >.
R0236        DISPLAY QUANTITY INFORMATION APPEARING ELSEWHERE IN SECTION 5 OTHER THAN IN 5.7 MAY BE FOUND THUS:
R0238                     N 60 & N 63  (ALL)       FIGURE 6.10-4  IN 5.6.10.3
R0240                     N 22 (ALL)               FIGURE 6.10-11 IN 5.6.10.6
R0242                     N 67 (LAT, LONG)         FIGURE 5.3.1   IN 5.5.3

R0244        VARIABLE  DESCRIPTION                MAXIMUM VALUE   DISPLAY NOUNS
R0246        --------  -----------                ------- -----   ------- -----

R0248        GMAX      PREDICTED MAXIMUM ENTRY ACCEL     163.84 GS        N 60
R0250        VPRED     PREDICTED VELOCITY AT ALTITUDE    128 M/CENTISEC   N 60
R0252                  400K FT ABOVE FISCHER RADIUS.
R0253        GAMMAEI   PREDICTED GAMMA AT ALTITUDE       1 REVOLUTION     N 60
R0255                  400K FT ABOVE FISCHER RADIUS.
R0256        RTGO      RANGE ANGLE TO SPLASH (RTOGO)     1 REVOLUTION     N 63
R0258                  FROM EMSALT FT ABOVE FISCHER
R0259                  RADIUS.  (IN NM)
R0260        VIO       PREDICTED VELOCITY AT ALTITUDE    128 M/CENTISEC   N 63
R0262                  EMSALT FT ABOVE FISCHER RADIUS.
R0263        TTE       TIME OF FREE FALL (TFE)  TO       B 28 CENTISEC    N 63
R0265                  ALTITUDE EMSALT FT ABOVE FISCHER
R0266                  RADIUS.
R0267        OGA       OUTER GIMBAL ANGLE  (OG ROLL)     1 REVOLUTION     N 22
R0269        IGA       INNER GIMBAL ANGLE  (IG PITCH)    1 REVOLUTION     N 22
R0271        MGA       MIDDLE GIMBAL ANGLE (MG YAW)      1 REVOLUTION     N 22
R0273                  ALL ABOVE ANGLES FOR HYPERSONIC TRIM
R0274        D         DRAG ACCELERATION  (G)            805 FPSS                  N 64,                N 74
R0276        VMAGI     INERTIAL VELOCITY MAGNITUDE (VI)  128 M/CENTISEC            N 64, N 68,          N 74
R0278        ROLLC     ROLL COMMAND  (BETA)              1 REVOLUTION     N 66,          N 68, N 69, N 74
R0280        XRNGERR   CROSS-RANGE ERROR <LATANG IN NM>  1 REVOLUTION     N 66
R0282        DNRNGERR  DOWN RANGE ERROR **               1 REVOLUTION     N 66
R0284                  <PREDANG - THETAH   IN NM>
R0285                  ** <DNRNGERR DISPLAYS 9999.9  IF GONEPAST =1  IN P 67>
R0287        HDOT      ALTITUDE RATE  <RDOT>             128 M/CENTISEC                  N 68
R0289        Q7        EXIT DRAG LEVEL  (DL)             805 FPSS                             N 69
R0291        VL        EXIT VELOCITY FOR UP-CONTROL      2 VSAT                               N 69
R0293        RTOGO     DESIRED RANGE ANGLE <THETAH>      1 REVOLUTION     N 67, N 64
R0295                  <-THETAH IF GONEBY =0,  THETAH IF GONEBY =1>
R0296        LAT       GEODETIC LATITUDE OF VEHICLE      1 REVOLUTION     N 67
R0298        LONG      LONGITUDE OF VEHICLE              1 REVOLUTION     N 67

R0300        THE FOLLOWING IS A DATA INPUT NOUN (REFER TO SECTION 4,P 61 & P 62)
R0302        HEADSUP   INDICATOR FOR INITIAL ROLL        1 REVOLUTION     N 61
R0304        LAT(SPL)  GEODETIC LATITUDE OF TARGET       1 REVOLUTION     N 61
```

```
R0306                          (IMPACT LAT)
R0307              LNG(SPL)    LONGITUDE OF TARGET (IMPACT LONG)  1 REVOLUTION    N 61

R0309  FIGURE    7.0-20        COMPUTER VARIABLES  (CONTINUED)
```

```
L         ENTRY LEXICON                                                                   USER'S PAGE NO.   9       E0 S3

R0310                CONSTANTS AND GAINS                                                  VALUE
R0312                -------------------                                                  -----

R0314                C1            FACTOR IN ALP COMPUTATION                               1.25
R0316                C16           CONSTD GAIN ON DRAG                                     0.01
R0318                C17           CONSTD GAIN ON ROOT                                     0.002
R0320                C18           BIAS VEL. FOR FINAL PHASE START                         500       FPS
R0322                C20           MAX DRAG FOR DOWN-LIFT                                  210       FPSS
R0324                C21           DRAG FOR NO LATERAL SWITCH                              140       FPSS
R0326                CHOOK         FACTOR IN AHOOK COMPUTATION                             0.25
R0328                CH1           FACTOR IN GAMMAL COMPUTATION                            1.0
R0330                COS15         COS( 15 DEG)                                            0.965
R0332                DLEWD0        INITIAL VARIATION IN LEWD                              -0.05
R0334                DT            COMPUTATION CYCLE TIME INTERVAL                         2         SEC.
R0336                GMAX          MAXIMUM ACCELERATION                                    257.6     FPSS          (8 G-S)
R0338                KA1           FACTOR IN KA CALC                                       1.3 GS
R0340                KA2           FACTOR IN KA CALC                                       0.2 GS
R0342                KA3           FACTOR IN D0 CALC                                       90   FPSS
R0344                KA4           FACTOR IN D0 CALC                                       40   FPSS
R0346                KB1           OPTIMIZED UPCONTROL GAIN                                2.5
R0348                KB2           OPTIMIZED UPCONTROL GAIN                                0.0025
R0350                KDMIN         INCREMENT ON Q7F TO DETECT END OF KEPLER PHASE          0.5       FPSS
R0352                KTETA         TIME OF FLIGHT CONSTANT                                 1000
R0354                KLAT1         FACTOR IN KLAT CALC                                     1/24
R0356                K44           GAIN  USED IN INITIAL ROLL SECTION                      19749550 FPS
R0358                LATBIAS       LATERAL SWITCH BIAS TERM                                0.41252961 NM
R0360                LEWD1         NOMINAL UPCONTROL L/D                                   0.15
R0362                POINT1        FACTOR TO REDUCE UPCONTROL GAIN                         0.1
R0364                Q3            FINAL PHASE DRANGE/D V                                  0.07      NM/FPS
R0366                Q5            FINAL PHASE DRANGE/ D GAMMA                             7050      NM/RAD
R0368                Q6            FINAL PHASE INITIAL FLIGHT PATH ANGLE                   0.0349    RAD
R0370                Q7F           MIN DRAG FOR UPCONTROL                                  6         FPSS
R0372                Q7MIN         MIN VALUE FOR Q7 IN FACTOR CALCULATION                  805       FPSS       (DISABLE FACTOR)
R0374                Q19           FACTOR IN GAMMAL1 CALCULATION                           0.5
R0376        *       Q21           FACTOR IN Q2 CALCULATION.                               3500      NM
R0378        *       Q22           FACTOR IN Q2 CALCULATION.                              -1992      NM
R0380                VFINAL1       VELOCITY TO START FINAL PHASE ON INITIAL ENTRY          27000     FPS
R0382                VFINAL        FACTOR IN INITIAL UP-DOWN CALC                          26600     FPS
R0384                VLMIN         MINIMUM VL                                              18000     FPS
R0386                VMIN          VELOCITY TO SWITCH TO RELATIVE VEL                      VSAT/2
R0388                VRCONTRL      ROOT TO START INTO HUNTEST                              700       FPS
R0390                              VRCONT = COMPUTER NAME
R0391                25NM          TOLERANCE TO STOP RANGE ITERATION                       25        NM
R0393                VQUIT         VELOCITY TO STOP STEERING                               1000      FPS
```

```
L        ENTRY LEXICON                                                  USER'S PAGE NO.  10        E0 53

P0395                CONVERSION FACTORS AND SCALING CONSTANTS
R0396                ---------- ------- --- ------- ---------

R0397                ATK          ANGLE IN RAD TO NM                    3437.7468    NM/RAD
R0399                GS           NOMINAL G VALUE FOR SCALING           32.2         FPSS
R0401                HS           ATMOSPHERE SCALE HEIGHT               28500        FT
R0403                J            GRAVITY HARMONIC COEFFICIENT          0.00162346
R0405                KWE          EQUATORIAL EARTH RATE                 1546.70168   FPS
R0407                MUE          EARTH GRAVITATIONAL CONSTANT          3.986032233 E 14 CUBIC M/ SEC SEC
R0409                RE           EARTH RADIUS                          21202900     FT
R0411                REQ          EARTH EQUATORIAL RADIUS               20925738.2   FT
R0413                VSAT         SATELLITE VELOCITY AT RE              25766.1973   FPS
R0415                WIE          EARTH RATE                            0.0000729211505 RAD/SEC

R0417   FIGURE       7.0-3        CONSTANTS, GAINS AND CONVERSION FACTORS
```

```
R0001    ENTRY INITIALIZATION ROUTINE
R0002     ----------------------------

 0004    REF    1                25,2000                     SETLOC REENTRY
 0005                            25,2000                     BANK

 0006    REF    1                                            COUNT* $$/ENTRY
 0007    REF    7  LAST  799     E7,1451                     EBANK= RTINIT

 0011    REF   24  LAST  196       0102             CM/FLAGS EQUALS STATE +6

 0012                            25,2000   77776 1  STARTENT EXIT                     MM = 63
A0013                                                                         COME HERE FROM  CM/POSE . RESTARTED IN CM/POSE.

 0014    REF    1                25,2001  4 2113 1           CS     ENTMASK           INITIALIZE ALL SWITCHES TO ZERO
A0015                                                                                 EXCEPT LATSW, ENTRYDSP AND GONEPAST.
A0016                                                                                 GONEBY 112D BIT8 FLAG7,SELF INITIALIZING
 0017                            25,2002  0 0004 0           INHINT
 0018    REF    5  LAST  828     25,2003  7 0102 0           MASK   CM/FLAGS
A0019                                                                                 ENTRYDSP = 92D  B13
A0020                                                                                 GONEPAST=95D B10,   RELVELSW=96D B9
A0021                                                                                 EGSW = 97D  B8        NOSWITCH = 98D  B7
A0022                                                                                 HIND=99D B6           INRLSW=100D B5
A0023                                                                                 LATSW=101D B4         .05GSW=102D B3

 0024    REF    1                25,2004  6 2114 1           AD     ENTRYSW           SET ENTRYDSP, LATSW, GONEPAST.
 0025    REF    6  LAST  852     25,2005  54 102 0           TS     CM/FLAGS

 0026                            25,2006  0 0003 1           RELINT

 0027    REF 208  LAST  836      25,2007  0 6006 1           TC     INTPRET

 0028                            25,2010   77735 0           SLOAD
 0029    REF    1                25,2011   03011 1                  LODPAD
 0030    REF    2  LAST  122     25,2012   03626 0           STORE  LOD

 0031                            25,2013   77735 0           SLOAD
 0032    REF    1                25,2014   03010 0                  LADPAD
 0033    REF    2  LAST  122     25,2015   03624 1           STORE  LAD

 0034                            25,2016   77605 1           DMP                      L/DCMINR = LAD COS(15)
 0035    REF    1                25,2017   15324 0                  COS15
 0036    REF    2  LAST  122     25,2020   17630 1           STODL  L/DCMINR
 0037    REF    1                25,2021   15151 0                  LATSLOPE
 0038                            25,2022   70405 1           DMP    SR1               KLAT = LAD/24
 0039    REF    3  LAST  852     25,2023   03624 1                  LAD
 0040    REF    2  LAST  122     25,2024   17632 0           STODL  KLAT
 0041    REF    1                25,2025   15200 1                  Q7F
 0042    REF    2  LAST  293     25,2026   17175 1           STODL  Q7                Q7 = Q7F
 0043    REF    2  LAST  303     25,2027   15344 0                  REARONE           1.0 -1BIT
```

```
  0044    REF   2  LAST  122    25,2030    17614 1                STODL   FACTOR
  0045    REF   4  LAST  852    25,2031    03624 1                        LAD
  0046                          25,2032    57565 0                SIGN    DCOMP
  0047    REF   6  LAST  796    25,2033    03327 1                        HEADSUP          MAY BE NOISE FOR DISPLAY P61
  0048    REF   2  LAST  122    25,2034    37634 1                STCALL  L/D              L/D = - LAD SGN(HEADSUP)

  0049    REF   2  LAST  793    25,2035    52063 0                        STARTEN1         RETURN VIA GOTOADDR
  0050                          25,2036    47375 0                VLOAD   VXV
  0051    REF  14  LAST  841    25,2037    01036 0                        VN               (-7) M/CS
  0052    REF   5  LAST  840    25,2040    01756 1                        UNITR            .5 UNIT            REF COORDS
  0053                          25,2041    50256 0                UNIT    DOT
  0054    REF   4  LAST  820    25,2042    03474 0                        RT               RT/2  TARGET VECTOR        REF COORDS
  0055    REF   5  LAST  187    25,2043    03676 0                STORE   LATANG           LATANG = UNI.RT /4
  0056                          25,2044    47076 0                DCOMP   RTB
  0057    REF  13  LAST  413    25,2045    45761 0                        SIGNMPAC
  0058    REF   2  LAST  122    25,2046    17644 1                STODL   K2ROLL           K2ROLL = -SGN(LATANG)

  0059    REF   5  LAST  853    25,2047    03624 1                        LAD
  0060                          25,2050    43205 1                DMP     DAD
  0061    REF   1               25,2051    15202 0                        Q21
  0062    REF   1               25,2052    15204 0                        Q22
  0063    REF   2  LAST  123    25,2053    03712 0                STORE   Q2               Q2 = -1992 + 3500 LAD

  0064                          25,2054    66331 0                SSP     SSP
  0065    REF   3  LAST  801    25,2055    03646 0                        GOTOADDR         SET SELECTOR FOR INITIAL PASS
  0066    REF   1               25,2056    52260 1                        INITROLL
  0067    REF   4  LAST  798    25,2057    03325 0                        POSEXIT
  0068    REF   1               25,2060    52115 0                        SCALEPOP         SET CM/POSE TO CONTINUE AT SCALEPOP

  0069                          25,2061    77634 0                RTB
  0070    REF   2  LAST  806    25,2062    53607 0                        SERVNOUT         OMIT INITIAL DISPLAY, SINCE 1ST GUESSBAD

R0071     CALCULATE THE INITIAL TARGET VECTOR:  RTINIT,  ALSO RTEAST, RINORM  AND  RT.    ALL ARE .5 UNIT AND IN
R0073      REFERENCE COORDINATES.

  0074                          25,2063    77220 1  STARTEN1 STQ       VLOAD
  0075    REF   4  LAST  853    25,2064    03645 0                        GOTOADDR
  0076    REF  10  LAST  647    25,2065    03401 1                        LAT(SPL)         TARGET COORDINATES
  0077                          25,2066    43014 0                CLEAR   CLEAR            DO CALL USING PAD RADIUS. WILL UNIT IT.
  0078    REF  10  LAST  806    25,2067    00662 0                        ERADFLAG         ANYWAY.
  0079    REF  18  LAST  806    25,2070    01663 0                        LUNAFLAG
  0080    REF   9  LAST  647    25,2071    14747 0                STODL   LAT
  0081    REF   1               25,2072    15336 0                        3ZEROS

  0082    REF  10  LAST  853    25,2073    14753 0                STODL   LAT +4           SET ALT=0.
  0083    REF  15  LAST  833    25,2074    01044 0                        PIPTIME          ESTABLISH RTINIT AT TIME OF PRESENT
 A0084                                                                                     RN AND VN.
  0085    REF   2  LAST  122    25,2075    37524 0                STCALL  TIME/RTO         SAVE TIME BASE OF RTINIT.
  0086    REF   8  LAST  759    25,2076    26524 0                        LALOTORV         C(MPAC) =TIME   (PIPTIME)
  0087                          25,2077    77656 1                UNIT                     ANSWER IN ALPHAV ALSO
 0088    REF   8  LAST  852   25,2100    17452 1              STODL   RTINIT          .5 UNIT TARGET          REF COORDS
 0089    REF   1              25,2101    12112 0                      500SEC          NOMINAL ENTRY TIME FOR P63
A0090                                                                                 TIME/RTO = PIPTIME, STILL.
 0091    REF   7  LAST  820   25,2102    37606 0              STCALL  DTEAROT         INITIALIZE EARROT
 0092    REF   1              25,2103    46213 0                      EARROT1         GET RT
 0093                         25,2104    72441 0              DOT     SL1
 0094    REF   6  LAST  853   25,2105    01756 1                      UNITR           RT/2 IN MPAC
 0095                         25,2106    77726 1              ACOS
 0096    REF   3  LAST  188   25,2107    37702 0              STCALL  THETAH          RANGE ANGLE /360
 0097    REF   5  LAST  853   25,2110    03645 0                      GOTOADDR        RETURN TO CALLER

 0098                         25,2111    00003 1   500SEC     2DEC    50000 B-28      CS
 0098                         25,2112    01520 1
 0099                         25,2113    11774 0   ENTMASK    OCT     11774
 0100                         25,2114    11010 0   ENTRYSW    OCT     11010           ENTRYDSP B13, GONEPAST B10, LATSW B4
```

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L        REENTRY CONTROL                                                                  USER'S PAGE NO.   4      E7 S3

P0101
 0102                            25,2115   77624 1  SCALEPOP CALL
 0103    REF   1                 25,2116   52125 0                    TARGETNG

 0104                            25,2117   77776 1           EXIT

 0105    REF  89  LAST  834      25,2120  0 5402 1  REFAZE10 TC       PHASCHNG
 0106                            25,2121   10035 0           OCT      10035              SERVICER 5.3 RESTART AT REFAZE10

 01065   REF  16  LAST  834      01,2250            5P3SPT14 =        5.3SPOT
 0107    REF 209  LAST  852      25,2122  0 6006 1           TC       INTPRET

R0108              JUMP TO PARTICULAR RE-ENTRY PHASE:

A0109                                               SEQUENCE
 0110                            25,2123   77650 1           GOTO
 0111    REF   6  LAST  854      25,2124   03645 0                    GOTOADDR

R0112

R0113              GOTOADDR  CONTAINS THE ADDRESS OF THE ROLL COMMAND EQUATIONS APPROPRIATE TO THE CURRENT PHASE OF
R0115    RE-ENTRY.  SEQUENCING IS AS FOLLOWS:

R0116    INITROLL ADDRESS IS SET HERE INITIALLY. HOLDS INITIAL ROLL ATTITUDE UNTIL KAT  IS EXCEEDED. THEN HOLDS NEW ROLL
R0118             ATTITUDE UNTIL  VRTHRESH  IS EXCEEDED.  THEN BRANCHES TO

R0119    HUNTEST  THIS SECTION CHECKS TO SEE IF THE PREDICTED RANGE AT NOMINAL   L/D FROM PRESENT CONDITIONS IS LESS
R0121             THAN THE DESIRED RANGE.
R0122               IF NOT - A ROLL COMMAND IS GENERATED BY THE CONSTANT DRAG CONTROLLER.
R0124               IF SO -  CONTROL AND GOTOADDR ARE SET TO  UPCONTRL.
R0125             USUALLY NO ITERATION IS INVOLVED EXCEPT IF THE RANGE DESIRED IS TOO LONG ON THE FIRST PASS THROUGH
R0127             HUNTEST.

R0128    UPCONTRL CONTROLS ROLL DURING THE SUPER-CIRCULAR PHASE.  UPCONTRL IS TERMINATED EITHER
R0130               (A)  WHEN THE DRAG (AS MEASURED BY THE PIPAS) FALLS BELOW Q7 ,  OR
R0132               (B)  IF RDOT IS NEGATIVE AND REFERENCE VL EXCEEDS V.
R0133             IN CASE (A),  GOTOADDR  IS SET TO  KEP2  AND IN CASE (B), TO PREDICT3  SKIPPING THE KEPLER PHASE OF
R0135             ENTRY.

R0136    KEP2     GOTOADDR IS SET HERE DURING THE KEPLER PHASE TO MONITOR DRAG. THE SPACECRAFT IS INSTANTANEOUSLY
R0138             TRIMMED IN PITCH AND YAW TO THE COMPUTED RELATIVE VELOCITY. THE LAST COMPUTED ROLL ANGLE IS MAINTAINED.
R0140             WHEN THE MEASURED DRAG EXCEEDS Q7 +0.5,  GOTOADDR  IS SET TO

R0141    PREDICT3 THIS CONTROLS THE FINAL SUB-ORBITAL PHASE. ROLL COMMANDS CEASE
R0142             WHEN  V  IS LESS THAN VQUIT. AN EXIT IS MADE TO

R0143    P67.1    THE LAST COMPUTED ROLL ANGLE IS MAINTAINED. RATE DAMPING IS DONE IN PITCH AND YAW. PRESENT LATITUDE
R0145             AND LONGITUDE ARE COMPUTED FOR DISPLAY.
R0146             ENTRY IS TERMINATED WHEN DISKY RESPONSE IS MADE TO TO THIS FINAL FLASHING DISPLAY.
```

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P0148    PROCESS AVERAGE G OUTPUT...SCALE IT AND GET INPUT DATA
R0149

R0150   * START  TARGETING ...

 0151   REF   9  LAST  854   E7,1451                     EBANK= RTINIT

A0152                                                                   TARGETNG IS CALLED BY P61, FROM GROUP 4.
A0153                                                                   TARGETNG IS CALLED BY ENTRY, FROM GROUP 5.

A0154                                                                   ALL MM COME HERE.
 0155                        25,2125  77214 0  TARGETNG BOFF   VLOAD        ENTER WITH PROPER EB FROM CM/POSE(TEST)
 0156   REF   1              25,2126  03346 0                  RELVELSW     RELVELSW = 96D  BIT9
 0157   REF   1              25,2127  52133 1                  GETVEL       WANT INERTIAL VEL. GO GET IT.
 0158   REF   2  LAST  122   25,2130  03526 0                  -VREL        NEW V  IS RELATIVE, CONTINUE

 0159                        25,2131  52076 1           VCOMP  GOTO         (VREL) = (V) + KWE UNITR*UNITW
 0160   REF   1              25,2132  52136 1                  GETUNITV -1  - VREL WAS LEFT BY CM/POSE

 0161                        25,2133  74375 0  GETVEL   VLOAD  VXSC         INERTIAL V WANTED
 0162   REF  15  LAST  853   25,2134  01036 0                  VN           KVSCALE = (12800 / .3048) / 2VS
 0163   REF   1              25,2135  15232 0                  KVSCALE      KVSCALE = .81491944
 0164   REF   2  LAST  122   25,2136  03516 0    -1     STORE  VEL          V/2 VS
 0165                        25,2137  44056 1  GETUNITV UNIT   STQ
 0166   REF   6  LAST  820   25,2140  03373 0                  60GENRET
 0167   REF   2  LAST  122   25,2141  17510 0           STODL  UNITV
 0168                        25,2142  00043 0                  34D
 0169   REF   2  LAST  122   25,2143  03622 1           STORE  VSQUARE      VSQ/4

 0170                        25,2144  77625 0           DSU                 LEQ = VSQUARE - 1
 0171   REF   1              25,2145  15326 1                  FOURTH       4 G-S FULL SCALE
 0172   REF   2  LAST  122   25,2146  17654 0           STODL  LEQ          LEQ/4

 0173                        25,2147  00045 0                  36D
 0174   REF   2  LAST  123   25,2150  27674 1           STOVL  V            V/2 VS = VEL/2 VS

 0175   REF   3  LAST  856   25,2151  03516 0                  VEL
 0176                        25,2152  72441 0           DOT    SL1          RDOT= V.UNITR
 0177   REF   7  LAST  854   25,2153  01756 1                  UNITR
 0178   REF   5  LAST  293   25,2154  27700 0           STOVL  RDOT         RDOT / 2 VS

 0179   REF  13  LAST  841   25,2155  01315 1                  DELV         PIPA COUNTS IN PLATFORM COORDS.
 0180                        25,2156  41246 1           ABVAL  DMP
 0181   REF   1              25,2157  15234 0                  KASCALE
 0182                        25,2160  53152 1           SL1    BZE
 0183   REF   1              25,2161  55136 0                  SETMIND
 0184   REF   4  LAST  293   25,2162  27640 0  DSTORE   STOVL  D            ACCELERATION USED TO APPROX DRAG
 0185   REF   4  LAST  856   25,2163  03516 0                  VEL
 0186                        25,2164  53435 0           VXV    UNIT         UNI = UNIT(V*R)
 0187   REF   8  LAST  856   25,2165  01756 1                  UNITR
 0188   REF   4  LAST  816   25,2166   03502 0                STORE  UNI               .5 UNI                   REF COORDS.

 0189                        25,2167   71214 0                BOFF   DLOAD
 0190   REF   2  LAST  856   25,2170   03346 0                       RELVELSW
 0191   REF   1              25,2171   55077 1                       GETETA
 0192   REF   2  LAST  853   25,2172   15336 0                       3ZEROS
 0193                        25,2173   43225 0  UPDATERT DSU         DAD               PIPTIME-TIME/RTO =ELAPSED TIME SINCE
A0194                                                                                  RTINIT  WAS ESTABLISHED.
 0195   REF   3  LAST  853   25,2174   03524 1                       TIME/RTO
 0196   REF  16  LAST  853   25,2175   01044 0                       PIPTIME
 0197   REF   8  LAST  854   25,2176   37606 0                STCALL DTEAROT           GET PREDICTED TARGET VECTOR  RT

 0198   REF   3  LAST  820   25,2177   46223 0                       EARROT2
 0199                        25,2200   40241 1                DOT    SETPD             SINCE (RT) UNIT VECT, THIS IS 1/4 MAX
 0200   REF   5  LAST  857   25,2201   03502 0                       UNI               LATANG = RT.UNI
 0201                        25,2202   00001 0                       0
 0202   REF   6  LAST  853   25,2203   27676 0                STOVL  LATANG            LATANG = MAC LATANG / 4

 0203   REF   5  LAST  853   25,2204   03474 0                       RT
 0204                        25,2205   77614 1                CLEAR
 0205   REF   1              25,2206   03667 0                       GONEBY            SHOW HAVE NOT GONE PAST TARGET.
 0206                        25,2207   50235 0                VXV    DOT               IF RT*UNITR.UNI NEG, GONEBY=1
 0207   REF   9  LAST  856   25,2210   01756 1                       UNITR             GONEPAST IS CONDITIONAL SW SET IN
 0208   REF   6  LAST  857   25,2211   03502 0                       UNI               FINAL PHASE.
 0209                        25,2212   43044 0                BPL    SET
 0210                        25,2213   52215 0                       +2
 0211   REF   2  LAST  857   25,2214   03467 1                       GONEBY            SHOW HAVE     GONE PAST TARGET.

 0212                        25,2215   77775 1                VLOAD
 0213   REF   6  LAST  857   25,2216   03474 0                       RT
 0214                        25,2217   45241 1  GETANGLE DOT         DSU               THETA = ARCCOS(RT.UNITR)
 0215   REF  10  LAST  857   25,2220   01756 1                       UNITR
 0216   REF   1              25,2221   15164 0                       NEAR1/4           TO IMPROVE ACCURACY, CALC RANGE BY
 0217                        25,2222   43244 1                BPL    DAD               TINYTHET IF HIGH ORDER PART OF
 0218   REF   1              25,2223   55141 0                       TINYTHET          ARCCOS ARGUMENT IS ZERO
 0219   REF   2  LAST  857   25,2224   15164 0                       NEAR1/4
 0220                        25,2225   65552 0                SL1    ACOS
 0221   REF   4  LAST  854   25,2226   03702 1  THETDONE STORE       THETAH            THETAH/360
A0222                                                                                  HI WORD, LO BIT =1.32 NM=360 60/16384

 0223                        25,2227   57414 1                BON    DCOMP
 0224   REF   3  LAST  857   25,2230   03707 1                       GONEBY            =1 IF HAVE GONE PAST TARGET.
A0225                                                                                  (SIGN MAY BECOME ERRATIC VERY NEAR
A0226                                                                                  TARGET DUE TO LOSS OF PRECISION.)
 0227                        25,2231   52232 0                       +1
 0228   REF   2  LAST  293   25,2232   17714 0                STODL  RTGON67           RANGE ERROR: NEG IF WILL FALL SHORT.

 0229   REF   5  LAST  856   25,2233   03640 0                       D
 0230                        25,2234   50025 0                DSU    BMN
 0231   REF   1              25,2235   15242 1                       .05G
```

```
L         REENTRY CONTROL                                                                   USER'S PAGE NO.   7       E7 S3

 0232   REF   1                 25,2236   52255 1                     NO.05G
 0233                           25,2237   77214 0             SET     VLOAD
 0234   REF   3  LAST  832      25,2240   03074 1                     .05GSW
 0235   REF   8  LAST  841      25,2241   03432 1                     DELVREF
 0236                           25,2242   50206 0             PUSH    DOT
 0237   REF   5  LAST  822      25,2243   03542 1                     UXA/2
 0238                           25,2244   63552 0             SL1     DSQ
 0239                           25,2245   47515 0             PDVL    VSQ                EXCHANGE WITH PDL.
 0240                           25,2246   56225 1             DSU     DDV
 0241                           25,2247   00001 0                     0
 0242                           25,2250   75400 1             BOV     SQRT
 0243   REF   1                 25,2251   52253 1                     NOLDCALC           OVFL LAST CLEARED IN EARROT2 ABOVE.
 0244   REF   1                 25,2252   03727 0             STORE   L/DCALC

 0245                           25,2253   77650 1   NOLDCALC  GOTO
 0246   REF   7  LAST  856      25,2254   03373 0                     60GENRET

 0247                           25,2255   52014 0   NO.05G    CLEAR   GOTO               THIS WAY FOR OAP.(MAY INTERRUPT)
 0248   REF   4  LAST  858      25,2256   03274 0                     .05GSW              .05GSW = 1020  B3
 0249   REF   2  LAST  858      25,2257   52253 1                     NOLDCALC           KEEP SINGLE EXIT FOR TARGETNG
```

```
P0250       SUBROUTINES CALLED BY SCALEPOP (TARGETING):

 0252   REF   1               26,2000                         SETLOC REENTRY1
 0253                         26,3077                         BANK

 0254   REF   1                                               COUNT* $$/ENTRY

 0255                         26,3077   56345 0   GETETA      DLOAD  DDV            D = D +D(-RDOT/HS -2D/V)  DT/2
A0256                                                                               DT/2  =  2/2  = 1
 0257   REF   6  LAST  856    26,3100   03700 0                      RDOT
 0258   REF   1               26,3101   15320 1                      -HSCALED
 0259                         26,3102   41325 0               PDDL   DMP
 0260   REF   6  LAST  857    26,3103   03640 0                      D
 0261   REF   1               26,3104   15322 0                      -KSCALE
 0262                         26,3105   43271 1               DDV    DAD
 0263   REF   3  LAST  856    26,3106   03674 1                      V
A0264                                                                               -RDOT/HS FROM PDL.
 0265                         26,3107   43205 1               DMP    DAD
 0266   REF   7  LAST  859    26,3110   03640 0                      D
 0267   REF   8  LAST  859    26,3111   03640 0                      D
 0268   REF   9  LAST  859    26,3112   03640 0               STORE  D

 0269                         26,3113   71214 0               BON    DLOAD          EGSW INDICATES FINAL PHASE.
 0270   REF   2  LAST   59    26,3114   03307 0                      EGSW
 0271   REF   1               26,3115   55122 0                      SUBETA
 0272   REF   5  LAST  857    26,3116   03702 1                      THETAH
 0273                         26,3117   52005 0               DMP    GOTO
 0274   REF   1               26,3120   15236 1                      KTETA          = 1000X2PI/(2)E14 163.84
 0275   REF   1               26,3121   52173 0                      UPDATERT

 0276                         26,3122   45345 1   SUBETA      DLOAD  DSU            SWITCH FROM  INERTIAL TO RELATIVE VEL.
 0277   REF   4  LAST  859    26,3123   03674 1                      V
 0278   REF   1               26,3124   15326 1                      VMIN
 0279                         26,3125   43044 0               BPL    SET
 0280   REF   1               26,3126   55130 0                      SUBETA2
 0281   REF   3  LAST  857    26,3127   03066 1                      RELVELSW

 0282                         26,3130   41345 0   SUBETA2     DLOAD  DMP

 0283   REF   6  LAST  859    26,3131   03702 1                      THETAH
 0284   REF   1               26,3132   15240 0                      KT1            KT1 = KT
 0285                         26,3133   52071 0               DDV    GOTO
 0286   REF   5  LAST  859    26,3134   03674 1                      V              KT = RE(2 PI)/2 VS 16384 163.84/ 2 VSAT
 0287   REF   2  LAST  859    26,3135   52173 0                      UPDATERT

 0288                         26,3136   52145 0   SETMIND     DLOAD  GOTO
 0289   REF   2  LAST  647    26,3137   16425 0                      1BITDP
 0290   REF   1               26,3140   52162 0                      DSTORE

 0291                         26,3141   51425 0   TINYTHET DSU       ABS            ENTER WITH X-.249
 0292   REF   3  LAST  859   26,3142   16426 0                1BITDP + 1      GET 1/4 - MPAC
 0293                        26,3143   75461 0         SL     SQRT            SCALE UP BEFORE SQRT
 0294                        26,3144   20216 0                13D             HAS FACTOR FOR UP SCALING
 0295                        26,3145   52005 0         DMP    GOTO
 0296   REF   1              26,3146   15250 1                KACOS
 0297   REF   1              26,3147   52226 0                THETDONE
```

```
P0298    * START   INITIAL ROLL ...

 0300    REF   2  LAST  852   25,2000                          SETLCC REENTRY
 0301                         25,2260                          BANK

 0302    REF   2 LAST  852 TO  859:   176    176*              COUNT* $$/ENTRY

A0303                                                                              MM = 63 , 64 ..
 0304                         25,2260    43014 0  INITROLL BON       BOFF          IF D- .05G NEG, GO TO LIMITL/D
 0305    REF   1              25,2261    03312 1                     INRLSW
 0306    REF   1              25,2262    52362 1                     INITRL1
 0307    REF   5  LAST  858   25,2263    03354 0                     .05GSW
 0308    REF   1              25,2264    53524 1                     LIMITL/D

A0309                                                                              MM = 64, NOW

A0310                                                                                               3
A0311                                                                              KA = KA1 LEQ  + KA2
 0312                         25,2265    63545 0           DLOAD     DSQ
 0313    REF   3  LAST  856   25,2266    03654 0                     LEQ
 0314                         25,2267    56205 0           DMP       DDV
 0315    REF   4  LAST  861   25,2270    03654 0                     LEQ
 0316    REF   1              25,2271    15306 0                     1/KA1         = 25 /(64  1.8)
 0317                         25,2272    47015 0           DAD       RT8
 0318    REF   1              25,2273    15310 1                     KA2           = .2
 0319    REF   1              25,2274    54432 0                     P64           ROLLC          V1            RDOT
A0320                                                                              XXX.XX DEG     XXXXX. FPS    XXXXX. FPS
 0321    REF   2  LAST  123   25,2275    03720 1           STORE     KAT

 03211                        25,2276    50025 0           DSU       BMN
 03212   REF   1              25,2277    15316 1                     KALIM
 03213                        25,2300    52304 1                     +4
 03214                        25,2301    77745 1           DLOAD
 03215   REF   2  LAST  861   25,2302    15316 1                     KALIM
 03216   REF   3  LAST  861   25,2303    03720 1           STORE     KAT
 0322                         25,2304    45345 1           DLOAD     DSU           IF V-VFINAL1 NEG, GO TO FINAL PHASE.
 0323    REF   6  LAST  859   25,2305    03674 1                     V
 0324    REF   1              25,2306    15304 1                     VFINAL1
 0325                         25,2307    51014 0           CLEAR     BPL           (CAN'T CLEAR INRLSW AFTER HERE:RESTARTS)
 0326    REF   1              25,2310    03265 0                     GONEPAST      GONEPAST WAS INITIALLY SET=1 TO FORCE
A0327                                                                              ROLLC TO REMAIN AS DEFINED BY HEADSUP
A0328                                                                              UNTIL START OF P64. (UNTIL D > .05G)
 0329    REF   1              25,2311    52316 1                     D0EQ
 0330                         25,2312    52131 0           SSP       GOTO
 0331    REF   7  LAST  855   25,2313    03646 0                     GOTOADDR
 0332    REF   1              25,2314    53316 0                     KEP2          AND IDLE UNTIL D>0.2 G.  (NO P66 HERE)
 0333    REF   1              25,2315    52351 1                     INRGLOUT      GO TO LIMITL/D AFTER SETTING INRLSW.

 0334                         25,2316    41345 0  D0EQ     DLOAD     DMP           D0 = KA3 LEQ + KA4
 0335    REF   5  LAST  861   25,2317    03654 0                     LEQ
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L      REENTRY CONTROL                                                             USER'S PAGE NO.  11       E7 S3

0336   REF   1              25,2320   15312 0                     KA3
0337                        25,2321   77615 0              DAD
0338   REF   1              25,2322   15314 0                     KA4
0339   REF   2  LAST  123   25,2323   03710 1              STORE  C0          D0/805
0340                        25,2324   40065 0              BDDV   BOV
0341   REF   1              25,2325   15270 0                     C001        (-4/25 G)  B-8
0342                        25,2326   52327 0                     +1          CLEAR OVFIND, IF ON.
0343   REF   2  LAST  123   25,2327   17706 0              STODL  C/D0        (-4/D0)  B-8
0344   REF   6  LAST  853   25,2330   03624 1                     LAD         IF V-VFINAL +K(ROOT/V)CUBED POS,L/D=-LAD
0345   REF   3  LAST  853   25,2331   17634 0              STODL  L/D
0346   REF   7  LAST  859   25,2332   03700 0                     ROOT
0347                        25,2333   41471 0              DDV    PUSH
0348   REF   7  LAST  861   25,2334   03674 1                     V
0349                        25,2335   41316 0              DSQ    DMP
0350                        25,2336   45271 1              DDV    DSU
0351   REF   1              25,2337   15300 0                     1/K44
0352   REF   1              25,2340   15302 1                     VFINAL
A0353                                                                                      3
A0354                                                                         V-VFINAL +(ROOT/V)  / K44   OVFL $

0355                        25,2341   40015 1              DAD    BOV
0356   REF   8  LAST  862   25,2342   03674 1                     V
0357   REF   2  LAST  861   25,2343   52351 1                     INROLOUT    GO TO LIMITL/D AFTER SETTING INRLSW.
0358                        25,2344   71240 1              BMN    DLOAD
0359   REF   3  LAST  862   25,2345   52351 1                     INROLOUT    GO TO LIMITL/D AFTER SETTING INRLSW.
0360   REF   7  LAST  862   25,2346   03624 1                     LAD
0361                        25,2347   77676 0              DCOMP
0362   REF   4  LAST  862   25,2350   03634 0              STORE  L/D

A0363                                                                         SET INRLSW AT END FOR RESTART PROTECTION
0364                        25,2351   77614 1   INROLOUT   BOFSET             END OF PRE .05G PATH OF INITROLL.
0365   REF   2  LAST  861   25,2352   03052 0                     INRLSW      SWITCH IS ZERO INITIALLY.
0366   REF   2  LAST  861   25,2353   53524 1                     LIMITL/D    (GO TO)

0367                        25,2354   45345 1   KATEST     DLOAD  DSU         IF KAT - D POS, GO TO CONSTD
0368   REF   4  LAST  861   25,2355   03720 1                     KAT
0369   REF  10  LAST  859   25,2356   03640 0                     D           IF POS, OUT WITH COMMAND VIA LIMITL/D
0370                        25,2357   52044 0              BPL    GOTO
0371   REF   3  LAST  862   25,2360   53524 1                     LIMITL/D
0372   REF   1              25,2361   53231 1                     CONSTD

0373                        25,2362   43345 1   INITRL1    DLOAD  DAD         IF ROOT + VRCONT POS, GO TO HUNTEST
0374   REF   8  LAST  862   25,2363   03700 0                     ROOT
0375   REF   1              25,2364   15262 0                     VRCONT
0376                        25,2365   45040 1              BMN    CALL        IF POSITIVE, FALL INTO HUNTEST.
0377   REF   1              25,2366   52354 1                     KATEST

03771  REF   1              25,2367   53021 1                     FOREHUNT    INITIALIZE HUNTEST.
```

```
P0378    * START    HUNT TEST    ..

A0379                                                                                 MM = 64
 0380                          25,2370   77731 1             SSP                      INITIALIZE HUNTEST ON FIRST PASS
 0381    REF   8  LAST  861    25,2371   03646 0                     GOTOADDR
 0382    REF   1               25,2372   52373 1                     HUNTEST          MUST GO AFTER FOREHUNT FOR RESTARTS.

 0389                          25,2373   77745 1  HUNTEST    DLOAD
 0390    REF  11  LAST  862    25,2374   03640 0                     0
 0391    REF   2  LAST  123    25,2375   17664 0             STODL   A1               A1/805  = A1/ 25G

 0392    REF   8  LAST  862    25,2376   03624 1                     LAD
 0393    REF   2  LAST  122    25,2377   17647 1             STODL   TEM1B
 0394    REF   9  LAST  862    25,2400   03700 0                     RDOT
 0395                          25,2401   71240 1             BMN     DLOAD            IF RDOT NEG,TEM1B=LAD, OTHERWISE = LEWD
 0396    REF   1               25,2402   52406 1                     A0CALC
 0397    REF   1               25,2403   03725 1                     LEWD
 0398    REF   3  LAST  863    25,2404   17647 1             STODL   TEM1B

 0399    REF  10  LAST  863    25,2405   03700 0                     RDOT
 0400                          25,2406   43271 1  A0CALC     DDV     DAD              V1 = V + RDOT/TEM1B
 0401    REF   4  LAST  863    25,2407   03647 1                     TEM1B
 0402    REF   9  LAST  862    25,2410   03674 1                     V
 0403    REF   2  LAST   73    25,2411   14326 0             STODL   V1               V1/2 VS

 0404    REF  11  LAST  863    25,2412   03700 0                     RDOT
 0405                          25,2413   56316 0             DSQ     DDV              A0=(V1/V)SQ(0+RDOT SQ/(TEM1B 2 C1 HS)
 0406    REF   5  LAST  863    25,2414   03647 1                     TEM1B
 0407                          25,2415   43271 1             DDV     DAD
 0408    REF   1               25,2416   15274 1                     2C1HS
 0409    REF  12  LAST  863    25,2417   03640 0                     0
 0410                          25,2420   41205 0             DMP     DMP
 0411    REF   3  LAST  863    25,2421   00326 0                     V1
 0412    REF   4  LAST  863    25,2422   00326 0                     V1
 0413                          25,2423   77671 1             DDV
 0414    REF   3  LAST  856    25,2424   03622 1                     VSQUARE
 0415    REF   1               25,2425   14330 1             STODL   A0               A0/805   = A0/ 25G

 0416    REF  12  LAST  863    25,2426   03700 0                     RDOT
 0417                          25,2427   71244 0             BPL     DLOAD
 0418    REF   1               25,2430   52433 1                     V1LEAD
 0419    REF   2  LAST  863    25,2431   00330 1                     A0
 0420    REF   3  LAST  863    25,2432   03664 0             STORE   A1               A1/25G

 04202                         25,2433   51145 0  V1LEAD     DLOAD   BPL              IF L/D NEG, V1=V1 - 1000
 04203   REF   5  LAST  862    25,2434   03634 0                     L/D
 04204   REF   1               25,2435   52442 1                     HUNTEST1

 04205                         25,2436   45345 1             DLOAD   DSU
 04206   REF   5  LAST  863    25,2437   00326 0                     V1
 04207  REF   1                25,2440   15216 0                     VQUIT
 04208  REF   6  LAST  863     25,2441   00326 0            STORE    V1

 0421                          25,2442   41345 0  HUNTEST1  DLOAD    DMP           ALP = 2 C1 HS A0/LEWD V1 V1
 0422   REF   3  LAST  863     25,2443   00330 1                     A0
 0423   REF   2  LAST  863     25,2444   15274 1                     2C1HS
 0424                          25,2445   40271 1            DDV      SETPD
 0425   REF   7  LAST  864     25,2446   00326 0                     V1
 0426                          25,2447   00001 0                     0
 0427                          25,2450   56271 0            DDV      DDV
 0428   REF   8  LAST  864     25,2451   00326 0                     V1
 0429   REF   2  LAST  863     25,2452   03725 1                     LEWD
 0430   REF   2  LAST  123     25,2453   03704 1            STORE    ALP

 0431                          25,2454   55221 0            BDSU     BDDV          FACT1 = V1 / (1 - ALP)
 0432   REF   1                25,2455   15344 0                     BARELY1
 0433   REF   9  LAST  864     25,2456   00326 0                     V1
 0434   REF   2  LAST  122     25,2457   17616 0            STODL    FACT1         FACT1 / 2VS

 0435   REF   3  LAST  864     25,2460   03704 1                     ALP
 0436                          25,2461   41225 1            DSU      DMP           FACT2 = ALP(ALP - 1) / A0
 0437   REF   2  LAST  864     25,2462   15344 0                     BARELY1
 0438   REF   4  LAST  864     25,2463   03704 1                     ALP
 0439                          25,2464   77671 1            DDV
 0440   REF   4  LAST  864     25,2465   00330 1                     A0
 0441   REF   2  LAST  122     25,2466   03620 0            STORE    FACT2         FACT2  (25G)

 0442                          25,2467   43205 1            DMP      DAD
 0443   REF   3  LAST  852     25,2470   03175 1                     Q7            Q7 /805 = Q7 / 25G
 0444   REF   5  LAST  864     25,2471   03704 1                     ALP           VL=FACT1 (1-SQRT(Q7 FACT2 +ALP)  )
 0445                          25,2472   44366 1            SQRT     BDSU
 0446   REF   3  LAST  864     25,2473   15344 0                     BARELY1
 0447                          25,2474   77605 1            DMP
 0448   REF   3  LAST  864     25,2475   03616 0                     FACT1
 0449   REF   2  LAST  293     25,2476   03757 1            STORE    VL            VL / 2 VS

 0450                          25,2477   41221 0            BDSU     DMP           GAMMAL1 = LEWD (V1-VL)/VL
 0451   REF  10  LAST  864     25,2500   00326 0                     V1
 0452   REF   3  LAST  864     25,2501   03725 1                     LEWD
 0453                          25,2502   77671 1            DDV
 0454   REF   3  LAST  864     25,2503   03757 1                     VL
 0455   REF   1                25,2504   14027 1            STODL    GAMMAL1       GAMMAL1 USED IN UPCONTROL

A0456                                                                              GAMMAL1 = PDL 220.
 0457   REF   4  LAST  864     25,2505   03757 1                     VL
 0458                          25,2506   50025 0            DSU      BMN           IF VL-VLMIN NEG, GO TO PREFINAL
 0459   REF   1                25,2507   15206 1                     VLMIN
 0460   REF   1                25,2510   53332 0                     PREFINAL

 0461                          25,2511   63545 0            DLOAD    DSQ
 0462    REF   5  LAST  864   25,2512   03757 1                      VL
 0463    REF   2  LAST  123   25,2513   17666 1            STODL     VBARS          VBARS / 4 VS VS

 0464    REF   1              25,2514   15334 1                      HALVE          IF VSAT-VL  NEG,  GO TO CONSTD
 0465                         25,2515   50025 0            DSU       BMN
 0466    REF   6  LAST  865   25,2516   03757 1                      VL
 0467    REF   1              25,2517   53225 1                      BECONSTD       SET MODE=HUNTEST, CONTINUE IN CONSTD
 0468    REF   2  LAST  123   25,2520   17662 0            STODL     DVL            DVL / 2VS

 0469    REF   2  LAST  865   25,2521   15334 1                      HALVE
 0470    REF   2  LAST  123   25,2522   03672 1            STORE     VS1            VS1 = VSAT

 0471                         25,2523   50025 0            DSU       BMN            IF V1 GREATER THAN VSAT , GO ON
 0472    REF  11  LAST  864   25,2524   00326 0                      V1
 0473    REF   1              25,2525   52533 0                      GETDHOOK
 0474                         25,2526   77621 1            BDSU
 0475    REF   3  LAST  865   25,2527   03662 0                      DVL
 0476    REF   4  LAST  865   25,2530   17662 0            STODL     DVL            DVL = DVL - (VSAT-V1) = V1 - VL
 0477    REF  12  LAST  865   25,2531   00326 0                      V1
 0478    REF   3  LAST  865   25,2532   03672 1            STORE     VS1            VS1 = V1,  IN THIS CASE

 0479                         25,2533   45145 0  GETDHOOK  DLOAD     CALL           DHOOK=((1-VS1/FACT1) SQ -ALP)/FACT2
 0480    REF   4  LAST  865   25,2534   03672 1                      VS1            VS1 /2 VS
 0481    REF   1              25,2535   53003 1                      DHOOKYQ7       GO CALC DHOOK
 0482    REF   2  LAST  122   25,2536   03656 1            STORE     DHOOK          DHOOK /256

 0483                         25,2537   56261 1            SR        DDV
 0484                         25,2540   20607 1                      6              CHOOK
 0485    REF   4  LAST  864   25,2541   03175 1                      Q7
 0486                         25,2542   77625 0            DSU
 0487    REF   1              25,2543   15252 0                      CHOOK          = .25/16 = (-6)
 0488    REF   2  LAST  123   25,2544   03660 1            STORE     AHOOKDV

 0489                         25,2545   41215 1            DAD       DMP            GAMMAL= GAMMAL1-CHI DVL SQ(1+AHOOK DVL)
 0490    REF   1              25,2546   31771 1                      1/16TH
 0491    REF   1              25,2547   15256 1                      CHI
 0492                         25,2550   41205 0            DMP       DMP
 0493    REF   5  LAST  865   25,2551   03662 0                      DVL
 0494    REF   6  LAST  865   25,2552   03662 0                      DVL
 0495                         25,2553   56271 0            DDV       DDV
 0496    REF   3  LAST  865   25,2554   03656 1                      DHOOK
 0497    REF   3  LAST  865   25,2555   03666 1                      VBARS
 0498                         25,2556   50021 1            BDSU      BMN
 0499    REF   2  LAST  864   25,2557   00027 1                      GAMMAL1
 0500    REF   1              25,2560   52750 1                      NEGAMA
 0501    REF   1              25,2561   03761 1  HUNTEST3  STORE     GAMMAL

 0502                         25,2562   77625 0            DSU                      GAMMAL1=GAMMAL1 +Q19 (GAMMAL-GAMMAL1)
 0503    REF   3  LAST  865   25,2563   00027 1                      GAMMAL1
 0504                         25,2564   43205 1            DMP       DAD
 0505   REF   1                 25,2565   15334 1                    Q19
 0506   REF   4  LAST  865      25,2566   00027 1                    GAMMAL1
 0507   REF   5  LAST  866      25,2567   14027 1             STODL  GAMMAL1
 0508   REF   2  LAST  865      25,2570   03761 1                    GAMMAL
```

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P0509     *START    RANGE PREDICTION ...

A0510                                                                           C(MPAC) = GAMMAL
 0511                          25,2571   60516 0  RANGER   DSQ     SR2          COSG = 1-GAMMAL SQ/2, TRUNCATED SERIES
 0512                          25,2572   77621 1           BDSU
 0513   REF   3  LAST  865     25,2573   15334 1                   HALVE
 0514   REF   2  LAST  123     25,2574   17670 0           STODL   COSG/2
 0515   REF   4  LAST  865     25,2575   03666 1                   VBARS        E=SQRT(1+VBARS.........

 0516                          25,2576   41225 1           DSU     DMP
 0517   REF   4  LAST  867     25,2577   15334 1                   HALVE
 0518   REF   5  LAST  867     25,2600   03666 1                   VBARS
 0519                          25,2601   41205 0           DMP     DMP
 0520   REF   3  LAST  867     25,2602   03670 0                   COSG/2
 0521   REF   4  LAST  867     25,2603   03670 0                   COSG/2
 0522                          25,2604   43312 0           SL2     DAD
 0523   REF   1                25,2605   31771 1                   C1/16        C1/16 = 1/16
 0524                          25,2606   65366 1           SQRT    PDDL         E/4 INTO PDL

 0525   REF   6  LAST  867     25,2607   03666 1                   VBARS
 0526                          25,2610   41205 0           DMP     DMP          ASKEP/2 = ARCSIN(VBARS COSG SING/E)
 0527   REF   5  LAST  867     25,2611   03670 0                   COSG/2
 0528   REF   3  LAST  866     25,2612   03761 1                   GAMMAL
 0529                          25,2613   67471 1           DDV     ASIN
 0530                          25,2614   41552 0           SL1     PUSH         ASKEP TO PDL 0.
 0531   REF   1                25,2615   17731 1           STODL   ASKEP        BALLISTIC RANGE         ASKEP/2PI

A0532                                                                  FOR TM,  STORE RANGE COMPONENTS OVERLAPPING (SP)
 0533   REF   7  LAST  865     25,2616   03757 1                   VL
 0534                          25,2617   43205 1           DMP     DAD          ASP1 = Q2 + Q3 VL
 0535   REF   1                25,2620   15172 1                   Q3
 0536   REF   3  LAST  853     25,2621   03712 0                   Q2
 0537   REF   1                25,2622   03732 1           STORE   ASP1         FINAL PHASE RANGE    ASP1/2 PI

 0538                          25,2623   63525 0           PDDL    DSQ          ASP1 TO PDL 2.
 0539   REF  13  LAST  865     25,2624   00326 0                   V1
A0540                                                                                        2
A0541                                                                           ASPUP= -C12 LOG(V1 Q7/VBARS A0)/GAMMAL1
 0542                          25,2625   56205 0           DMP     DDV
 0543   REF   5  LAST  865     25,2626   03175 1                   Q7
 0544   REF   7  LAST  867     25,2627   03666 1                   VBARS
 0545                          25,2630   45071 0           DDV     CALL
 0546   REF   5  LAST  864     25,2631   00330 1                   A0
 0547   REF   1                25,2632   46155 1                   LOG          RETURN WITH -LOG IN MPAC

 0548                          25,2633   56205 0           DMP     DDV
 0549   REF   1                25,2634   15210 0                   C12
 0550   REF   6  LAST  866     25,2635   00027 1                   GAMMAL1
 0551   REF   1                25,2636   03733 0           STORE   ASPUP        UP PHASE RANGE          ASPUP / 2 PI
 0552                      25,2637   41325 0           PDDL   DMP          ASPUP TO PDL 4.
 0553   REF   1            25,2640   15260 1                  KC3          KC3 =-4 VS VS/ 2 PI 805 RE
A0554                                                                      ASPDWN = KC3 RDOT V / A0
 0555   REF  13  LAST  863 25,2641   03700 0                  RDOT
 0556                      25,2642   56205 0           DMP    DDV
 0557   REF  10  LAST  863 25,2643   03674 1                  V
 0558   REF   6  LAST  867 25,2644   00330 1                  A0
 0559                      25,2645   41471 0           DDV    PUSH         ASPDWN TO PDL 6.
 0560   REF   9  LAST  863 25,2646   03624 1                  LAD
 0561   REF   1            25,2647   17734 1           STODL  ASPDWN       RANGE TO PULL OUT        ASPDWN /2 PI

 0562   REF   1            25,2650   15176 0                  Q6
 0563                      25,2651   41225 1           DSU    DMP          ASP3 = Q5(Q6-GAMMAL)
 0564   REF   4  LAST  867 25,2652   03761 1                  GAMMAL
 0565   REF   1            25,2653   15174 1                  Q5
 0566   REF   1            25,2654   27735 0           STOVL  ASP3         GAMMA CORRECTION        ASP3/2PI

 0567   REF   2  LAST  867 25,2655   03731 1                  ASKEP        GET HI-WD AND
 0568   REF   1            25,2656   17126 1           STODL  ASPS(TM)     SAVE HI-WORD OF ASP'S FOR TM.

 0569   REF   2  LAST  868 25,2657   03735 0                  ASP3
 0570                      25,2660   43215 0           DAD    DAD
A0571                                                                      ASPDWN FROM PDL 6.
A0572                                                                      ASPUP FROM PDL 4.
 0573                      25,2661   43215 0           DAD    DAD
A0574                                                                      ASP1 FROM PDL 2.
A0575                                                                      ASKEP FROM PDL 0.
 0576                      25,2662   41025 0           DSU    BOVB         CLEAR OVFIND.
 0577   REF   7  LAST  859 25,2663   03702 1                  THETAH
 0578   REF   3  LAST  808 25,2664   57544 0                  TCDANZIG
 0579   REF   2  LAST  122 25,2665   03610 0           STORE  DIFF         DIFF = (ASP-THETAH) /2 PI
A0580                                                            ASP=ASKEP+ASP1+ASPUP+ASP3+ASPDWN = TOTAL RANGE

 0581                      25,2666   45246 0           ABS    DSU          IF ABS(THETAH-ASP) -25NM NEG, GO TO UPSY
 0582   REF   1            25,2667   15224 1                  25NM
 0583                      25,2670   43040 1           BMN    BON
 0584   REF   1            25,2671   53032 0                  GOTOUPSY
 0585   REF   1            25,2672   03311 1                  HIND
 0586   REF   1            25,2673   52677 0                  GETDLEWD

 0587                      25,2674   51145 0           DLOAD  BPL
 0588   REF   3  LAST  868 25,2675   03610 0                  DIFF
 0589   REF   1            25,2676   53220 1                  DCONSTD      EVENTUALLY SETS MODE = HUNTEST.
 0590                      25,2677   41345 0  GETDLEWD DLOAD  DMP
A0591                                                                      DLEWD = DLEWD (DIFF/(DIFFOLD-DIFF))
 0592   REF   2  LAST  122 25,2700   03642 1                  DLEWD
 0593   REF   4  LAST  868 25,2701   03610 0                  DIFF
 0594                      25,2702   45325 1           PDDL   DSU
 0595   REF   2  LAST  122 25,2703   03612 1                  DIFFOLD
 0596   REF   5  LAST  863 25,2704   03610 0                  DIFF
 0597                         25,2705   77665 1            BDDV
 05971                        25,2706   77626 0  LWDSTORE  STADR
 0598    REF   3  LAST  868   25,2707   74135 0            STORE   DLEWD
 0599                         25,2710   50015 0            DAD     BMN               IF LEWD+DLEWD NEG,DLEWD=-LEWD/2
 0600    REF   4  LAST  864   25,2711   03725 1                    LEWD
 06002   REF   1              25,2712   52744 1                    LEWDPTR
 06004                        25,2713   77600 1            BOV
 0601    REF   1              25,2714   52740 0                    LEWDOVFL
 0602    REF   5  LAST  869   25,2715   03725 1            STORE   LEWD

 0603                         25,2716   77776 1  SIDETRAK  EXIT

 0604    REF  13  LAST  808   25,2717  0 4606 0            TC      E7SETTER

 06051   REF   8  LAST  570   25,2720  3 5055 1            CA      PRIO16            DROP GRP 5 RESTART PRIO TO 1 LESS THAN
 06052   REF   1              25,2721  55'270 1            TS      PHSPRDT5          GRP 4.

 0606    REF  90  LAST  855   25,2722  0 5402 1            TC      PHASCHNG
 0607                         25,2723   00474 0            OCT     00474             RESTART GRP 4 AT PRE-HUNT.
A06071                                                                               FORCE RESTART TO PICK UP IN GRP 4:
A06072                                                                               USE PRIO 17 FOR GRP 4( < SERVICER PRIO)
 06073   REF   1              01,2212            4P47SPT1  =       4.47SPOT
 0608    REF   9  LAST  869   25,2724  3 5055 1            CA      PRIO16            CONTINUE GRP 5 AT LOWER PRIO THAN EITHER
A06081                                                                               GRP 4 OR SERVICER.
 0609    REF  13  LAST  741   25,2725  0 5176 1            TC      PRIOCHNG

 0610    REF   1              25,2726  3 3031 0            CAF     ADENDEXT          SIDETRACK NEXT PASS UNTIL THIS ONE DONE.
 0611    REF   9  LAST  863   25,2727  55'645 0            TS      GOTOADDR          ONLY AFTER RESTART IS LEFT AFTER DETOUR.

 0612    REF 210  LAST  855   25,2730  0 6006 1            TC      INTPRET

 0613                         25,2731   43145 0            DLOAD   SET
 0614    REF   6  LAST  868   25,2732   03610 0                    DIFF
 0615    REF   2  LAST  868   25,2733   03071 1                    HIND
 0616    REF   3  LAST  868   25,2734   17612 1            STODL   DIFFOLD           DIFFOLD / 2 PI

 0617    REF   2  LAST  852   25,2735   15200 1                    Q7F
 0621    REF   6  LAST  867   25,2736   37175 0            STCALL  Q7                Q7 / 805 FPSS
 0622    REF   2  LAST  863   25,2737   52373 1                    HUNTEST            (GO TO )

 0623                         25,2740   77745 1  LEWDOVFL  DLOAD
 0624    REF   3  LAST  852   25,2741   15344 0                    NEARONE
 0625    REF   6  LAST  869   25,2742   37725 0            STCALL  LEWD
 0626    REF   2  LAST  868   25,2743   53220 1                    DCONSTD           (GO TO)  ALSO WILL SET MODE = HUNTEST

 06262                        25,2744   70545 1  LEWDPTR   DLOAD   SR1
 06264   REF   7  LAST  869   25,2745   03725 1                    LEWD
 06266                        25,2746   52076 1            DCOMP   GOTO
 06268   REF   1              25,2747   52706 1                    LWDSTORE
```

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R0627     NEGAMA IS PART OF HUNTEST ...

 0628                        25,2750   41205 0  NEGAMA    DMP     DMP              ENTER WITH GAMMAL IN MPAC
 0629   REF   8  LAST  867   25,2751   03757 1                    VL
 0630   REF   1              25,2752   15152 0                    1/3RD
 0631                        25,2753   41325 0            PDDL    DMP              PUSH GAMMAL VL/3
 0632   REF   8  LAST  869   25,2754   03725 1                    LEWD
 0633   REF   2  LAST  870   25,2755   15152 0                    1/3RD
 0634                        25,2756   43325 1            PDDL    DAD              PUSH LEWD/3
 0635   REF   3  LAST  865   25,2757   03660 1                    AHOOKDV
 0636   REF   1              25,2760   15254 0                    1/24TH
 0637                        25,2761   41205 0            DMP     DMP              DEL VL =(GAMMAL VL/3)/(LEWD/3-DVL
 0638   REF   7  LAST  865   25,2762   03662 0                    DVL              (2/3 + AHOOKDV)(CH1 GS/DHOOK VL))
 0639   REF   2  LAST  865   25,2763   15256 1                    CHI
 0640                        25,2764   56271 0            DDV     DDV
 0641   REF   4  LAST  865   25,2765   03656 1                    DHOOK
 0642   REF   9  LAST  870   25,2766   03757 1                    VL
 0643                        25,2767   55221 0            BDSU    BDDV
A0644                                                                              LEWD/3
A0645                                                                              GAMMAL VL /3
 0646                        25,2770   77615 0            DAD
 0647   REF  10  LAST  870   25,2771   03757 1                    VL
 0648   REF  11  LAST  870   25,2772   37757 0            STCALL  VL               VL/2 VS

 0649   REF   2  LAST  865   25,2773   53003 1                    DHOOKYQ7         GO CALC Q7
A0650                                                                              Q7=((1-VL/FACT1)SQ - ALP)/FACT2
 0651   REF   7  LAST  869   25,2774   17175 1            STODL   Q7               Q7 / 256

 0652   REF  12  LAST  870   25,2775   03757 1                    VL
 0653                        25,2776   77716 1            DSQ
 0654   REF   8  LAST  867   25,2777   17666 1            STODL   VBARS            VBARS / 4 VS VS

 0655   REF   3  LAST  857   25,3000   15336 0                    3ZEROS
 0656                        25,3001   77650 1            GOTO                     SET GAMMAL = 0
 0657   REF   1              25,3002   52561 1                    HUNTEST3

 0658                        25,3003   56342 1  DHOOKYQ7  SR1     DDV              SUBROUTINE TO CALC DHOOK OR Q7)
 0659   REF   4  LAST  864   25,3004   03616 0                    FACT1
 0660                        25,3005   72421 0            BDSU    SL1
 0661   REF   5  LAST  867   25,3006   15334 1                    HALVE
 0662                        25,3007   45316 1            DSQ     DSU
 0663   REF   6  LAST  864   25,3010   03704 1                    ALP
 0664                        25,3011   43471 1            DDV     RVQ
 0665   REF   3  LAST  864   25,3012   03620 0                    FACT2
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P06651


A0666                                                                  COME TO PRE-HUNT WHEN RESTART OCCURS AFTER
A0667                                                                  HUNTEST IS SIDE-TRACKED AT SIDETRAK.
A0668                                                                  PICK UP IN GROUP 4.

 0669   REF 211  LAST  869   25,3013  0 6006 1  PRE-HUNT TC       INTPRET
 0670                        25,3014   45014 0           CLEAR    CALL
 0671   REF   3  LAST  869   25,3015   03271 0                    HIND              HIND        990  BIT 6  FLAG 6
 0672   REF   2  LAST  862   25,3016   53021 1                    FOREHUNT          RE-INITIALIZE HUNTEST AFTER RE-START.
 0673                        25,3017   77650 1           GOTO
 0675   REF   3  LAST  869   25,3020   52373 1                    HUNTEST


 0676                        25,3021   77745 1  FOREHUNT DLOAD                      INITIALIZE HUNTEST.
 0677   REF   4  LAST  870   25,3022   15336 0                    3ZEROS
 0678   REF   4  LAST  869   25,3023   17612 1           STODL    DIFFOLD
 0679   REF   1              25,3024   15160 1                    DLEWD0
 0680   REF   4  LAST  869   25,3025   17642 1           STODL    DLEWD
 0681   REF   1              25,3026   15154 0                    LEWD1
 0682   REF   9  LAST  870   25,3027   03725 1           STORE    LEWD
 0683                        25,3030   77616 0           RVQ


A0684
 0685   REF   2  LAST  797   25,3031   53574 1  ADENDEXT CADR     ENDEXIT
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P0686  * START  UP CONTROL ...

A0687                                                                                      MM = 65
 0688                           25,3032   77634 0  GOTOUPSY RTB                            END OF HUNTEST
 0689   REF   1                 25,3033   54440 0                    P65                   HUNTEST USE OF GRP4 IS DISABLED BY P65
A0690                                                                                      USE FOR DISPLAY.
A0691                                                                                      SET MODE = UPCONTRL.
A0692                                                                                      RETURN FROM P65 DIRECTLY TO UPCONTRL
A0693                                                                                      VIA THE GOTOADDR AT REFAZE10.

 0694                           25,3034   45345 1  UPCONTRL DLOAD    DSU                   IF D-140 POS, NOSWITCH =1
 06941  REF  13  LAST  863      25,3035   03640 0                    D                     (SUPPRESS LATERAL SWITCH)
 06942  REF   1                 25,3036   15222 1                    C21
 06943                          25,3037   43040 1           BMN      SET
 06944                          25,3040   53042 1                    +2
 06945  REF   1                 25,3041   03070 0                    NOSWITCH

 06946                          25,3042   45345 1           DLOAD    DSU                   IF  V-V1  POS, GO TO DOWN CONTROL.
 0695   REF  11  LAST  868      25,3043   03674 1                    V
 0696   REF  14  LAST  867      25,3044   00326 0                    V1
 0697                           25,3045   71244 0           BPL      DLOAD
 0698   REF   1                 25,3046   53257 1                    DOWNCNTL
 0699   REF  14  LAST  872      25,3047   03640 0                    D
 0700                           25,3050   50025 0           DSU      BMN                   IF D- Q7 NEG, GO TO KEP
 0701   REF   8  LAST  870      25,3051   03175 1                    Q7
 0702   REF   1                 25,3052   53312 1                    KEP
 0703                           25,3053   51145 0           DLOAD    BPL                   IF RDOT NEG, DO VLTEST
 0704   REF  14  LAST  868      25,3054   03700 0                    RDOT
 0705   REF   1                 25,3055   53064 0                    CONT1

 0706                           25,3056   45345 1  VLTEST   DLOAD    DSU                   IF V-VL-C18 NEG,EGSW=1,MODE=PREDICT3
 0707   REF  12  LAST  872      25,3057   03674 1                    V
 0708   REF  13  LAST  870      25,3060   03757 1                    VL
 0709                           25,3061   50025 0           DSU      BMN
 0710   REF   1                 25,3062   15166 1                    C18
 0711   REF   2  LAST  864      25,3063   53332 0                    PREFINAL

 0712                           25,3064   77745 1  CONT1    DLOAD                          IF D-A0 POS, L/D = LAD, GO TO LIMITL/D
 0713   REF  15  LAST  872      25,3065   03640 0                    D
 0714                           25,3066   50025 0           DSU      BMN
 0715   REF   7  LAST  868      25,3067   00330 1                    A0
 0716   REF   1                 25,3070   53074 1                    CONT3
 0717                           25,3071   52145 0           DLOAD    GOTO
 0718   REF  10  LAST  868      25,3072   03624 1                    LAD
 0719   REF   1                 25,3073   53523 0                    STOREL/D
A0720

 0721                           25,3074   41345 0  CONT3    DLOAD    DMP                   VREF=FACT1(1-SQRT(FACT2 D + ALP))
 0722   REF  16  LAST  872      25,3075   03640 0                    D
 0723   REF   4  LAST  870      25,3076   03620 0                    FACT2
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L         REENTRY CONTROL                                                                USER'S PAGE NO. 22        E7 S3

 0724                            25,3077   75415 0              DAD     SQRT
 0725    REF   7  LAST  870      25,3100   03704 1                      ALP
 0726                            25,3101   41221 0              BDSU    DMP
 0727    REF   4  LAST  864      25,3102   15344 0                      BARELYI
 0728    REF   5  LAST  870      25,3103   03616 0                      FACT1
 0729    REF   1                 25,3104   01312 0              STORE   VREF               VREF / 2VS

 0730                            25,3105   41221 0              BDSU    DMP                RDOTREF = LEWD(V1-VREF)
 0731    REF  15  LAST  872      25,3106   00326 0                      V1
 0732    REF  10  LAST  871      25,3107   03725 1                      LEWD
 0733    REF   2  LAST   84      25,3110   15310 1              STODL   RDOTREF            RDOTREF / 2VS

 0734    REF   5  LAST  865      25,3111   03672 1                      VS1
 0735                            25,3112   50025 0              DSU     BMN                IF VSAT-VREF NEG, GO TO CONTINU2
 0736    REF   2  LAST  873      25,3113   01312 0                      VREF
 0737    REF   1                 25,3114   53133 0                      CONTINU2

 0738                            25,3115   41406 0              PUSH    PUSH               VS1-VREF  TO PDL TWICE
 0739                            25,3116   56205 0              DMP     DDV                RDHOOK=CH1(1+DV AHOOKDV/DVL) DV DV
 0740    REF   4  LAST  870      25,3117   03660 1                      AHOOKDV                /DHOOK VREF
 0741    REF   8  LAST  870      25,3120   03662 0                      DVL                WHERE  DV = (VS1-VREF)
 0742                            25,3121   41215 1              DAD     DMP
 0743    REF   2  LAST  865      25,3122   31771 1                      1/16TH
 0744    REF   3  LAST  870      25,3123   15256 1                      CH1
 0745                            25,3124   41205 0              DMP     DMP
A0746                                                                                      VS1-VREF  FROM PDL TWICE.
 0747                            25,3125   77671 1              DDV
 0748    REF   5  LAST  870      25,3126   03656 1                      DHOOK
 0749                            25,3127   44271 0              DDV     BDSU
 0750    REF   3  LAST  873      25,3130   01312 0                      VREF
 0751    REF   3  LAST  873      25,3131   01310 1                      RDOTREF            C(RDOTREF)= LEWD (V1-VREF)
 0752    REF   4  LAST  873      25,3132   01310 1              STORE   RDOTREF            RDOTREF = RDOTREF - RDHOOK

 0753                            25,3133   45345 1   CONTINU2   DLOAD   DSU
 0754    REF  17  LAST  872      25,3134   03640 0                      D
 0755    REF   1                 25,3135   15344 0                      Q7MIN
 0756                            25,3136   50004 0              BOVB    BMN
 0757    REF   4  LAST  868      25,3137   57544 0                      TCDANZIG           CLEAR OVFL IND, IF ON
 0758    REF   1                 25,3140   53151 1                      UPCNTRL3
 0759                            25,3141   45345 1              DLOAD   DSU
 0760    REF   4  LAST  863      25,3142   03664 0                      A1
 0761    REF   9  LAST  872      25,3143   03175 1                      Q7
 0762                            25,3144   45325 1              PDDL    DSU
 0763    REF  18  LAST  873      25,3145   03640 0                      D
 0764    REF  10  LAST  873      25,3146   03175 1                      Q7
 0765                            25,3147   45471 1              DDV     STADR
 0766    REF   3  LAST  853      25,3150   74163 0              STORE   FACTOR             FACTOR / 256
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L        REENTRY CONTROL                                                                                USER'S PAGE NO.  23        E7 S3

P0767    SKIPPER

A0768                                                                                  DELTA L/D=-((RDOT-RDOTREF)F1 KB1+V-VREF)F1 KB2
A0769                                                                                      WHERE F1 = FACTOR

 0770                           25,3151   77745 1  LPCNTRL3 DLOAD
 0771   REF  15  LAST  872      25,3152   03700 0                    RDOT
 0772                           25,3153   41225 1           DSU      CMP          L/D = LEWD
 0773   REF   5  LAST  873      25,3154   01310 1                    RDOTREF      -((RDOT-RDOTREF)F1/KB1+V-VREF)F1/KB2
 0774   REF   4  LAST  873      25,3155   03614 1                    FACTOR
 0775                           25,3156   43271 1           DDV      DAD
 0776   REF   1                 25,3157   15212 1                    1/KB1
 0777   REF  13  LAST  872      25,3160   03674 1                    V
 0778                           25,3161   41225 1           DSU      DMP
 0779   REF   4  LAST  873      25,3162   01312 0                    VREF
 0780   REF   5  LAST  874      25,3163   03614 1                    FACTOR
 0781                           25,3164   41471 0           DDV      PUSH

 0782   REF   1                 25,3165   15214 1                    -1/KB2       DELTA L/D INTO PDL
 0783                           25,3166   51400 1           BOV      ABS          NONLINEAR CIRCUIT FOR REDUCING HIGH GAIN
 0784   REF   1                 25,3167   53470 1                    GOMAXL/D
 0785                           25,3170   50025 0           DSU      BMN
 0786   REF   1                 25,3171   15276 0                    PT1/16
 0787   REF   1                 25,3172   53177 0                    NEXT1
 0788                           25,3173   43205 1           DMP      DAD
 0789   REF   1                 25,3174   15156 1                    POINT1
 0790   REF   2  LAST  874      25,3175   15276 0                    PT1/16
 0791                           25,3176   41565 1           SIGN     PUSH         ATTACH SIGN OF PUSH TO MPAC THEN PUSH

 0792                           25,3177   42545 0  NEXT1    DLOAD    SL4
A0793                                                                             DELTA L/D FROM PDL.
 0794                           25,3200   77615 0           DAD
 0795   REF  11  LAST  873      25,3201   03725 1                    LEWD
 0796                           25,3202   41400 0  NEGTESTS BOV      PUSH         L/D TO PDL FOR USE IN NEGTESTS.
 0797   REF   2  LAST  874      25,3203   53470 1                    GOMAXL/D
 0798   REF   6  LAST  863      25,3204   17634 0           STODL    L/D
A0799                                                                             IF D-C20 POS, LATSW = 0
A0800                                                                             AND IF L/D NEG, L/D = 0
 0801   REF  19  LAST  873      25,3205   03640 0                    D
 0802                           25,3206   50025 0           DSU      BMN
 0803   REF   1                 25,3207   15220 0                    C20
 0804   REF   4  LAST  862      25,3210   53524 1                    LIMITL/D
 0805                           25,3211   71214 0           CLEAR    DLOAD
 0806   REF   1                 25,3212   03273 1                    LATSW        =210.  ROLL OVER TOP, REGARDLESS.
A0807                                                                             L/D FROM PDL.
 0808                           25,3213   71244 0           BPL      DLOAD
 0809   REF   5  LAST  874      25,3214   53524 1                    LIMITL/D
 0810   REF   5  LAST  871      25,3215   15336 0                    3ZEROS
 0811   REF   7  LAST  874      25,3216   37634 1           STCALL   L/D
 0812   REF   6  LAST  874      25,3217   53524 1                    LIMITL/D     (GO TO)
 0813                          25,3220   77745 1  DCONSTD   DLOAD                   TWO RANGER ENTRIES TO CONSTD HERE
 0814   REF   7  LAST  869     25,3221   03610 0                      DIFF
A0815                                                                                 SAVE OLD VALUE OF DIFF FOR NEXT PASS.
 0817   REF   5  LAST  871     25,3222   17612 1            STODL     DIFFOLD         DIFFOLD / 2 PI

 0818   REF   3  LAST  869     25,3223   15200 1                      Q7F
 0819   REF  11  LAST  873     25,3224   03175 1            STORE     Q7

 0820                          25,3225   47131 1  BECONSTD  SSP       RTB             A HUNTEST ENTRY INTO CONSTD.
 0821   REF  10  LAST  869     25,3226   03646 0                      GOTOADDR        RESET MODE TO HUNTEST
 0822   REF   4  LAST  871     25,3227   52373 1                      HUNTEST
 0823   REF   1                25,3230   54505 0                      KILLGRP4        DEACTIVATE GRP4 FROM HUNTEST.

 0824                          25,3231   77604 0  CONSTD    BOVB
 0825   REF   5  LAST  873     25,3232   57544 0                      TCDANZIG        CLEAR OVF IND IF ON.

 0826                          25,3233   41345 0            DLOAD     DMP
 0827   REF   6  LAST  861     25,3234   03654 0                      LEQ
 0828   REF   3  LAST  862     25,3235   03706 0                      C/D0            C/D0 = -4/D0  B-8
 0829                          25,3236   41325 0            PDDL      DMP             LEQ C/D0  INTO PDL
 0830   REF   1                25,3237   15264 0                      2HS             2HS / 4 VS VS
 0831   REF   3  LAST  862     25,3240   03710 1                      D0
 0832                          25,3241   43271 1            DDV       DAD             RDOTREF = - 2 HS D0/V
 0833   REF  14  LAST  874     25,3242   03674 1                      V
 0834   REF  16  LAST  874     25,3243   03700 0                      RDOT
 0835                          25,3244   43205 1            DMP       DAD
 0836   REF   1                25,3245   15230 1                      K2D             C/D0 LEQ + K2D(RDOT-RDOTREF) INTO PD
 0837                          25,3246   77725 1            PDDL
 0838   REF   4  LAST  875     25,3247   03710 1                      D0              D0 /805

 0839                          25,3250   77621 1  CONSTD1   BDSU                      ENTER WITH  DREF  IN MPAC
 0840   REF  20  LAST  874     25,3251   03640 0                      D
 0841                          25,3252   43205 1            DMP       DAD
 0842   REF   1                25,3253   15226 0                      K1D             K2D TERM FROM PUSH
 0843                          25,3254   52061 1            SL        GOTO
 0844                          25,3255   20211 1                      8D
 0845   REF   1                25,3256   53202 1                      NEGTESTS        (GO TO)


 0846                          25,3257   77604 0  DOWNCNTL  BOVB                      INITIAL PART OF UPCONTROL.
 0847   REF   6  LAST  875     25,3260   57544 0                      TCDANZIG        CLEAR OVFIND , IF ON.

 0848                          25,3261   54345 1            DLOAD     SR
 0849   REF  11  LAST  872     25,3262   03624 1                      LAD
 0850                          25,3263   20611 0                      8D
 0851                          25,3264   45325 1            PDDL      DSU             RDTR = LAD(V1-V)
 0852   REF  15  LAST  875     25,3265   03674 1                      V
 0853   REF  16  LAST  873     25,3266   00326 0                      V1
 0854                          25,3267   43205 1            DMP       DAD
 0855   REF  12  LAST  875     25,3270   03624 1                      LAD
```

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L        REENTRY CONTROL                                                                                USER'S PAGE NO.  25       E7 S3

 0856    REF  17  LAST  875    25,3271   03700 0                RDOT
 0857                          25,3272   43205 1          DMP   DAD
 0858    REF   2  LAST  875    25,3273   15230 1                K2D
A0859                                                                          PUSH UP LAD.
 0860                          25,3274   45325 1          PDDL  DSU            LAD + K2D(RDOT-RDTR) INTO PD
 0861    REF  17  LAST  875    25,3275   00326 0                V1
 0862    REF  16  LAST  875    25,3276   03674 1                V
 0863                          25,3277   41316 0          DSQ   DMP
 0864    REF  13  LAST  875    25,3300   03624 1                LAD
 0865                          25,3301   65271 0          DDV   PDDL           (V1-V)SQ LAD/(2 C1 HS) INTO PD
 0866    REF   3  LAST  864    25,3302   15274 1                2C1HS
 0867    REF  18  LAST  876    25,3303   00326 0                V1
 0868                          25,3304   56316 0          DSQ   DDV
 0869    REF   4  LAST  863    25,3305   03622 1                VSQUARE
 0870                          25,3306   45265 1          BDDV  DSU            DREF = (V/V1)SQ AD - PD
 0871    REF   8  LAST  872    25,3307   00330 1                AD
A0872                                                                          PUSH UP HERE
 0873                          25,3310   77650 1          GOTO                 C(MPAC) = DREF
 0874    REF   1               25,3311   53250 0                CONSTD1

A0875                                                                      2              2
A0876                                                           DREF = (V/V1)  AD -(V-V1)  LAD/2 C1 HS
```

```
P0877    * START  BALLISTIC PHASE ...

A0878                                                                                 MM = 66     UPCONTRL ENTRY INTO KEP2.
 0879                           25,3312   66234 1  KEP         RTB    SSP
 0880   REF   1                 25,3313   54473 0                     P66                  DISPLAY TRIM GIMBAL ANGLE VALUES.
 0881   REF  11  LAST  875      25,3314   03646 0                     GOTOADDR             SET GOTOADDR TO KEPLER PHASE.
 0882   REF   2  LAST  861      25,3315   53316 0                     KEP2

A0883                                                                        KEP2 CAN ALSO BE STARTED UP DIRECTLY FROM INITROLL
A0884                                                                        IN P64. PROGRAM WILL IDLE IN P64 UNTIL D EXCEEDS
A0885                                                                        .2 G BEFORE GOING ON TO P67.

 0886                           25,3316   45345 1  KEP2        DLOAD  DSU                  IF Q7F+KOMIN -D NEG,GO TO FINAL PHASE.
 0887   REF   1                 25,3317   15170 0                     Q7FKOMIN             (Q7F + KOMIN)/805
 0888   REF  21  LAST  875      25,3320   03640 0                     D
 0889                           25,3321   72240 1              BMN    TLOAD
 0891   REF   3  LAST  872      25,3322   53332 0                     PREFINAL


A0892                                                                                  SET ROLLHOLD = ROLLC, IN CASE CMDAPMOD
 0893   REF  11  LAST  822      25,3323   03316 0                     ROLLC                = +1 EVER ENTERED.
 0895                           25,3324   72214 0              BON    TLOAD                IF D > .05G, KEEP PRESENT ROLL COMMAND.
 0896   REF   6  LAST  861      25,3325   03314 1                     .05GSW               IF D < .05G, SET ROLL COMMAND = 0.
 0897                           25,3326   53330 1                     +2
 0898   REF   6  LAST  874      25,3327   15336 0                     3ZEROS               SET ROLLC & ROLLHOLD =0.
 0899   REF  12  LAST  877      25,3330   37316 1  +2          STCALL ROLLC                (SP ROLLHOLD FOLLOWS DP ROLLC)
 0900   REF   2  LAST  795      25,3331   54402 0                     P62.3                CALC DESIRED GIMBAL ANGLES AT PRESENT
A0901                                                                                 RN, VN  TO YIELD TRIM ATTITUDE.
A0902                                                                                 AVAILABLE IN CPHI'S FOR N22.
```

```
L      REENTRY CONTROL                                                           USER'S PAGE NO. 27      E7 S3

P0903  START  FINAL  PHASE ..

A0904                                                                            MM = 67
0905                       25,3332   47131 1  PREFINAL SSP    RTB
0906   REF  12  LAST  877  25,3333   03646 0                  GOTOADDR         RESTART PROTECT: RESET GOTOADDR IF CAME
0907   REF   4  LAST  877  25,3334   53332 0                  PREFINAL         FROM HUNTEST.
0908   REF   1             25,3335   54477 1                  P67              DISABLES GRP4. FINE IF FROM HUNTEST.BUT
A0909                                                                            MAY ALSO REMOVE RESTART PROTECTION OF
A0910                                                                            N69 (P65).
A0911                                                                            ROLLC           XRNGERR          DNRNGERR
A0912                                                                            XXX.XX DEG      XXXX.X NM        XXXX.X NM

0913                       25,3336   66214 0           SET    SSP
0914   REF   3  LAST  859  25,3337   03067 0                  EGSW
0915   REF  13  LAST  878  25,3340   03646 0                  GOTOADDR
0916   REF   1             25,3341   53342 1                  PREDICT3


0917                       25,3342   45345 1  PREDICT3 DLOAD  DSU              IF V-VQUIT NEG, STOP STEERING
0918   REF  17  LAST  876  25,3343   03674 1                  V
0919   REF   2  LAST  864  25,3344   15216 0                  VQUIT
0920                       25,3345   77440 1           BMN    EXIT
0921   REF   1             25,3346   53611 1                  STEEROFF

0922   REF  14  LAST  869  25,3347  0 4606 0           TC     E7SETTER         PRECAUTIONARY

0924   REF   2  LAST  223  25,3350  3 5775 1           CA     TWELVE
0925   REF   1             25,3351  55'761 1  BACK     TS     JJ

0926   REF  18  LAST  878  25,3352  4 1673 0           CS     V
0927   REF   2  LAST  878  25,3353  51'761 0           INDEX  JJ
0928   REF   1             25,3354  6 3634 0           AD     VREFER            VREF - V, HIGHEST VREF AT END OF TABLE.
0929   REF 187  LAST  834  25,3355  10 000 0           CCS    A                 IF VREF-V POS LOOP BACK
0930   REF   3  LAST  878  25,3356  11'761 1           CCS    JJ                DECREMENT JJ , JJ CANNOT BE ZERO
0931   REF   1             25,3357  1 3351 1           TCF    BACK
0932   REF  90  LAST  828  25,3360  6 4770 0           AD     ONE
0933   REF   6  LAST  863  25,3361  55'646 0           TS     TEM1B             V-VREF IN TEM1B (MUST BE POSITIVE NUM)

0934   REF   4  LAST  878  25,3362  51'761 0           INDEX  JJ
0935   REF   2  LAST  878  25,3363  4 3634 1           CS     VREFER
0936   REF   5  LAST  878  25,3364  51'761 0           INDEX  JJ
0937   REF   3  LAST  878  25,3365  6 3635 1           AD     VREFER + 1        V(K+1) - V(K)      (POS NUM)
0938   REF   7  LAST  878  25,3366  57'646 1           XCH    TEM1B
0939                       25,3367  22 007 0           ZL
0940                       25,3370  0 0006 1           EXTEND
0941   REF   8  LAST  878  25,3371  11'646 0           DV     TEM1B
0942   REF   2  LAST  122  25,3372  55'651 0           TS     GRAD              GRAD = (V-VREF)/(VK+1 - VK)    (POS NUM

0943   REF  20  LAST  829  25,3373  3 4773 0           CAF    FIVE
0944   REF   5  LAST  812  25,3374  55'650 1  BACK2    TS     MM
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L        REENTRY CONTROL                                                                 USER'S PAGE NO.  28       E7 S3

 0945   REF   2  LAST  836   25,3375  3 4776 0              CAF     THIRTEEN
 0946   REF   6  LAST  878   25,3376  27'761 1              ADS     JJ
 0947   REF 188  LAST  878   25,3377  50 000 1              INDEX   A
 0948   REF   4  LAST  878   25,3400  4 3634 1              CS      VREFER
 0949   REF   7  LAST  879   25,3401  51'761 0              INDEX   JJ
 0950   REF   5  LAST  879   25,3402  6 3635 1              AD      VREFER + 1         X(K+1) - X(K)
 0951                        25,3403  0 0006 1              EXTEND
 0952   REF   3  LAST  878   25,3404  7 1651 0              MP      GRAD
 0953   REF   8  LAST  879   25,3405  51'761 0              INDEX   JJ
 0954   REF   6  LAST  879   25,3406  6 3634 0              AD      VREFER
 0955   REF   6  LAST  878   25,3407  51'650 0              INDEX   MM
 0956   REF   2  LAST  122   25,3410  55'652 0              TS      FX                  FX = AK + GRAD (AK+1 - AK)
 0957   REF   7  LAST  879   25,3411  11'650 1              CCS     MM
 0958   REF   1              25,3412  1 3374 0              TCF     BACK2
 0959   REF   3  LAST  879   25,3413  57'653 0              XCH     FX +1              ZERO FX +1  AND GET DREFR
 0960   REF  22  LAST  877   25,3414  6 1637 1              AD      D
 0961                        25,3415  0 0006 1              EXTEND
 0962   REF   4  LAST  879   25,3416  7 1657 0              MP      FX + 5              F1
 0963   REF 280  LAST  833   25,3417  52 155 1              DXCH    MPAC               MPAC = F1(D-DREF)

 0964                        25,3420  0 0006 1              EXTEND
 0965   REF  18  LAST  876   25,3421  4 1700 0              DCS     RDOT               FORM RDOTREF - RDOT
 0966                        25,3422  20 001 1              DDOUBL
 0967                        25,3423  20 001 1              DDOUBL
 0968                        25,3424  20 001 1              DDOUBL                     SCALE UP BY 8 FOR THIS PHASE.
 0969   REF   5  LAST  879   25,3425  6 1655 0              AD      FX + 3              RDOTREF
 0970                        25,3426  0 0006 1              EXTEND
 0971   REF   6  LAST  879   25,3427  7 1656 1              MP      FX + 4              F2
 0972   REF   7  LAST  879   25,3430  6 1654 1              AD      FX +2              RTOGO
 0973   REF 281  LAST  879   25,3431  20 155 1              DAS     MPAC               ADD F2(DADVI-DADVR)
 0974   REF 282  LAST  879   25,3432  3 0154 1              CA      MPAC
 0975   REF   2  LAST  123   25,3433  55'760 0              TS      PREDANG
A0976                                                                                  L/D = LOD +(THETA- PREDANG)/ Y
 0977   REF 212  LAST  871   25,3434  0 0006 1              TC      INTPRET

 0978                        25,3435   45242 1              SR3     DSU
 0979   REF   8  LAST  868   25,3436   03702 1                      THETAH
 0980                        25,3437   43014 0              BON     BOFF
 0981   REF   2  LAST  861   25,3440   03305 1                      GONEPAST
 0982   REF   1              25,3441   53466 0                      GONEGLAD
 0983   REF   4  LAST  857   25,3442   03747 0                      GONEBY
 0984   REF   1              25,3443   53451 1                      HAVDNRNG
 0985                        25,3444   43145 0              DLOAD   SET                SET GONEPAST IF GONEBY SET & LATCH IN -
 0986   REF   1              25,3445   13770 0                      MAXRNG             DISPLAY = 9999.9 IF GONEBY          PLACE
 0987   REF   3  LAST  879   25,3446   03065 1                      GONEPAST
 0988   REF   3  LAST  293   25,3447   37716 0              STCALL  DNRNGERR
 0989   REF   2  LAST  879   25,3450   53466 0                      GONEGLAD

 0990   REF   4  LAST  879   25,3451   03716 1  HAVDNRNG STORE   DNRNGERR            = (PREDANG - THETA) /360
```

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0991                           25,3452   77676 0                   DCOMP                   FALL SHORT IF NEG, OVERSHOOT IF POS
0993                           25,3453   56204 1                   BOVB     DDV
0994    REF   7  LAST  875     25,3454   57544 0                            TCDANZIG       CLEAR OVFIND IF ON.
0995    REF   8  LAST  879     25,3455   03653 1                            FX             FX= DRANGE/D L/D = Y
0996                           25,3456   40061 1                   SL       BOV
0997                           25,3457   20206 1                            5
0998    REF   3  LAST  874     25,3460   53470 1                            GOMAXL/D
0999                           25,3461   40015 1                   DAD      BOV
1000    REF   3  LAST  852     25,3462   03626 0                            LCD
1001    REF   4  LAST  880     25,3463   53470 1                            GOMAXL/D
1002    REF   8  LAST  874     25,3464   37634 1                   STCALL   L/D
1003    REF   1                25,3465   53474 0                            GLIMITER       (GO TO)

R1004   GONEGLAD  AND GOPOSMAX  ENTRY POINTS FOR  GLIMITER  ...

1005                           25,3466   77745 1  GONEGLAD DLOAD                           SET L/D = -LAD
1006    REF   3  LAST  879     25,3467   13467 0                            GONEGLAD       (ANY NEGATIVE NUMBER WILL DO)

1007                           25,3470   41234 1  GOMAXL/D RTB      DMP                    L/D = LAD SIGN(MPAC)
1008    REF  14  LAST  853     25,3471   45761 0                            SIGNMPAC
1009    REF  14  LAST  876     25,3472   03624 1                            LAD
1010    REF   9  LAST  880     25,3473   03634 0                   STORE    L/D            AND FALL INTO GLIMITER SECTION

1011                           25,3474   45345 1  GLIMITER DLOAD   DSU                    IF GMAX/2-D POS, GO TO LIMITL/D
1012    REF   1                25,3475   15162 0                            GMAX/2
1013    REF  23  LAST  879     25,3476   03640 0                            D
1014                           25,3477   43244 1                   BPL      DAD            IF GMAX  -D NEG, GO TO GOPOSLAD
1015    REF   7  LAST  874     25,3500   53524 1                            LIMITL/D
1016    REF   2  LAST  880     25,3501   15162 0                            GMAX/2
1017                           25,3502   41240 1                   BMN      DMP
1018    REF   1                25,3503   53521 1                            GOPOSLAD
1019    REF   2  LAST  875     25,3504   15264 0                            2HS
1020                           25,3505   41325 0                   PDDL     DMP            2HS(GMAX-D) INTO PD
1021    REF   7  LAST  875     25,3506   03654 0                            LEQ
1022    REF   1                25,3507   15334 1                            1/GMAX
1023                           25,3510   41215 1                   DAD      DMP
1024    REF  15  LAST  880     25,3511   03624 1                            LAD
1025                           25,3512   56325 0                   PDDL     DDV            2HS(GMAX-D) (LEQ/GMAX+LAD) INTO PD
1026    REF   1                25,3513   15266 1                            2HSGMXSQ
1027    REF   5  LAST  876     25,3514   03622 1                            VSQUARE
1028                           25,3515   75415 0                   DAD      SQRT           XLIM = SQRT(PD+(2HSGMAX/V)SQ)
1029                           25,3516   51015 1                   DAD      BPL            IF ROOT+XLIM POS, GO TO LIMITL/D
1030    REF  19  LAST  879     25,3517   03700 0                            ROOT
1031    REF   8  LAST  880     25,3520   53524 1                            LIMITL/D

1032                           25,3521   77745 1  GOPOSLAD DLOAD
1033    REF  16  LAST  880     25,3522   03624 1                            LAD
1034    REF  10  LAST  880     25,3523   03634 0  STOREL/D STORE    L/D
```

```
 1035                                25,3524   77745 1  LIMITL/D DLOAD
 1036   REF  11  LAST  880    25,3525   03634 0                             L/D
 1037   REF   3  LAST  187    25,3526   17636 1             STODL    L/D1
 1038   REF   6  LAST  880    25,3527   03622 1                      VSQUARE

 1039                                25,3530   77614 1             BON                                NO LATERAL CONTROL IF PAST TARGET
 1040   REF   4  LAST  879    25,3531   03305 1                      GONEPAST
 1041   REF   1                       25,3532   53564 0                      L355
 1042                                25,3533   43205 1             DMP      DAD                       Y= KLAT VSQUARE + LATBIAS
 1043   REF   3  LAST  852    25,3534   03632 0                      KLAT
 1044   REF   1                       25,3535   15244 1                      LATBIAS                   Y INTO PD
 1045                                25,3536   51525 1  L350       PDDL     ABS                       IF ABS(L/D)-L/DCMINR NEG, GO TO L353
 1046   REF  12  LAST  881    25,3537   03634 0                      L/D
 1047                                25,3540   50025 0             DSU      BMN
 1048   REF   3  LAST  852    25,3541   03630 1                      L/DCMINR
 1049   REF   1                       25,3542   53551 0                      L353
 1050                                25,3543   75345 1             DLOAD    SIGN                      IF K2ROLL LATANG NEG, GO TO L357
 1051   REF   7  LAST  857    25,3544   03676 0                      LATANG
 1052   REF   3  LAST  853    25,3545   03644 1                      K2ROLL
 1053                                25,3546   71240 1             BMN      DLOAD
 1054   REF   1                       25,3547   53627 1                      L357
 1055                                25,3550   41542 1             SR1      PUSH                      Y = Y/2
 1056                                25,3551   75345 1  L353       DLOAD    SIGN                      IF LATANG SIGN(K2ROLL)-Y POS, SWITCH
 1057   REF   8  LAST  881    25,3552   03676 0                      LATANG
 1058   REF   4  LAST  881    25,3553   03644 1                      K2ROLL
 1059                                25,3554   77625 0             DSU
 1060                                25,3555   71240 1             BMN      DLOAD
 1061   REF   2  LAST  881    25,3556   53564 0                      L355
 1062   REF   5  LAST  881    25,3557   03644 1                      K2ROLL
 1063                                25,3560   57414 1             BONCLR DCOMP                       IF NOSWITCH =1, K2ROLL= K2ROLL
 10631  REF   2  LAST  872    25,3561   03210 1                      NOSWITCH
 10632  REF   3  LAST  881    25,3562   53564 0                      L355
 1064   REF   6  LAST  881    25,3563   03644 1             STORE    K2ROLL                    K2ROLL  =  -  K2ROLL

 1065                                25,3564   56345 0  L355       DLOAD    DDV                       ROLLC = ACOS(  (L/D1) / LAD)
 1066   REF   4  LAST  881    25,3565   03636 1                      L/D1
 1067   REF  17  LAST  880    25,3566   03624 1                      LAD                       MPAC SET TO +-1 IF OVERFLOW***
 1068                                25,3567   65542 1             SR1      ACOS
 1069                                25,3570   43165 1             SIGN     CLEAR
 1070   REF   7  LAST  881    25,3571   03644 1                      K2ROLL
 10701  REF   3  LAST  881    25,3572   03270 1                      NOSWITCH
 1071   REF  13  LAST  877    25,3573   03316 0             STORE    ROLLC

 1072                                25,3574   77776 1  ENDEXIT    EXIT

 1073   REF   1                       25,3575 3 4754 0  OVERNOUT CAF      ENDSPBIT                  ENTRYDSP = 920 BIT13
 1074   REF   7  LAST  852    25,3576 7 0102 0             MASK     CM/FLAGS
 1075                                25,3577 0 0006 1             EXTEND
 1076   REF   1                       25,3600 1 3604 1             BZF      NODISKY                   OMIT DISPLAY.
 1077    REF    6  LAST  804   25,3601  3 1122 1             CA       ENTRYVN          ALL ENTRY DISPLAYS ARE DONE HERE.
 1078    REF  207  LAST  834   25,3602  0 4636 0             TC       BANKCALL
 1079    REF    1              25,3603   20724 1             CADR     REGODSPR         NO ABORT IF DISKY IN USE

 1080                          25,3604  0 0004 0  NODISKY   INHINT
 1081    REF    5  LAST  521   25,3605  10 067 1             CCS      NEWJOB           PROTECT READACCS GRP 5, IF SIDETRACKED.
 1082    REF    3  LAST  521   25,3606  0 5152 1             TC       CHANG1
 1083    REF   49  LAST  834   25,3607  0 4655 0  SERVNOUT  TC       POSTJUMP         ( COME HERE FROM P67.3)
 1084    REF    4  LAST  809   25,3610   77143 1             CADR     SERVEXIT         AND END AVERAGEG JOB VIA  ENDOFJOB.
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P1085             DISPLAY WHEN V IS LESS THAN VQUIT.

  1086                          25,3611   77776 1  STEEROFF EXIT
  1087   REF  15  LAST  873     25,3612 0 4606 0            TC      E7SETTER

  1089   REF  10  LAST  869     25,3613 3 5055 1            CA      PRIO16            2 LESS THAN NTRYPRIO.
  1090   REF  18  LAST  826     25,3614 0 5121 0            TC      NOVAC
  1091   REF  22  LAST  838     E6,1661                     EBANK=  AOG               ANY EB HERE
  1092   REF   3  LAST  804     25,3615   02511 0           2CADR   P67.1             START UP REMAINDER OF P67
  1092                          25,3616   54066 0
A1093                                                                                 RTOGO          LAT            LONG
A1094                                                                                 XXXX.X NM      XXX.XX DEG     XXX.XX DEG

  1095   REF  34  LAST  834     25,3617 0 5362 0            TC      2PHSCHNG          INHINT/RELINT DONE.
  1096                          25,3620   00414 0           OCT     00414             4.41 RESTART FOR P67.1 DISPLAY JOB.
  1097                          25,3621   10035 0           OCT     10035             SERVICER 5.3 RESTART.

  10972  REF   1                01,2201            4P41SPT1 =       4.41SPOT
  10974  REF  17  LAST  855     01,2250            5P3SPT15 =       5.3SPOT
  1098   REF   1                25,3622 3 3626 0            CA      P67.2CAD          HEREAFTER, DO LAT, LONG.
  1099   REF  14  LAST  878     25,3623 55'645 0            TS      GOTOADDR

  1100   REF 213  LAST  879     25,3624 0 6006 1            TC      INTPRET
  1101                          25,3625   77650 1           GOTO
  1102   REF   1                25,3626   54532 1  P67.2CAD         P67.2             CONTINUE FOR LAT, LONG THIS TIME.

  1103                          25,3627   75345 1  L357     DLOAD   SIGN              L/D = L/DCMINR SIGN(L/D)
  1104   REF   4  LAST  881     25,3630   03630 1                   L/DCMINR
  1105   REF  13  LAST  881     25,3631   03634 0                   L/D
  1106   REF   5  LAST  881     25,3632   37636 0           STCALL  L/D1
  1107   REF   4  LAST  881     25,3633   53564 0                   L355              (GO TO )
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L         REENTRY CONTROL                                                                        USER'S PAGE NO.  33       E7 S3

P1108         TABLE USED FOR SUB-ORBITAL REFERENCE TRAJECTORY CONTROL.

  1109                          25,3634   00474 0  VREFER    DEC       .019288             REFERENCE VELOCITY SCALED V/51532.3946
  1110                          25,3635   01235 1            DEC       .040809             13 POINTS ARE STORED AS THE INDEPENDENT
  1111                          25,3636   02337 1            DEC       .076107             VARIABLE AND THEN SIX 13 POINT FUNCTIONS
  1112                          25,3637   03721 0            DEC       .122156             OF V ARE STORED CONSECUTIVELY
  1113                          25,3640   05230 0            DEC       .165546
  1114                          25,3641   06213 1            DEC       .196012
  1115                          25,3642   10550 0            DEC       .271945
  1116                          25,3643   11717 0            DEC       .309533
  1117                          25,3644   13314 0            DEC       .356222
  1118                          25,3645   14736 0            DEC       .404192
  1119                          25,3646   16255 1            DEC       .448067
  1120                          25,3647   16457 0            DEC       .456023
  1121                          25,3650   25570 1            DEC       .67918               HIGH VELOCITY FOR SAFETY

  1122                          25,3651   77526 0            DEC       -.010337            DRANGE/DA    SCALED DRDA/(2700/805)
  1123                          25,3652   77360 1            DEC       -.016550
  1124                          25,3653   77106 0            DEC       -.026935
  1125                          25,3654   76516 1            DEC       -.042039
  1126                          25,3655   76071 0            DEC       -.058974
  1127                          25,3656   75570 1            DEC       -.070721
  1128                          25,3657   74661 0            DEC       -.098538
  1129                          25,3660   70657 1            DEC       -.223611
  1130                          25,3661   66352 0            DEC       -.298146
  1131                          25,3662   66352 0            DEC       -.298148
  1132                          25,3663   54557 1            DEC       -.602557
  1133                          25,3664   40000 0            DEC       -.99999
  1134                          25,3665   40000 0            DEC       -.99999

  1135                          25,3666   77635 1            DEC       -.0478599   B-3  -DRANGE/DRDOT
  1136                          25,3667   77563 1            DEC       -.0683663   B-3  SCALED((2VS/8 2700) DR/DRDOT)
  1137                          25,3670   77354 0            DEC       -.1343468   B-3
  1138                          25,3671   76712 1            DEC       -.2759846   B-3
  1139                          25,3672   76066 0            DEC       -.4731437   B-3
  1140                          25,3673   75322 0            DEC       -.6472087   B-3
  1141                          25,3674   73237 0            DEC       -1.171693   B-3
  1142                          25,3675   72104 1            DEC       -1.466382   B-3
  1143                          25,3676   70301 1            DEC       -1.905171   B-3
  1144                          25,3677   65635 1            DEC       -2.547990   B-3
  1145                          25,3700   57311 0            DEC       -4.151220   B-3
  1146                          25,3701   50575 0            DEC       -5.813617   B-3
  1147                          25,3702   50575 0            DEC       -5.813617   B-3
```

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P1148

  1149                       25,3703   74443 1          DEC      -.0134001    B3  RDOTREF    SCALED (8 RDT/2VS)
  1150                       25,3704   74333 1          DEC      -.013947     B3
  1151                       25,3705   74433 0          DEC      -.013462     B3
  1152                       25,3706   74763 0          DEC      -.011813     B3
  1153                       25,3707   75432 0          DEC      -.0095631    B3
  1154                       25,3710   75735 1          DEC      -.00806946   B3
  1155                       25,3711   76200 1          DEC      -.006828     B3
  1156                       25,3712   75735 1          DEC      -.00806946   B3
  1157                       25,3713   75140 0          DEC      -.0109791    B3
  1158                       25,3714   74075 0          DEC      -.0151496    B3
  1159                       25,3715   73312 0          DEC      -.0179817    B3
  1160                       25,3716   73732 0          DEC      -.0159061    B3
  1161                       25,3717   73732 0          DEC      -.0159061    B3

  1162                       25,3720   00026 0          DEC      .00137037         3.7   RTOGO SCALED RTOGO/2700
  1163                       25,3721   00077 1          DEC      .00385185        10.4
  1164                       25,3722   00217 0          DEC      .00874074        23.6
  1165                       25,3723   00431 1          DEC      .017148
  1166                       25,3724   00712 0          DEC      .027926
  1167                       25,3725   01136 1          DEC      .037
  1168                       25,3726   02015 1          DEC      .063296
  1169                       25,3727   02374 0          DEC      .077889
  1170                       25,3730   03123 1          DEC      .098815
  1171                       25,3731   04051 1          DEC      .127519
  1172                       25,3732   05767 1          DEC      .186963
  1173                       25,3733   07476 0          DEC      .238148
  1174                       25,3734   11324 1          DEC      .294185185

  1175                       25,3735   76272 1          DEC      -.051099          -AREF/805
  1176                       25,3736   75472 1          DEC      -.074534
  1177                       25,3737   74604 0          DEC      -.101242
  1178                       25,3740   74210 1          DEC      -.116646
  1179                       25,3741   74052 0          DEC      -.122360
  1180                       25,3742   73735 1          DEC      -.127081
  1181                       25,3743   73217 1          DEC      -.147453
  1182                       25,3744   73013 1          DEC      -.155528
  1183                       25,3745   73155 1          DEC      -.149565
  1184                       25,3746   74151 1          DEC      -.118509
  1185                       25,3747   76703 1          DEC      -.034907
  1186                       25,3750   77575 0          DEC      -.007950
  1187                       25,3751   77575 0          DEC      -.007950
```

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P1188

  1189                      25,3752   00112 0          DEC     .004491          DRANGE/D L/D SCALED Y/2700
  1190                      25,3753   00204 1          DEC     .008081
  1191                      25,3754   00407 1          DEC     .016030
  1192                      25,3755   01113 0          DEC     .035815
  1193                      25,3756   02161 0          DEC     .069422
  1194                      25,3757   03260 0          DEC     .104519
  1195                      25,3760   03717 0          DEC     .122
  1196                      25,3761   05411 0          DEC     .172407
  1197                      25,3762   10057 1          DEC     .252852
  1198                      25,3763   13476 0          DEC     .363148
  1199                      25,3764   20324 0          DEC     .512963
  1200                      25,3765   21677 1          DEC     .558519
  1201                      25,3766   21677 1          DEC     .558519           END OF STORED REFERENCE
```

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P1202    REENTRY CONSTANTS.

R1203    DEFINED BY EQUALS

 1204    REF   3  LAST  589       4777                  DEC15      =       LOW4
A1205                                                   GAMMAL1    =       22D

 12055                       25,3767   16631 1  MAXRNG     2OCT    16631 06755       DNRNGERR = 9999.9 IF GONEPAST=1
 12055                       25,3770   06755 0

 1207    REF   2  LAST  859  26,2000                               SETLOC  REENTRY1
 1208                        26,3150                               BANK

 1209    REF   2 LAST  859 TO  861:     41      41*                COUNT*  $$/ENTRY

 1210    REF   4  LAST  869  26,3343                    BARELY1    =       NEARONE           COMMON TO BOTH DISK,DANCE.DEFND IN TFF
A1211                                                   1BITDP                  COMMON TO BOTH DISK AND DANCE. DEFND IN VECPOINT.

 1212                        26,3150   02525 1  1/12TH     DEC     .083333           DP 1/12 USES HI WORD IN 1/3 BELOW
 1213                        26,3151   12525 0  1/3RD      2DEC    .3333333333       DP 1/3
 1213                        26,3152   12525 0
 12131   REF   3  LAST  813  34,3770            1/16TH     =       DP2(-4)

R1214

R1215     BELOW:  VS    =    VSAT   = 25766.1973  FT/SEC

R1216              RE    =  21,202,900    FEET

 1217                        26,3153   04631 1  LEWD1      2DEC    .15
 1217                        26,3154   23146 0
 1218                        26,3155   03146 1  POINT1     2DEC    .1
 1218                        26,3156   14632 0
 1220                        26,3157   76314 0  DLEWD0     2DEC    - .05                -.05
 1220                        26,3160   71462 1
 1221                        26,3161   05075 0  GMAX/2     2DEC    .16                 8 GS / 2
 1221                        26,3162   16051 1
 1222    REF  24  LAST  814  26,3335            3ZEROS     EQUALS  HI6ZEROS
 1223                        26,3163   07777 1  NEAR1/4    2OCT    07777 00000          1/4 LESS 1 BIT IN UPPER PART.
 1223                        26,3164   00000 1
 1224                        26,3165   00236 0  C18        2DEC    .0097026346          500/2VS
 1224                        26,3166   36763 0
 1225                        26,3167   00204 1  Q7FKDMIN 2DEC     .0080745342        6.5/805  (Q7F +KDMIN) = 6 + .5)
 1225                        26,3170   11303 1
 1226    REF   4  LAST  887  34,3770            C1/16      =       DP2(-4)

 1227                        26,3171   05260 0  Q3         2DEC    .167003132           .07 2VS/21600
 1227                        26,3172   05572 1
 1228                        26,3173   12343 0  Q5         2DEC    .326388889           .3 23500/21600
 1228                        26,3174   21616 0
```

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  1229                      26,3175   01073 1  Q6        2DEC    .0349              2 DEG, APPROX 820/23500
  1229                      26,3176   31515 1
  1230                      26,3177   00172 0  Q7F       2DEC    .0074534161         6/805     (VALUE OF Q7 IN FIXED MEM.)
  1230                      26,3200   03571 1
  1231   REF   6  LAST  870 26,3333            Q19       =       HALVE              Q19 = .5

  1232                      26,3201   05136 0  Q21       2DEC    .1620370370        3500/21600
  1232                      26,3202   32046 1
  1233                      26,3203   75031 1  Q22       2DEC    -.092222222        -1992/21600
  1233                      26,3204   40775 0
  1234                      26,3205   13132 0  VLMIN     2DEC    .34929485          18000/2 VS
  1234                      26,3206   33062 0
  1235   REF   2  LAST  856 26,3325            VMIN      =       FOURTH             (VS/2) / 2VS
  1236                      26,3207   00160 0  C12       2DEC    .00684572901       32 28500/(21202900 2 PI)
  1236                      26,3210   05104 1
  1237                      26,3211   14631 0  1/KB1     2DEC    .4                 1/ 2.5
  1237                      26,3212   23146 0
  1238                      26,3213   74015 0  -1/KB2    2DEC    -.0077621078 B4 -1/( .0025  2 VS) EXP +4
  1238                      26,3214   46560 0
  1239                      26,3215   00475 1  VQUIT     2DEC    .019405269         1000 /2VS
  1239                      26,3216   35746 1
  1240                      26,3217   10262 0  C20       2DEC    .26086957          210/805  90 DEG MAX ROLL IF ABOVE C20
  1240                      26,3220   02622 0
  12405                     26,3221   05441 0  C21       2DEC    .17391304          140/805
  12405                     26,3222   14412 0
  1241                      26,3223   00022 1  25NM      2DEC    .0011574074        25/21600          (25 NAUT MILES)
  1241                      26,3224   36641 1
  1242                      26,3225   01003 0  K1D       2DEC    .0314453125        =C16 805/256 = .01 805/256
  1242                      26,3226   06315 0
  1243                      26,3227   63073 0  K2D       2DEC    -.402596836        -C17 2VS/256  = -.002 2VS/256
  1243                      26,3230   73236 1
  1244                      26,3231   32047 0  KVSCALE   2DEC    .81491944           12800/(2 VS .3048)
  1244                      26,3232   24367 0
  1245                      26,3233   37200 1  KASCALE   2DEC    .57657358           5.85 16384/(4 .3048 100 805)
  1245                      26,3234   05636 1
  1246                      26,3235   00046 0  KTETA     2DEC*   .383495203 E2 B-14*         1000 2PI/16384(163.84)
  1246                      26,3236   13137 0
  1247                      26,3237   00017 1  KT1       2DEC*   .157788327 E 2 B-14*     RE(2PI)/2 VS(16384) 163.84
  1247                      26,3240   30730 0
  1248                      26,3241   00040 0  .05G      2DEC    .002                .05/25
  1248                      26,3242   30447 0
  1249                      26,3243   00000 1  LATBIAS   2DEC    .00003              APPRX .5 NM/ 4(21600/2 PI)
  1249                      26,3244   17565 1
  1250                      26,3245   01727 1  KWE       2DEC    .120056652 B-1
  1250                      26,3246   20103 1
  1251                      26,3247   00121 0  KACOS     2DEC    .004973592          1/32(2PI)
  1251                      26,3250   17460 0
  1252                      26,3251   00400 0  CHOOK     2DEC    1 B-6              .25/16
  1252                      26,3252   00000 1
  1253                      26,3253   01252 0  1/24TH    2DEC    .0833333333 B-1
  1253                      26,3254   25253 1
```

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L          REENTRY CONTROL                                                                    USER'S PAGE NO.  38       E7 S3

  1254                            26,3255    24365 1   CH1        2DEC    .32 B1              16 CH1/25 = 16 (1) /25
  1254                            26,3256    30244 0
  1255                            26,3257    77152 1   KC3        2DEC    -.0247622232        -(4 VS VS/ 2 PI 805 RE)
  1255                            26,3260    51354 1
  1256                            26,3261    00336 1   VRCONT     2DEC    .0135836886          700/2 VSAT
  1256                            26,3262    21610 0
  1257   REF  10  LAST  819       26,3333              HALVE      EQUALS HIDPHALF
  1258   REF   2  LAST  820       26,3325              FOURTH     EQUALS HIDP1/4

  1259   REF   7  LAST  888       26,3333              1/GMAX     EQUALS HALVE             4/GMAX = 4 / 8
  1260                            26,3263    00433 0   2HS        2DEC    .0172786611          2 28500 25 32.2/(4 VS VS)
  1260                            26,3264    02775 0
  1261                            26,3265    00000 1   2HSGMXSQ 2DEC     .0000305717         (2 28500 8 32.2/ 4 VS VS)SQ
  1261                            26,3266    20017 0
  1262                            26,3267    77765 0   C001       2DEC    -.000625            -(4/25)/256    LEQ/D0 CONST
  1262                            26,3270    70243 0
  1263                            26,3271    31463 1   POINT8     2DEC    .8
  1263                            26,3272    06315 0
  1264                            26,3273    00541 1   2C1HS      2DEC    .0215983264          2 1.25 28500 805/(2 VS)SQ
  1264                            26,3274    33575 0
  1265                            26,3275    00146 1   PT1/16     2DEC    .1 B-4
  1265                            26,3276    14632 0
  1266                            26,3277    00052 0   1/K44      2DEC    .00260929464        2 VS/19749550
  1266                            26,3300    30013 0
  1267                            26,3301    20411 1   VFINAL     2DEC    .51618016           26600/2 VS
  1267                            26,3302    03041 1
  1268                            26,3303    20610 1   VFINAL1    2DEC    .523942273          = 27000 / 2 VS
  1268                            26,3304    10513 1
  1269                            26,3305    11473 1   1/KA1      2DEC    .30048077           25/(1.3 64)
  1269                            26,3306    02355 0
  1270                            26,3307    00203 0   KA2        2DEC    .008                .2 / 25
  1270                            26,3310    02234 0
  1271                            26,3311    16237 0   KA3        2DEC    .44720497           = 90  4/805
  1271                            26,3312    00146 1
  1272                            26,3313    01456 1   KA4        2DEC    .049689441          40/805
  1272                            26,3314    03450 0
  12725                           26,3315    01727 1   KALIM      2DEC    .06                 1.5/25
  12725                           26,3316    01217 1
  1273   REF   5  LAST  887       26,3343              Q7MIN      =       NEARONE             805/805       (DISABLE FACTOR CALC)
  1274                            26,3317    56232 1   -HSCALED 2DEC      -.55305018          -28500/2 VS
  1274                            26,3320    72332 0
  1275                            26,3321    77000 1   -KSCALE    2DEC    -.0312424837        -805/VS
  1275                            26,3322    43741 1
  1276                            26,3323    36702 1   COS15      2DEC    .965
  1276                            26,3324    21727 0
  1277   REF   1                  26,3150              LATSLOPE EQUALS 1/12TH
R 1278        ... END OF RE-ENTRY CONSTANTS ...
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L       CM BODY ATTITUDE                                                                     USER'S PAGE NO.  1      E0 S3

P0001

 0011   REF   1                 37,2000                             SETLOC BODYATT   .
 0012                           37,3404                             BANK

 0013   REF   1                                                     COUNT* $$/CMBAT
A0014                                                               PDL 12D - 15D SAFE.

R0015     VALUES OF GIMBAL AND BODY ANGLES VALID AT PIP TIME ARE SAVED DURING    READACCS.

 0017   REF  10  LAST  856   E7,1451                                EBANK= RTINIT          LET INTERPRETER SET EB

 0018   REF 214  LAST  883   37,3404  0 6006 1  CM/POSE  TC      INTPRET          COME HERE VIA AVEGEXIT.

 0019                        37,3405   77201 1           SETPD   VLOAD
 0020                        37,3406   00001 0                   0
 0021   REF  16  LAST  856   37,3407   01036 0                   VN               KVSCALE = (12800/ .3048) /2VS
 0022                        37,3410   63361 0           VXSC    PDVL
 0023   REF   1              37,3411   37700 1                   -KVSCALE         KVSCALE = .81491944
 0024   REF  10  LAST  840   37,3412   01712 1                   UNITW            FULL UNIT VECTOR
 0025                        37,3413   74235 0           VXV     VXSC             VREL = V - WE*R
 0026   REF  11  LAST  857   37,3414   01756 1                   UNITR
 0027   REF   1              37,3415   15246 0                   KWE
 0028                        37,3416   45455 1           VAD     STADR
 0029   REF   3  LAST  856   37,3417   74251 1           STORE   -VREL            SAVE FOR ENTRY GUIDANCE.  REF COORDS

 0030                        37,3420   72056 1           UNIT    LXA,1
 0031                        37,3421   00044 1                   36D              ABVAL( -VREL) TO X1
 0032   REF   6  LAST  858   37,3422   03542 1           STORE   UXA/2            -UVREL                      REF COORDS

 0033                        37,3423   57435 1           VXV     VCOMP
 0034   REF  12  LAST  890   37,3424   01756 1                   UNITR            .5 UNIT                     REF COORDS
 0035                        37,3425   66256 0           UNIT    SSP              THE FOLLOWING IS TO PROVIDE A STABLE
 0036   REF  30  LAST  791   37,3426   00051 0                   S1               UN FOR THE END OF THE TERMINAL PHASE.
 0037                        37,3427   00476 1  SPVQUIT  DEC     .019405          1000/ 2 VS
 0038                        37,3430   77300 1           TIX,1   VLOAD            IF V-VQUIT POS, BRANCH.
 0039   REF   1              37,3431   77433 0                   CM/POSE2         SAVE UYA IN OLDUYA
 0040   REF   2  LAST  122   37,3432   03534 0                   OLDUYA           OTHERWISE CONTINUE TO USE OLDUYA.
 0041   REF   3  LAST  822   37,3433   03550 1  CM/POSE2 STORE   UYA/2                                        REF COORDS

 0042   REF   3  LAST  890   37,3434   03534 0           STORE   OLDUYA           RESTORE, OR SAVE AS CASE MAY BE.

 0043                        37,3435   57435 1           VXV     VCOMP
 0044   REF   7  LAST  890   37,3436   03542 1                   UXA/2            FINISH OBTAINING TRAJECTORY TRIAD.
 0045                        37,3437   77772 0           VSL1
 0046   REF   3  LAST  822   37,3440   03556 1           STORE   UZA/2                                        REF COORDS

 0047                        37,3441   77751 1           TLOAD                    PICK UP CDUX, CDUY, CDUZ CORRESPONDING
 0048   REF   3  LAST  828   37,3442   03270 1                   ADG/PIP          TO PIPUP TIME IN 2S,C  AND SAVE.
 0049                        37,3443   14031 0  CM/TRIO  STODL   24D
 0050                         37,3444   00032 0                  250           AIG/PIP

 0051                         37,3445   41434 1          RTB     PUSH          TO PDL0
 0052    REF   6  LAST  453   37,3446   51754 0                  CDULOGIC
 0053                         37,3447   77746 1          COS
 0054    REF   2  LAST  122   37,3450   17564 0          STODL   UBX/2         CI /2
AC055                                                                          AIG/PIP FROM PDL 0
 0056                         37,3451   57556 0          SIN     DCOMP
 0057    REF   3  LAST  891   37,3452   17570 0          STODL   UBX/2 +4      -SI /2
 0058                         37,3453   00033 1                  260           AMG/PIP
 0059                         37,3454   41434 1          RTB     PUSH          TO PDL 0
 0060    REF   7  LAST  891   37,3455   51754 0                  CDULOGIC
 0061                         37,3456   65356 1          SIN     PDDL          XCH PDL 0. SAVE SM /2
 0062                         37,3457   65346 0          COS     PDDL          CM /2 TO PDL 2
 0063                         37,3460   00001 0                  0             SM /2
 0064                         37,3461   74276 1          DCOMP   VXSC
 0065    REF   4  LAST  891   37,3462   03564 0                  UBX/2
 0066                         37,3463   77772 0          VSL1                  NOISE WONT OVFL.
 0067    REF   2  LAST  122   37,3464   17572 1          STODL   UBY/2         =(-SMCI, NOISE, SMSI) /2
 0068                         37,3465   00003 1                  2             CM /2  REPLACES NOISE
 0069    REF   3  LAST  891   37,3466   17574 1          STODL   UBY/2 +2      UBY/2=(-SMCI, CM, SMSI)/2
 0070                         37,3467   00031 0                  240           AOG/PIP
 0071                         37,3470   41434 1          RTB     PUSH          TO PDL 4
 0072    REF   8  LAST  891   37,3471   51754 0                  CDULOGIC
 0073                         37,3472   65356 1          SIN     PDDL          XCH PDL 4. SAVE SO /2
 0074                         37,3473   74346 0          COS     VXSC          CO /2
 0075    REF   4  LAST  891   37,3474   03572 1                  UBY/2
 0076    REF   5  LAST  891   37,3475   17572 1          STODL   UBY/2         UBY/2=(-COSMCI, COCM, COSMSI)/4
 0077                         37,3476   00005 1                  40            SO /2
 0078                         37,3477   57405 1          DMP     DCOMP
 0079    REF   5  LAST  891   37,3500   03570 0                  UBX/2 +4      -SI /2
 0080                         37,3501   77615 0          DAD
 0081    REF   6  LAST  891   37,3502   03572 1                  UBY/2          INCREMENT BY (SOSI /4)
 0082    REF   7  LAST  891   37,3503   17572 1          STODL   UBY/2
AC083                                                                          SO /2 FROM PDL 4
 0084                         37,3504   43205 1          DMP     DAD
 0085    REF   6  LAST  891   37,3505   03564 0                  UBX/2         CI /2
 0086    REF   8  LAST  891   37,3506   03576 0                  UBY/2 +4
 0087    REF   9  LAST  891   37,3507   27576 0          STOVL   UBY/2 +4      YB/4                PLATFORM COORDS

AC088                                                                 YB = (-COSMCI + SOSI , COCM , COSMSI + SOCI )

 0089    REF  10  LAST  891   37,3510   03572 1                  UBY/2
 0090                         37,3511   72505 1          VXM     VSL2
 0091    REF  46  LAST  841   37,3512   01734 0                  REFSMMAT      .5 UNIT
 0092    REF  11  LAST  891   37,3513   17572 1          STODL   UBY/2         YB/2  DONE              REF COORDS

AC093                                                                          CM /2 FROM PDL 2
 0094                         37,3514   76561 1          VXSC    VSL1
 0095    REF   7  LAST  891   37,3515   03564 0                  UBX/2
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L         CM BODY ATTITUDE                                                            USER'S PAGE NO.   3      E7 S3

 0096   REF   8  LAST  891   37,3516   17564 0          STODL  UBX/2              =( CMCI, NOISE, -CMSI)/2
 0097                        37,3517   77626 0          STADR                     SM /2 FROM PDL 0
 0098   REF   9  LAST  892   37,3520   50211 0          STOVL  UBX/2 +2           SM /2 REPLACES NOISE
 0099   REF  10  LAST  892   37,3521   03564 0                 UBX/2              XB/2                     PLATFORM COORDS

A0100                                                                        XB = ( CMCI , SM , -CMSI )

 0101                        37,3522   76505 0          VXM    VSL1
 0102   REF  47  LAST  891   37,3523   01734 0                 REFSMMAT           .5 UNIT
 0103   REF  11  LAST  892   37,3524   03564 0          STORE  UBX/2              XB/2  DONE                   REF COORDS

 0104                        37,3525   76435 1          VXV    VSL1
 0105   REF  12  LAST  891   37,3526   03572 1                 UBY/2
 0106   REF   2  LAST  122   37,3527   27600 1          STOVL  UBZ/2              ZB/2  DONE                   REF COORDS

A0107                                                                        EQUIVALENT TO
A0108                                                                        ZB = ( SOSMCI + COSI , -SOCM , -SOSMSI + COCI)

 0109   REF   8  LAST  890   37,3530   03542 1                 UXA/2              -UVREL/2 = -UVA/2
 0110                        37,3531   53435 0          VXV    UNIT               GET UNIT(-UVREL*UBY)/2  = UL/2
 0111   REF  13  LAST  892   37,3532   03572 1                 UBY/2              YB/2
 0112                        37,3533   50206 0          PUSH   DOT                UL/2  TO PDL 0,5
 0113   REF   4  LAST  890   37,3534   03556 1                 UZA/2              UNA/2
 0114   REF   5  LAST  606   37,3535   24021 1          STOVL  COSTH              COS(ROLL)/4
 0115                        37,3536   00001 0                 0                  UL/2

 0116                        37,3537   77641 1          DOT
 0117   REF   4  LAST  890   37,3540   03550 1                 UYA/2
 0118   REF   5  LAST  607   37,3541   34023 1          STCALL SINTH              -SIN(ROLL)/4
 0119   REF   5  LAST  607   37,3542   47311 1                 ARCTRIG
 0120                        37,3543   24007 0          STOVL  6D                 -(ROLL/180) /2
 0121   REF  14  LAST  892   37,3544   03572 1                 UBY/2
 0122                        37,3545   72441 0          DOT    SL1                -UVA.UBY = -SIN(BETA)
 0123   REF   9  LAST  892   37,3546   03542 1                 UXA/2              -UVREL/2
 0124                        37,3547   77736 0          ARCSIN
 0125                        37,3550   24010 0          STOVL  7D                 -(BETA/180) /2
 0126   REF  12  LAST  892   37,3551   03564 0                 UBX/2              XB/2
 0127                        37,3552   77641 1          DOT                       UL.UBX = -SIN(ALFA)
 0128                        37,3553   00001 0                 0                  UL/2
 0129   REF   6  LAST  892   37,3554   24023 0          STOVL  SINTH              -SIN(ALFA)/4
 0130                        37,3555   77641 1          DOT                       UL/2 FROM PDL 0
 0131   REF   3  LAST  892   37,3556   03600 1                 UBZ/2
 0132   REF   6  LAST  892   37,3557   34021 0          STCALL COSTH              COS(ALFA)/4
 0133   REF   6  LAST  892   37,3560   47311 1                 ARCTRIG
 0134                        37,3561   24011 1          STOVL  8D                 -(ALFA/180) /2
 0135   REF  13  LAST  890   37,3562   01756 1                 UNITR              UR/2                         REF COORDS
 0136                        37,3563   72441 0          DOT    SL1
 0137   REF   5  LAST  892   37,3564   03556 1                 UZA/2              MORE ACCURATE AT LARGE ARG.
 0138                        37,3565   77726 1          ARCCOS
 0139                        37,3566   00013 0          STORE  10D                (-GAMA/180)/2
 0140                 37,3567   77551 0        TLOAD   EXIT         ANGLES IN MPAC IN THE ORDER
A0141                                                               -( (ROLL, BETA, ALFA) /180)/2
 0142                 37,3570   00007 0                60           THESE VALUES CORRECT AT PIPUP TIME.
R0143   SPACER
```

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L         CM BODY ATTITUDE                                                           USER'S PAGE NO.   5       07 53

P0144     BASIC SUBROUTINE TO UPDATE ATTITUDE ANGLES

 0145     REF  23  LAST  883    E6,1661                          EBANK= AOG

 0146     REF  12  LAST  710    37,3571  0 4611 0   CM/ATUP   TC       E6SETTER

 0148     REF  15  LAST  787    37,3572  50 120 1   CMTR1     INDEX    FIXLOC
 0149                           37,3573  4 0012 0             CS       10D                (GAMA/180)/2
 0150     REF   2  LAST  116    37,3574  57'722 1             XCH      GAMA
 0151     REF  81  LAST  829    37,3575  54 001 1             TS       L

 0152                           37,3576  0 0004 0             INHINT
A0153                                                                            MUST REMAIN INHINTED UNTIL UPDATE OF BODY
A0154                                                                            ANGLES, SO THAT GAMDIFSW IS VALID FIRST PASS
A0155                                                                            INDICATOR.

 0156     REF   8  LAST  881    37,3577  4 0102 0             CS       CM/FLAGS
 0157     REF   1               37,3600  7 4756 0             MASK     GMDIFBIT           GAMDIFSW = 94D BIT11 INITLY=0
 0158                           37,3601  0 0006 1             EXTEND                      DONT CALC GAMA DOT UNTIL HAVE FORMD
A0159                                                                                     ONE DIFFERENCE.
 0160     REF   1               37,3602  1 3605 0             BZF      DOGAMDOT           IS OK, GO ON.
 0161     REF   9  LAST  894    37,3603  26 102 0             ADS      CM/FLAGS           KNOW BIT IS 0
 0162     REF   1               37,3604  0 3620 0             TC       NOGAMDOT           SET GAMDOT = 0

 0163     REF  82  LAST  894    37,3605  4 0001 1   DOGAMDOT  CS       L
 0164     REF   3  LAST  894    37,3606  6 1722 1             AD       GAMA               DEL GAMA/360 = T GAMDOT/360
 0165                           37,3607  0 0006 1             EXTEND
 0166     REF   1               37,3610  7 3701 0             MP       TCDU               TCDU = .1 SEC,   T = 2 SEC
 0167     REF   2  LAST  116    37,3611  55'723 1             TS       GAMDOT             GAMA DOT TCDU / 180

 0168                           37,3612  0 0006 1             EXTEND                      IGNORE GAMDOT IF LEQ  .5 DEG/SEC
 0169                           37,3613  6 3615 0             BZMF     +2
 0170                           37,3614  4 0000 0             COM
 0171     REF  21  LAST  878    37,3615  6 4773 0             AD       FIVE
 0172                           37,3616  0 0006 1             EXTEND
 0173                           37,3617  6 3622 1             BZMF     +3                 SET GAMDOT=+0 AS TAG IF TOO SMALL.

 0174     REF 146  LAST  839    37,3620  3 4772 1   NOGAMDOT  CA       ZERO               COME HERE INHINTED.
 0175     REF   3  LAST  894    37,3621  55'723 1             TS       GAMDOT
A0176                                                                                     FOR NOW LEAVE IN 2S,C
A0177                                                                                     UPDATE ANGLES BY CORRECTING EUILER ANG
A0178                                                                                     FOR ACCRUED INCREMENT SINCE PIPUP
A0179                                                                                     R = R EUIL + R(NOW) -R(PIPUP)
 0180     REF 283  LAST  879    37,3622  4 0154 0             CS       MPAC               GET (R EUL/180) /2
 0181                           37,3623  6 0000 1             DOUBLE                      POSSIBLE OVERFLOW
 0182     REF   1               37,3624  0 3671 1             TC       CORANGOV           CORRECT FOR OVFL IF ANY
 0183                           37,3625  0 0006 1             EXTEND
 0184     REF   3  LAST  828    37,3626  61'672 0             SU       ROLL/PIP           GET INCR SINCE PIPUP
 0185     REF   3  LAST  828    37,3627  6 1664 1             AD       ROLL/180           ONLY SINGLE OVFL POSSIBLE.
 0186     REF   2  LAST  894    37,3630  0 3671 1             TC       CORANGOV           CORRECT FOR OVFL IF ANY
 0187   REF   2  LAST  119    37,3631  55'770 1              TS       TEMPROLL

 0188   REF 284  LAST  894    37,3632  4 0156 1              CS       MPAC +2          GET (ALFA EUL/180) /2
 0189                         37,3633  6 0000 1              DOUBLE                    SAME AS FOR ROLL  NEEDED FOR EXT ATM DAP
 0190   REF   3  LAST  894    37,3634  0 3671 1              TC       CORANGOV         CORRECT FOR OVFL IF ANY
 0191                         37,3635  0 0006 1              EXTEND
 0192   REF   2  LAST  115    37,3636  61'673 1              SU       ALFA/PIP
 0193   REF   4  LAST  187    37,3637  6 1665 0              AD       ALFA/180
 0194   REF   4  LAST  895    37,3640  0 3671 1              TC       CORANGOV         CORRECT FOR OVFL IF ANY
 0195   REF   2  LAST  119    37,3641  55'771 0              TS       TEMPALFA

 0196   REF 285  LAST  895    37,3642  4 0155 1              CS       MPAC +1          GET (BETA EUL/180) /2
 0197                         37,3643  6 0000 1   CMTR2      DOUBLE
 0198                         37,3644  0 0006 1              EXTEND
 0199   REF   3  LAST  828    37,3645  61'674 0              SU       BETA/PIP
 0200   REF   4  LAST  828    37,3646  6 1666 0              AD       BETA/180
 0201   REF   2  LAST  119    37,3647  57'772 1              XCH      TEMPBETA         OVFL NOT EXPECTED.

 0202   REF   5  LAST  536    37,3650  3 5024 1              CA       EBANK3
 0203   REF  24  LAST  786    37,3651  54 003 0              TS       EBANK

 0204   REF   1               E3,1446                        EBANK=   PHSNAME5
 0205                         37,3652  0 0006 1              EXTEND
 0206   REF   1               37,3653  3 3703 0              DCA      REPOSADR         THIS ASSUMES THAT THE   TC   PHASCHNG
 0207   REF   2  LAST  895    37,3654  53'447 0              DXCH     PHSNAME5         IS NOT CHANGED IN       OCT  10035
A0208                                                                                  SERVICER.

 0209   REF  13  LAST  894    37,3655  0 4611 0              TC       E6SETTER

 0211   REF  24  LAST  894    E6,1661                        EBANK=   AOG
 0212                         37,3656  0 0006 1   REDOPOSE   EXTEND                    RE-STARTS COME HERE
 0213   REF   3  LAST  895    37,3657  3 1771 1              DCA      TEMPROLL
 0214   REF   4  LAST  894    37,3660  53'665 1              DXCH     ROLL/180
 0215   REF   3  LAST  895    37,3661  3 1772 1              CA       TEMPBETA
 0216   REF   5  LAST  895    37,3662  55'666 1              TS       BETA/180

 0218   REF 215  LAST  890    37,3663  0 6006 1              TC       INTPRET          CANT TC DANZIG AFTER PHASCHNG.
 0219                         37,3664   51575 1   CM/POSE3   VLOAD    ABVAL            RETURN FROM CM/ATUP.  (RESTART)
 0220   REF  17  LAST  890    37,3665   01036 0                       VN               2(-7)  M/CS
 0221   REF  11  LAST  547    37,3666   03723 1              STORE    VMAGI            FOR DISPLAY ON CALL.

 0222                         37,3667   77650 1              GOTO
 0223   REF   5  LAST  853    37,3670   03324 1                       POSEXIT          ENDEXIT, STARTENT, OR SCALEPOP.

 0224   REF  83  LAST  894    37,3671  54 001 1   CORANGOV   TS       L
 0225   REF 153  LAST  839    37,3672  0 0002 0              TC       Q
 0226   REF 189  LAST  879    37,3673  50 000 1              INDEX    A
 0227   REF   1               37,3674  3 4751 0              CA       LIMITS
 0228   REF  84  LAST  895    37,3675  26 001 1              ADS      L
 0229   REF 154  LAST  895    37,3676  0 0002 0              TC       Q                COSTS 2 MCT TO USE. SEE ANGOVCOR.
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L         CM BODY ATTITUDE                                                                        USER'S PAGE NO.   7      26 53

 0230                          37,3677   45730 1   -KVSCALE 2DEC    -.81491944       -12800/(2 VS .3048)
 0230                          37,3700   53410 1
 0231                          37,3701   03146 1   TCDU      DEC     .1               TCDU = .1 SEC.

 0232     REF  25  LAST  895   E6,1661                      EBANK= AOG
 0233     REF   1              37,3702   03656 1   REPOSADR 2CADR   REDOPOSE
 0233     REF   1              37,3703   76066 0
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L        P37,P70                                                                                    USER'S PAGE NO.   1      EU 53

 00012  REF   1                    36,2000                        SETLOC RTE1
 00014                             36,2476                        BANK

  0002  REF   3  LAST  292   E7,1631                              EBANK= RTEDVD
  0003  REF   1                                                   COUNT* $$/P37
R0050   PROGRAM DESCRIPTION - P37, RETURN TO EARTH

R0051   DESCRIPTION
R0052     A RETURN TO EARTH TRAJECTORY IS COMPUTED PROVIDED THE CSM IS OUTSIDE THE LUNAR SPHERE OF INFLUENCE AT THE
R0054   TIME OF IGNITION. INITIALLY A CONIC TRAJECTORY IS DETERMINED AND RESULTING IGNITION AND REENTRY PARAMETERS ARE
R0056   DISPLAYED TO THE ASTRONAUT. THEN IF THE ASTRONAUT SO DESIRES, A PRECISION TRAJECTORY IS DETERMINED WITH THE
R0058   RESULTING IGNITION AND REENTRY PARAMETERS DISPLAYED. UPON FINAL ACCEPTANCE BY THE ASTRONAUT, THE PROGRAM
R0060   COMPUTES AND STORES THE TARGET PARAMETERS FOR RETURN TO EARTH FOR USE BYSPS PROGRAM (P40) OR RCS PROGRAM (P41).

R0080   CALLING SEQUENCE
R0081     L       TC      P37

R0100   SUBROUTINES CALLED
R0101     PREC100
R0102       V2T100
R0103       RTENCK2
R0104       RTENCK3
R0105       TIMERAD
R0106       PARAM
R0107     V2T100
R0108       GAMDV10
R0109       XT1LIM
R0110       DVCALC
R0111     RTENCK1
R0112       INTSTALL
R0113       INTEGRVS
R0114     RTEVN
R0115       RTEDISP
R0116       TMRAD100
R0117       AUGEKUGL
R0118       LAT-LONG
R0119     TMRAD100
R0120       TIMERAD
R0121     INVC100
R0122       CSMPREC
R0123     GETERAD
R01235    TIMETHET
R0124     P37CALRM
R0125     VN1645
R0126     POLY

R0150   ERASABLE INITIALIZATION REQUIRED
R0151     CSM STATE VECTOR
R0152     NJETSFLG     NUMBER OF JETS IF THE RCS PROPULSION SYSTEM SELECTED    STATE FLAG      0=4 JETS  1=2 JETS
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L        P37,P70                                                                       USER'S PAGE NO.   2      E? 53

R0160    ASTRONAUT INPUT
R0161      SPRTETIG      TIME OF IGNITION (OVERLAYS TIG)                           DP       B28      CS
R0163      VPRED         DESIRED CHANGE IN VELOCITY AT TIG(PROGRM COMPUTED IF 0) DP       B7       METERS/CS
R0165      GAMMAEI       DESIRED FLIGHT PATH ANGLE AT REENTRY (COMPUTED IF 0)    DP       B0       REVS  + ABOVE HORIZ.
R0167      OPTION2       PROPULSION SYSTEM OPTION                                  SP       B14      1=SPS, 2=RCS

R0180    OUTPUT
R0181      CONIC OR PRECISION TRAJECTORY DISPLAY
R0182        VPRED       VELOCITY MAGNITUDE AT 400,000 FT. ENTRY ALTITUDE          DP       B7       METERS/CS
R0184        T3TOT4      TRANSIT TIME TO 400,000 FT. ENTRY ALTITUDE                DP       B28      CS
R0186        GAMMAEI     FLIGHT PATH ANGLE AT 400,000 FT. ENTRY ALTITUDE           DP       B0       REVS  + ABOVE HORIZON
R0188        DELVLVC     INITIAL VELOCITY CHANGE VECTOR IN LOCAL VERTICAL COORD. VECTOR   B7       METERS/CS
R0190        LAT(SPL)    LATITUDE OF THE LANDING SITE                              DP       B0       REVS
R0192        LNG(SPL)    LONGITUDE OF THE LANDING SITE                             DP       B0       REVS
R0194      TARGETING COMPUTATION DISPLAY
R0195        TIG         RECOMPUTED TIG BASED ON THRUST OPTION                     DP       B28      CS
R0197        TTOGO       TIME FROM TIG                                             DP       B28      CS
R0199        +MGA        POSITIVE MIDDLE GIMBAL ANGLE                              DP       B0       REVS  -.02 IF REFSMFLG=0
R0201      THRUST PROGRAM COMMUNICATION
R0202        XDELVFLG    EXTERNAL DELTA V FLAG                                     STATE FLAG        SET 0  FOR LAMBERT AIMPT
R0204        NORMSW      LAMBERT AIMPT ROTATION SWITCH                             STATE FLAG        SET 0 FOR NO ROTATION
R0206        ECSTEER     CROSS PRODUCT STEERING CONSTANT                           SP       B2       SET 1
R0208        RTARG       CONICALLY INTEGRATED REENTRY POSITION VECTOR              VECTOR   B29      METERS
R0210        TPASS4      REENTRY TIME                                              DP       B28      CS

 0243   REF  91  LAST  869   36,2476  0 5402 1  P37       TC      PHASCHNG          P37 IS NOT RESTARTABLE.
 0244                        36,2477   00004 0            OCT     4

 0245   REF 216  LAST  895   36,2500  0 6006 1            TC      INTPRET
 0246                        36,2501   66170 1            AXT,1   SXA,1
 0247                        36,2502   04000 0            OCT     04000
 0248   REF   5  LAST  693   36,2503   03424 0                    ECSTEER
 02481                       36,2504   77745 1            DLOAD
 02482  REF  35  LAST  682   36,2505   15336 0                    ZEROVECS
 02483  REF   9  LAST  814   36,2506   03757 1            STORE   VPRED
 02484  REF  11  LAST  814   36,2507   03761 1            STORE   GAMMAEI
 0249                        36,2510   77776 1            EXIT
 0250   REF   1              36,2511  3 5026 0            CAF     V6N33RTE          INPUT TIG   STORED IN SPRTETIG
 0251   REF   1              36,2512  0 3246 1            TCR     P370GOF                         OVERLAYED WITH TIG
 0252                        36,2513  1 2511 1            TCF     -2                DESPLAY NEW DATA
 0253   REF   1              36,2514  3 5033 1            CAF     V6N60RTE          INPUT REENTRY ANGLE IN GAMMAEI
 0254   REF   1              36,2515  0 3222 0            TCR     P37GFRB1            AND DESIRED DELTA V IN RTEDVD
 0255                        36,2516  1 2514 1            TCF     -2                DISPLAY NEW DATA
 0500   REF 217  LAST  898   36,2517  0 6006 1  RTE299    TC      INTPRET
 0501                        36,2520   71331 0            SSP     DLOAD
 0502   REF   1              36,2521   00122 0                    CVFIND
 05025                       36,2522   00000 1                    0
 0503   REF  10  LAST  898   36,2523   03757 1                    VPRED
 0504   REF   4  LAST  897   36,2524   17632 0            STODL   RTEDVD
 0505   REF  12  LAST  898   36,2525   03761 1                    GAMMAEI
 0508    REF   3  LAST  292   36,2526   17634 0             STODL  RTEGAM2D
 0509    REF   1              36,2527   33572 1                    1RTEB13
 0510    REF   2  LAST  131   36,2530   17551 0             STODL  CONIC X1
 0511    REF   1              36,2531   33662 0                    C4RTE
 0512    REF   2  LAST  131   36,2532   37652 1             STCALL MAMAX1
 0513    REF   1              36,2533   64455 1                    INVC100         GET R(T1)/,V(T1)/,UR1/,UH/
 051304                       36,2534   71214 0             CLEAR  DLOAD
 051308  REF   1              36,2535   02662 1                    SLOWFLG
 051312  REF   5  LAST  898   36,2536   03632 0                    RTEDVD
 051316                       36,2537   51444 1             BPL    ABS
 05132   REF   1              36,2540   74550 1                    RTE317
 051324  REF   6  LAST  899   36,2541   03632 0             STORE  RTEDVD
 051328                       36,2542   45345 1             DLOAD  DSU
 051332  REF   2  LAST  131   36,2543   03646 0                    R(T1)
 051336  REF   1              36,2544   33664 0                    K1RTE
 05134                        36,2545   43040 1             BMN    SET
 051344  REF   2  LAST  899   36,2546   74550 1                    RTE317
 051348  REF   2  LAST  899   36,2547   02462 0                    SLOWFLG
 0514                         36,2550   77545 0  RTE317     DLOAD  EXIT
 05145   REF   3  LAST  899   36,2551   03646 0                    R(T1)
 0515    REF   2  LAST  303   36,2552  0 7171 1             TC     POLY
 0516                         36,2553   00002 0             DEC    2
 0517                         36,2554   02544 0             2DEC   181000434.B-31
 0517                         36,2555   35436 0
 0518                         36,2556   14040 0             2DEC   1.50785145B-2
 0518                         36,2557   05066 1
 0519                         36,2560   44052 0             2DEC*  -6.49993057E-9B27*
 0519                         36,2561   60030 1
 0520                         36,2562   26415 0             2DEC*  9.76938926E-18B56*
 0520                         36,2563   25057 1
 0521    REF 218  LAST  898   36,2564  0 6006 1             TC     INTPRET
 0522                         36,2565   77752 1             SL1
 0525    REF   2  LAST  131   36,2566   17654 0             STODL  MAMAX2          C0+C1*R+C2*R**2+C3*R**3=MAMAX2 B30
 0526    REF   1              36,2567   33614 1                    M9RTEB28
 0527    REF   1              36,2570   17730 0             STODL  NN1A
 0528    REF   1              36,2571   33666 1                    K2RTE
 0529    REF   2  LAST  131   36,2572   17636 1  RTE320     STODL  RCON            RCON=K2
 0530    REF   4  LAST  899   36,2573   03634 0                    RTEGAM2D
 0531                         36,2574   44254 1             BZE    BDSU
 0532    REF   1              36,2575   74604 0                    RTE340          GOTORTE340 IF REENTRY ANGLE NOT INPUT
 0533    REF   2  LAST  674   36,2576   15326 1                    1RTEB2
 05335                        36,2577   71406 0             PUSH   COS                                                 PL02D
 0534                         36,2600   73525 1             PDDL   SIN
 0535                         36,2601   45465 1             BDDV   STADR                                               PL00D
 0536    REF   1              36,2602   40051 1             STCALL X(T2)           X(T2)=COT(GAM2D)                B0
 0537    REF   1              36,2603   74617 1                    RTE360
 0538                         36,2604   45345 1  RTE340     DLOAD  DSU
 0539    REF   4  LAST  899   36,2605   03646 0                    R(T1)
 0540    REF   2  LAST  899   36,2606   33664 0                    K1RTE
 0541                         36,2607   71240 1             BMN    DLOAD
 0542    REF   1               36,2610   74614 1                     RTE350
 0543    REF   1               36,2611   33672 1                     K4RTE
 0544    REF   2  LAST   899   36,2612   37726 0           STCALL X(T2)               X(T2)=K4
 0545    REF   2  LAST   899   36,2613   74617 1                     RTE360
 0546                          36,2614   77745 1  RTE350    DLOAD
 0547    REF   1               36,2615   33670 0                     K3RTE
 0548    REF   3  LAST   900   36,2616   03726 1           STORE  X(T2)               X(T2)=K3
 0549                          36,2617   77624 1  RTE360    CALL
 0550    REF   1               36,2620   65102 1                     V2T100
 0551                          36,2621   52054 1           BZE    GOTO
 0552    REF   1               36,2622   74624 1                     RTE367
 0553    REF   1               36,2623   64272 1                     RTEALRM
 0554                          36,2624   77775 1  RTE367    VLOAD
 0555    REF   2  LAST   131   36,2625   03640 0                     R(T1)/
 0556    REF   8  LAST   688   36,2626   16657 1           STODL  RVEC
 0557    REF   3  LAST   899   36,2627   03636 1                     RCON
 0558    REF   2  LAST   100   36,2630   26760 1           STOVL  RDESIRED
 0559    REF   2  LAST   131   36,2631   03700 0                     V2(T1)/
 0560    REF  10  LAST   688   36,2632   36746 1           STCALL VVEC
 0561    REF   1               36,2633   64304 1                     TMRAD100
 0562                          36,2634   77615 0           DAD
 0563    REF   2  LAST   131   36,2635   03716 1                     T1
 0570    REF   2  LAST   131   36,2636   17552 0           STODL  T2
 0571    REF   5  LAST   899   36,2637   03634 0                     RTEGAM2D
 0572                          36,2640   52054 1           BZE    GOTO
 05725   REF   1               36,2641   74643 0                     RTE369
 057251  REF   1               36,2642   74665 1                     RTE372
 0573                          36,2643   51575 1  RTE369    VLOAD  ABVAL
 0574    REF   2  LAST   131   36,2644   03710 1                     V(T2)/
 0575                          36,2645   77776 1           EXIT
 0576    REF   3  LAST   899   36,2646 0 7171 1            TC     POLY
 0577                          36,2647   00002 0           DEC    2
 0578                          36,2650   00000 1           2DEC   0
 0578                          36,2651   00000 1
 0579                          36,2652   47021 1           2DEC   -4.8760771E-2B4
 0579                          36,2653   65002 0
 0580                          36,2654   35610 0           2DEC   4.5419476E-4B11
 0580                          36,2655   07722 1
 0581                          36,2656   63772 0           2DEC   -1.4317675E-6B18
 0581                          36,2657   63276 1
 0582    REF 219  LAST   899   36,2660 0 6006 1            TC     INTPRET
 05825                         36,2661   77615 0           DAD
 058251  REF   1               36,2662   01343 1                     RTED1
 0583                          36,2663   52052 1           SL3    GOTO                X(T2),=D1+D2V2+D3V2**2+D4V2**3
 0587    REF   1               36,2664   74667 0                     RTE373
 0588                          36,2665   77745 1  RTE372    DLOAD                      X(T2),=X(T2)
 0589    REF   4  LAST   900   36,2666   03726 1                     X(T2)
 05895                         36,2667   41425 1  RTE373    DSU    PUSH                X(T2)ERR                   B0 PL02D
 058951  REF   5  LAST   900   36,2670   03726 1                     X(T2)
 0590                          36,2671   53575 0           VLOAD  UNIT
```

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L          P37,P70                                                                                      USER'S PAGE NO.   5      E7 S3

  0591     REF   2  LAST  131   36,2672    03656 1                    R(T2)/                                             858
  0592     REF  16  LAST  816   36,2673    36152 1             STCALL ALPHAV
  0593     REF   3  LAST  816   36,2674    26570 1                    GETERAD
  0594                          36,2675    77615 0             DAD
  0606     REF   1              36,2676    33676 0                    E3RTE
  0607                          36,2677    45206 1             PUSH   DSU           RCON,=(E1/(1+E2BETA11)**.5)+E3 829 PL040
  0608     REF   4  LAST  900   36,2700    03636 1                    RCON
  0609                          36,2701    45246 0             ABS    DSU
  0610     REF   1              36,2702    33646 0                    EPC2RTE
  0611                          36,2703    52040 1             BMN    GOTO
  0612     REF   1              36,2704    74706 0                    RTE374
  0613     REF   1              36,2705    74713 1                    RTE375
  0614                          36,2706    51545 1  RTE374     DLOAD  ABS
  0615                          36,2707    00001 0                    000
  0617                          36,2710    50025 0             DSU    BMN
  0618     REF   1              36,2711    33650 1                    EPC3RTE
  0620     REF   1              36,2712    74763 0                    P37E
  0621                          36,2713    43345 1  RTE375     DLOAD  DAD
  0622     REF   2  LAST  899   36,2714    03730 0                    NNIA
  0623     REF   1              36,2715    33600 1                    1RTEB28
  0624                          36,2716    67240 0             BMN    SLOAD
  0625     REF   1              36,2717    74723 1                    RTE380
  0626     REF   1              36,2720    33630 1                    OCT605
  0627                          36,2721    77650 1             GOTO
  0628     REF   2  LAST  900   36,2722    64272 1                    RTEALRM           TOO MANY ITERATIONS
  0629     REF   3  LAST  901   36,2723    03730 0  RTE380     STORE  NNIA
  0630                          36,2724    53025 0             DSU    BZE
  0631     REF   1              36,2725    33616 0                    MBRTEB28
  0632     REF   1              36,2726    74744 0                    RTE385
  0633                          36,2727    45345 1             DLOAD  DSU
  0634                          36,2730    00001 0                    000
  0635     REF   2  LAST  131   36,2731    03666 1                    DRCON
  0636                          36,2732    65301 0             NORM   PDDL              X(T2)ERR-X(T2)ERR,=Z1                  PL06D
  0637     REF  32  LAST  840   36,2733    00047 1                    X1
  0638     REF   2  LAST  131   36,2734    03670 0                    RPRE,
  0639                          36,2735    56225 1             DSU    DDV               X(T2)PRI-X(T2)=Z2                      PL04D
  0640     REF   6  LAST  900   36,2736    03726 1                    X(T2)
  06405                         36,2737    53605 1             DMP    SL*               DX(T2)=X(T2)ERR(Z2/Z1)
  0641                          36,2740    00001 0                    0,0
  06415                         36,2741    20201 0                    0,1
  0642                          36,2742    77650 1             GOTO
  06425    REF   1              36,2743    74746 1                    RTE390
  0643                          36,2744    77745 1  RTE385     DLOAD                    DX(T2)=X(T2)ERR
  06435                         36,2745    00001 0                    000
  0644                          36,2746    14021 1  RTE390     STODL  160               DX(T2)                                 PL02D
  06445                         36,2747    77626 0             STADR
  0645     REF   5  LAST  901   36,2750    60141 0             STODL  RCON              RCON=RCON,
  06455                         36,2751    77600 1             BOV
  064551   REF   3  LAST  900   36,2752    74617 1                    RTE360
  0646     REF   3  LAST  901   36,2753    17666 1             STODL  DRCON             X(T2)ERR,=X(T2)ERR
```

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 06465  REF   7  LAST  901   36,2754   03726 1                    X(T2)
 0647   REF   3  LAST  901   36,2755   17670 0           STODL    RPRE,           X(T2)PRI=X(T2)
 06475                       36,2756   00021 1                    16D
 0648                        36,2757   77615 0           DAD
 06485  REF   8  LAST  902   36,2760   03726 1                    X(T2)
 0649   REF   9  LAST  902   36,2761   37726 0           STCALL   X(T2)           X(T2)=X(T2)+DX(T2)
 06495  REF   4  LAST  901   36,2762   74617 1                    RTE360          REITERATE
 0650                        36,2763   77624 1  P37E     CALL                     DISPLAY CONIC SOLUTION
 0651   REF   1              36,2764   75007 1                    RTEVN
 0800                        36,2765   41345 0  RTE505   DLOAD    DMP
 0801   REF   2  LAST  131   36,2766   03720 1                    PCON
 0802   REF   2  LAST  131   36,2767   03744 0                    BETA1
 0803                        36,2770   53021 1           BDSU     BZE
 0804   REF   6  LAST  901   36,2771   03636 1                    RCON
 0805   REF   1              36,2772   75000 0                    RTE510
 0806                        36,2773   71240 1           BMN      DLOAD
 0807   REF   2  LAST  902   36,2774   75000 0                    RTE510
 0808   REF   3  LAST  899   36,2775   15326 1                    1RTEB2
 0809                        36,2776   77650 1           GOTO                     ENTRY NEAR APOGEE
 0810   REF   1              36,2777   75002 1                    RTE515
 0811                        36,3000   57545 1  RTE510   DLOAD    DCOMP           ENTRY NEAR PERIGEE
 0812   REF   4  LAST  902   36,3001   15326 1                    1RTEB2
 0813   REF   2  LAST  131   36,3002   37751 0  RTE515   STCALL   PHI2
 0814   REF   1              36,3003   64546 1                    PREC100         PRECISION TRAJECTORY COMPUTATION
 0815                        36,3004   52054 1  RTE625   BZE      GOTO
 0816   REF   1              36,3005   75035 0                    P370
 0817   REF   3  LAST  901   36,3006   64272 1                    RTEALRM
R0824
R0825                                             RETURN TO EARTH DISPLAY SUBROUTINE

 0826                        36,3007   45020 1  RTEVN    STQ      CALL
 0829   REF   2  LAST  132   36,3010   03753 0                    VNSTORE
 0830   REF   1              36,3011   64323 1                    RTEDISP         DISPLAY PREPARATION
 0831                        36,3012   77776 1           EXIT
 0832   REF   1              36,3013  3 5034 0           CAF      V6N61RTE        LATITUDE,LONGITUDE,BLANK
 0833   REF   1              36,3014  0 3232 1           TCR      P370GOFR          IN LAT(SPL),LNG(SPL),-
 0834   REF  10  LAST  829   36,3015  3 4766 1           CAF      FOUR
 0835   REF   1              36,3016  0 3226 1           TCR      37BLANK +1
 0836                        36,3017  1 3024 0           TCF      +5
 0837   REF   2  LAST  225   36,3020  1 2476 1           TCF      P37             RECYCLE
 0841   REF   1              36,3021  3 3257 1           CAF      V6N39RTE        T21 HRS,MIN,SEC IN T3TOT4
 0844   REF   2  LAST  898   36,3022  0 3246 1           TCR      P370GOF
 0845   REF   3  LAST  902   36,3023  1 2476 1           TCF      P37             RECYCLE
 0847   REF   2  LAST  898   36,3024  3 5033 1           CAF      V6N60RTE        DISPLAY BLANK,V(T2),FPA2
 0848   REF   2  LAST  898   36,3025  0 3222 0           TCR      P37GFRB1          IN -,VPRED,GAMMAEI
 0849   REF   4  LAST  902   36,3026  1 2476 1           TCF      P37             RECYCLE
 0856   REF   1              36,3027  3 4535 0           CAF      V6N81RTE        DISPLAY DELTA V (LV) IN DELVLVC
 0859   REF   3  LAST  902   36,3030  0 3246 1           TCR      P370GOF
 0860   REF   5  LAST  902   36,3031  1 2476 1           TCF      P37             RECYCLE
 08615  REF 220  LAST  900   36,3032  0 6006 1           TCR      INTPRET
 0862                             36,3033   77650 1             GOTO
 0863    REF   3  LAST  902       36,3034   03753 0                    VNSTORE

R0864    PRECISION DISPLAY,TARGETING COMPUTATION AND RTE END PROCESSING

 0865                             36,3035   77624 1  P37G       CALL
 0866    REF   2  LAST  902       36,3036   75007 1                    RTEVN
 0867                             36,3037   77776 1             EXIT
 0868    REF  13  LAST  614       36,3040  3 4774 1  P37N       CAF    SEVEN
 0869    REF   5  LAST  283       36,3041  54 775 0             TS     OPTION1
 0870    REF  91  LAST  878       36,3042  3 4770 0             CAF    ONE
 0871    REF  13  LAST  744       36,3043  54 776 0             TS     OPTION2
 0872    REF   1                  36,3044  3 4537 1             CAF    V4N06RTE         DISPLAY RCS OR SPS OPTION  SPS ASSUMED
 0873    REF   4  LAST  902       36,3045  0 3246 1             TCR    P370GOF
 0874                             36,3046  1 3044 0             TCF    -2               RECYCLE
 0875    REF 221  LAST  902       36,3047  0 6006 1             TC     INTPRET          PROCEED
 0876                             36,3050   67201 0             SETPD  SLOAD
 0877                             36,3051   00001 0                    00D
 0878    REF  14  LAST  903       36,3052   00777 0                    OPTION2
 0879                             36,3053   53025 0             DSU    BZE
 0880    REF   2  LAST  899       36,3054   33572 1                    1RTEB13
 0881    REF   1                  36,3055   75064 1                    P37Q
 0882                             36,3056   60335 1             SLOAD  NORM             SPS
 0883    REF   2  LAST  725       36,3057   01351 1                    EMDOT
 0884    REF  33  LAST  901       36,3060   00047 1                    X1
 0885                             36,3061   52125 0             PDDL   GOTO
 0886    REF   1                  36,3062   33622 1                    VCSPS
 0887    REF   1                  36,3063   75075 1                    P37T
 0888                             36,3064   43145 0  P37Q       DLOAD  BON              RCS
 0889    REF   1                  36,3065   33626 0                    MDOTRCS
 0890    REF   3  LAST  737       36,3066   00700 0                    NJETSFLG
 0891    REF   1                  36,3067   75071 0                    P37R
 0892                             36,3070   77752 1             SL1
 0893                             36,3071   77752 1  P37R       SL1
 0894                             36,3072   65301 0             NORM   PDDL
 0895    REF  34  LAST  903       36,3073   00047 1                    X1
 0896    REF   1                  36,3074   33624 1                    VCRCS
 0897                             36,3075   56325 0  P37T       PDDL   DDV              DV/VC                           B7 -B5 = B2 PL02D
 0898    REF   2  LAST  131       36,3076   03706 0                    DV
 0899                             36,3077   77776 1             EXIT
 0900    REF   4  LAST  900       36,3100  0 7171 1             TC     POLY
 0901                             36,3101   00001 0             DEC    1
 0902                             36,3102   00001 0             2DEC   5.66240507E-48-3
 0902                             36,3103   05070 0
 0903                             36,3104   17527 1             2DEC   9.79487897E-1B-1
 0903                             36,3105   36700 0
 0904                             36,3106   47114 0             2DEC   -.38828195581
 0904                             36,3107   70670 1
 0905    REF 222  LAST  903       36,3110  0 6006 1             TC     INTPRET
 0906                             36,3111   67206 1             PUSH   SLOAD            (1-E)**(-DV/VC)=A                    B3 PL04D
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0907    REF   5  LAST  732   36,3112   03076 0                     WEIGHT/G
0908                         36,3113   56205 0           DMP       DDV         DTB=(MC/MDOT)A          B16+B3-B3=B16 PL00D
0909                         36,3114   41257 1           SL*       DMP
0910                         36,3115   20165 1                     -12D,1
0911    REF   1              36,3116   15334 1                     CSUBT
0912                         36,3117   77621 1           BDSU
0913    REF   3  LAST  900   36,3120   03716 1                     T1
0914    REF  78  LAST  740   36,3121   03413 1           STORE     TIG         TIG=T1-CT*DTB                  B28
0915                         36,3122   77776 1           EXIT
0916    REF   2  LAST  898   36,3123  3 5026 0           CAF       V6N33RTE    DISPLAY BIASED TIG
0917    REF   5  LAST  903   36,3124  0 3246 1           TCR       P370GOF
0918                         36,3125  1 3123 0           TCF       -2
09184   REF 147  LAST  894   36,3126  3 4772 1           CAF       ZERO
09185   REF   9  LAST  584   36,3127  54 771 1           TS        VHFCNT
09186   REF   5  LAST  584   36,3130  54 772 1           TS        TRKMKCNT
0919    REF 223  LAST  903   36,3131  0 6006 1           TC        INTPRET
09195                        36,3132   77624 1           CALL                  CONICALLY INTEGRATE FROM R1,V1 OVER T12
091951  REF   1              36,3133   63624 1                     RTENCK1
0920                         36,3134   53575 0           VLOAD     UNIT                                             PL00D
092001  REF   3  LAST  901   36,3135   03656 1                     R(T2)/
092005                       36,3136   74315 0           PDVL      VXSC        UR2                            B1 PL06D
09201   REF   2  LAST  131   36,3137   03554 0                     UR1/
092015  REF   1              36,3140   33632 0                     MCOS7.5
09202                        36,3141   74315 0           PDVL      VXSC        -UR1(COS7.5)                   B1 PL12D
092025  REF   1              36,3142   03562 0                     UH/
09203   REF   1              36,3143   33634 0                     MSIN7.5
092035                       36,3144   50255 0           VAD       DOT         K/=-UR1(COS7.5)-UH(SIN7.5)     B2 PL00D
09204                        36,3145   50015 0           DAD       BMN
092045  REF   1              36,3146   33636 1                     MCOS22.5
09205   REF   1              36,3147   75174 1                     P37W
092055                       36,3150   50375 0           VLOAD     DOT         K/ . UR2 GR COS22.5
09206   REF   2  LAST  904   36,3151   03562 0                     UH/
092065  REF   4  LAST  904   36,3152   03656 1                     R(T2)/
09207                        36,3153   71240 1           BMN       DLOAD
092075  REF   1              36,3154   75160 1                     P37U
09208   REF   1              36,3155   33640 0                     THETA165
092085                       36,3156   52006 0           PUSH      GOTO
09209   REF   1              36,3157   75162 0                     P37V
092095                       36,3160   41545 0  P37U     DLOAD     PUSH
0921    REF   1              36,3161   33642 1                     THETA210
092105                       36,3162   77756 0  P37V     SIN
09211   REF   8  LAST  688   36,3163   16732 0           STODL     SNTH
092115                       36,3164   43146 0           COS       CLEAR
09212   REF   7  LAST  688   36,3165   03666 1                     RVSW
092125  REF   6  LAST  688   36,3166   26734 0           STOVL     CSTH
09213   REF   3  LAST  900   36,3167   03640 0                     R(T1)/
092135  REF   9  LAST  900   36,3170   26657 1           STOVL     RVEC
09214   REF   3  LAST  900   36,3171   03700 0                     V2(T1)/
092145  REF  11  LAST  900   36,3172   36746 1           STCALL    VVEC
09215   REF   7  LAST  688   36,3173   25002 1                     TIMETHET
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  0922                              36,3174   43014 0  P37W      CLEAR  CLEAR
  0923    REF    8  LAST   728      36,3175   01267 0                   XDELVFLG
  0924    REF    5  LAST   729      36,3176   03665 1                   NORMSW
  0925                              36,3177   77214 0            SET    VLOAD
  0926    REF   10  LAST   668      36,3200   01071 0                   FINALFLG
  0927                              36,3201   77626 0            STADR
  0928    REF   11  LAST   494      36,3202   60362 0            STODL  RTARG
  0929    REF    3  LAST   468      36,3203   00037 0                   T
  0933                              36,3204   77615 0            DAD
  0934    REF    4  LAST   904      36,3205   03716 1                   TI
  0936    REF   11  LAST   723      36,3206   27656 1            STOVL  TPASS4
  0937    REF    4  LAST   904      36,3207   03700 0                   V2(TI)/
  0938                              36,3210   77451 1            VSU    EXIT
  0939    REF    2  LAST   131      36,3211   03672 1                   V(TI)/
  09391   REF    3  LAST   652      36,3212  3 4756 1            CAF    EBANK4
  09392   REF   25  LAST   895      36,3213  54 003 0            TS     EBANK
  09393   REF  224  LAST   904      36,3214  0 6006 1            TC     INTPRET
  0940    REF   12  LAST   695      36,3215   03646 0            STORE  DELVSIN
  09401                             36,3216   77624 1  P37WW     CALL
  0941    REF    9  LAST   669      36,3217   73027 0                   VN1645
  0942                              36,3220   77650 1            GOTO
  0943    REF    1                  36,3221   75216 0                   P37WW
 R0948
 R0949    SUBROUTINE TO GO TO GOFLASHR AND BLANK R1

  0950                              36,3222  0 0006 1  P37GFRB1 EXTEND
  0951    REF    2  LAST   132      36,3223  23'752 0            QXCH   SPRTEX
  0952    REF    2  LAST   902      36,3224  0 3232 1            TCR    P370GOFR
  0953    REF   92  LAST   903      36,3225  3 4770 0  37BLANK   CAF    ONE
  0954    REF   11  LAST   756      36,3226  0 5516 0     +1     TCR    BLANKET
  0955    REF   84  LAST   834      36,3227  1 5205 1            TCF    ENDOFJOB
  0956    REF    3  LAST   905      36,3230  0 1752 0            TC     SPRTEX               RECYCLE
  0957    REF    1                  36,3231  1 3255 1            TCF    P37PROC              PROCEED
 R0958
 R0959    SUBROUTINE TO GO TO GOFLASHR

  0960                              36,3232  0 0006 1  P370GOFR EXTEND
  0961    REF    2  LAST   131      36,3233  23'547 0            QXCH   RTENCKEX
  0962    REF  208  LAST   882      36,3234  0 4636 0            TCR    BANKCALL
  0963    REF    5  LAST   801      36,3235   21101 1            CADR   GOFLASHR
  0964    REF   51  LAST   805      36,3236  1 4103 0            TCF    GOTOPOOH             TERMINATE
  0965                              36,3237  1 3242 1            TCF    +3
  0966                              36,3240  1 3244 1            TCF    +4
  0967    REF    3  LAST   905      36,3241  0 1547 0            TC     RTENCKEX             IMMEDIATE RETURN
  0968    REF    4  LAST   905      36,3242  51'547 0            INDEX  RTENCKEX             PROCEED
  0969                              36,3243  1 0004 1            TCF    0 +4
  0970    REF    5  LAST   905      36,3244  51'547 0            INDEX  RTENCKEX             RECYCLE
  0971                              36,3245  1 0003 0            TCF    0 +3
 R0973
 R0974    SUBROUTINE TO GO TO GOFLASH
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L          P37,P70                                                                                 USER'S PAGE NO.  1          E7 S3

 0975                                  36,3246   0 0006 1   P370GOF   EXTEND
 0976     REF   4  LAST   905   36,3247   23'752 0                  QXCH      SPRTEX
 0977     REF 209  LAST   905   36,3250   0 4636 0                  TCR       BANKCALL
 0978     REF  25  LAST   804   36,3251    20743 0                  CADR      GOFLASH
 0979     REF  52  LAST   905   36,3252   1 4103 0                  TCF       GOTOPOOH
 0980                                  36,3253   1 3255 1                  TCF       +2
 0981     REF   5  LAST   906   36,3254   0 1752 0                  TC        SPRTEX
 0982     REF   6  LAST   906   36,3255   51'752 0   P37PROC   INDEX     SPRTEX
 0983                                  36,3256   1 0001 1                  TCF       0 +1
 0985     REF   6  LAST   655        5026                  V6N33RTE =         V06N33
 0986     REF   1                     4537                  V4N06RTE =         V04N06
 0987     REF   3  LAST   796        5034                  V6N61RTE =         V06N61
 0988                                  36,3257    01447 1   V6N39RTE VN        0639
 0989     REF   2  LAST   793        5033                  V6N60RTE =         V06N60
 0990     REF   4  LAST   685        4535                  V6N81RTE =         V06N81
 0997     REF   1                  32,2000                              SETLOC   RTE
 0998                                  32,2272                              BANK
 0999     REF   1                                                           COUNT*  $$/P37
```

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P1000    ALARM DISPLAY SUBROUTINE
  1051                                32,2272    77776 1  RTEALRM  EXIT
  1055   REF 286  LAST  895    32,2273  3 0154 1             CA       MPAC
  1056   REF   3  LAST  661    32,2274  0 5770 1             TC       VARALARM
  1057   REF   1               32,2275  3 5023 0             CAF      V5N09RTE
  1058   REF 210  LAST  906    32,2276  0 4636 0             TC       BANKCALL
  1059   REF  26  LAST  906    32,2277   20743 0             CADR     GOFLASH
  1060   REF  53  LAST  906    32,2300  1 4103 0             TCF      GOTOPOOH
  1061                         32,2301  1 2275 1             TCF      -4
  1062   REF  50  LAST  882    32,2302  0 4655 0             TC       POSTJUMP
  1063   REF   6  LAST  902    32,2303   74476 1             CADR     P37
  1065   REF   6  LAST  809       5023              V5N09RTE =        V05N09
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L         P37,P70                                                                              USER'S PAGE NO.  12       E7 S3

P2000     TIME RADIUS CALLING SUBROUTINE

R2001     INPUT
R2002       RVEC            INITIAL POSITION VECTOR                                   VECTOR  B29      METERS
R2004       VVEC            INITIAL VELOCITY VECTOR                                   VECTOR  B7       METERS/CS
R2006       RDESIRED        FINAL RADIUS FOR WHICH TRANSFER TIME IS TO BE COMPUTED    DP      B29      METERS
R2008       CONICX1         X1 SETTING FOR CONIC SUBROUTINES  -2 = EARTH              SP      B14
R2010     OUTPUT
R2011       R(T2)/          FINAL POSITION VECTOR                                     VECTOR  B29      METERS
R2013       V(T2)/          FINAL VELOCITY VECTOR                                     VECTOR  B7       METERS/CS
R2015       T12             TRANSFER TIME TO FINAL RADIUS                             DP      B28      CS

  2100                         32,2304   43020 1  TMRAD100 STQ     CLEAR
  2101    REF   6  LAST  905   32,2305   03547 1                   RTENCKEX
  2102    REF   8  LAST  904   32,2306   03666 1                   RVSW
  2103                         32,2307   67164 0           AXC,2   SXA,2
  2104                         32,2310   20000 0           OCT     20000
  2105    REF   2  LAST  100   32,2311   02756 1                   SGNRDOT
  2106                         32,2312   45140 0           LXC,1   CALL
  2107    REF   3  LAST  899   32,2313   03550 1                   CONICX1
  2108    REF   1              32,2314   25607 1                   TIMERAD
  2109    REF   3  LAST  900   32,2315   27710 1           STOVL   V(T2)/                                          PL00D
  2110                         32,2316   77626 0           STADR
  2111    REF   5  LAST  904   32,2317   60121 0           STODL   R(T2)/
  2112    REF   4  LAST  905   32,2320   00037 0                   T
  2113    REF   3  LAST  132   32,2321   37724 1           STCALL  T12
  2114    REF   7  LAST  908   32,2322   03547 1                   RTENCKEX
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L         P37,P70                                                                                    USER'S PAGE NO.  13       E7 S3

P2200     DISPLAY CALCULATION SUBROUTINE

R2201     DESCRIPTION
R2202       OUTPUT FOR DISPLAY IS CONVERTED TO PROPER UNITS AND PLACED IN OUTPUT STORAGE REGISTERS. LANDING SITE
R2204     COMPUTATION FOR DETERMINING LANDING SITE LATITUDE AND LONGITUDE IS INCLUDED IN THE ROUTINE.

R2206     CALLING SEQUENCE
R2207       L         CALL
R2208       L+1                RTEDISP

R2209     SUBROUTINES CALLED
R2210       TMRAD100
R2211       AUGEKUGL
R2212       LAT-LONG

R2213     ERASABLE INITIALIZATION REQUIRED
R2214       PUSHLIST
R2215         NONE
R2216       MPAC
R2217         NONE
R2218       OTHER
R2219         R(T2)/       FINAL POSITION VECTOR                                     VECTOR  B29     METERS
R2221         V(T2)/       FINAL VELOCITY VECTOR                                     VECTOR  B7      METERS/CS
R2223         T2           FINAL TIME                                                DP      B28     CS
R2225         V2(T1)/      POST IMPULSE INITIAL VELOCITY VECTOR                      VECTOR  B7      METERS/CS
R2227         V(T1)/       INITIAL VELOCITY VECTOR                                   VECTOR  B7      METERS/CS
R2229         UR1/         UNIT INITIAL VECTOR                                       VECTOR  B1
R2231         UH/          UNIT HORIZONTAL VECTOR                                    VECTOR  B1

R2233     OUTPUT
R2234       VPRED          VELOCITY MAGNITUDE AT 400,000 FT. ENTRY ALTITUDE          DP      B7      METERS/CS
R2236       T3TOT4         TRANSIT TIME TO 400,000 FT. ENTRY ALTITUDE                DP      B28     CS
R2238       GAMMAEI        FLIGHT PATH ANGLE AT 400,000 FT. ENTRY ALTITUDE           DP      B0      REVS  + ABOVE HORIZ
R2240       DELVLVC        INITIAL VELOCITY CHANGE VECTOR IN LOCAL VERTICAL COORD.   VECTOR  B7      METERS/CS
R2242       LAT(SPL)       LATITUDE OF THE LANDING SITE                              DP      B0      REVS
R2244       LNG(SPL)       LONGITUDE OF THE LANDING SITE                             DP      B0      REVS

  2275                         32,2323   77220 1  RTEDISP  STQ     VLOAD             DISPLAY
  2276   REF   7  LAST  906    32,2324   03752 1                   SPRTEX
  2277   REF   4  LAST  908    32,2325   03710 1                   V(T2)/
  2278                         32,2326   65256 0           UNIT    POOL
  2279                         32,2327   00045 0                   360
  2280   REF  11  LAST  898    32,2330   17757 1           STODL   VPRED             V(T2)
  2281   REF   3  LAST  900    32,2331   03552 0                   T2
  2282                         32,2332   77625 0           DSU
  2283   REF   1               32,2333   03413 1                   SPRTETIG
  2284   REF   2  LAST  284    32,2334   26641 0           STOVL   T3TOT4            T21
  2285   REF   6  LAST  908    32,2335   03656 1                   R(T2)/
  2286                         32,2336   50256 0           UNIT    DOT
  22865                        32,2337   77752 1           SL1
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  2287                              32,2340   44326 0            ARCCOS  BDSU
  2288    REF   5  LAST  902        32,2341   15326 1                    1RTEB2
  2289    REF  13  LAST  898        32,2342   27761 1            STOVL   GAMMAEI            FLIGHT PATH ANGLE T2
  2290    REF   5  LAST  905        32,2343   03700 0                    V2(T1)/
  2291                              32,2344   41451 1            VSU     PUSH
  2292    REF   3  LAST  905        32,2345   03672 1                    V(T1)/
  2293                              32,2346   57441 1            DOT     DCOMP
  2294    REF   3  LAST  904        32,2347   03554 0                    UR1/
  2295                              32,2350   41515 0            PDVL    PUSH
  2296                              32,2351   63345 0            DLOAD   PDVL
  2297    REF   1                   32,2352   15330 0                    ZERORTE
  2298                              32,2353   55441 0            DOT     VDEF
  2299    REF   3  LAST  904        32,2354   03562 0                    UH/
  22995                             32,2355   77772 0            VSL1
  2300    REF  23  LAST  685        32,2356   17405 0            STODL   DELVLVC
  230004  REF  24  LAST  910        32,2357   03405 0                    DELVLVC
  23001                             32,2360   57414 1            BOFF    DCOMP
  230012  REF   1                   32,2361   02741 1                    RETROFLG
  230014  REF   1                   32,2362   64364 1                    RTD18
  230016  REF  25  LAST  910        32,2363   03405 0            STORE   DELVLVC             NEGATE X COMPONENT, RETROGRADE
  230018                            32,2364   51575 1   RTD18    VLOAD   ABVAL
  230019  REF  26  LAST  910        32,2365   03405 0                    DELVLVC
  23002   REF   8  LAST  732        32,2366   27763 0            STOVL   VGDISP
  2301    REF   7  LAST  909        32,2367   03656 1                    R(T2)/
  2302    REF  10  LAST  904        32,2370   02657 1            STORE   RVEC               *****  LANDING SITE COMPUTATION  *****
  2303                              32,2371   45246 0            ABVAL   DSU
  2304    REF   1                   32,2372   33620 0                    30480RTE
  2305    REF   3  LAST  900        32,2373   26760 1            STOVL   RDESIRED
  2306    REF   5  LAST  909        32,2374   03710 1                    V(T2)/
  2307    REF  12  LAST  904        32,2375   36746 1            STCALL  VVEC
  2308    REF   2  LAST  900        32,2376   64304 1                    TMRAD100           R3,V3,T23 FROM TIMERAD
  2309                              32,2377   53575 0            VLOAD   UNIT
  2310    REF   8  LAST  910        32,2400   03656 1                    R(T2)/
  2311                              32,2401   53515 0            PDVL    UNIT               UR3                              PL06D
  2312    REF   6  LAST  910        32,2402   03710 1                    V(T2)/
  2313                              32,2403   72441 0            DOT     SL1                GAMMAE=ARCSIN(UR3 . UV3)         PL00D
  2314                              32,2404   65336 1            ARCSIN  PDDL               V(T3)                            PL02D
  2315                              32,2405   00045 0                    36D
  2316                              32,2406   51525 1            PDDL    ABS
  2317                              32,2407   45006 0            PUSH    CALL               /GAMMAE/                         PL04D
  2318    REF   2  LAST  647        32,2410   64105 1                    AUGEKUGL           PHIE                             PL06D
  2319                              32,2411   43215 0            DAD     DAD
  2320    REF   4  LAST  908        32,2412   03724 0                    T12                T23
  2321    REF   4  LAST  909        32,2413   03552 0                    T2
  2322                              32,2414   00003 1            STORE   02D                 T(LS) = T2&T23&TE
  232204                            32,2415   53135 0            SLOAD   BZE
  232208  REF   1                   32,2416   03013 0                    P37RANGE
  232212  REF   1                   32,2417   64421 1                    RTD22
  232216                            32,2420   00005 1            STORE   04D                 OVERRIDE RANGE (PCR 261)
  23222                             32,2421   73545 1   RTD22    DLOAD   SIN
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 2323                          32,2422   00005 1                4D
 2325    REF   5  LAST  293    32,2423   17403 0         STODL  LNG(SPL)        LNG(SPL)=SIN(PHIE)                  PL04D
 2326                          32,2424   77746 1         COS
 2327    REF  11  LAST  853    32,2425   03401 1         STORE  LAT(SPL)        LAT(SPL)=COS(PHIE)
 2328                          32,2426   53575 0         VLOAD  UNIT
 2329    REF   9  LAST  910    32,2427   03656 1                R(T2)/
 2330                          32,2430   41406 0         PUSH   PUSH
 2331                          32,2431   53515 0         PDVL   UNIT                                                PL22D
 2332    REF   7  LAST  910    32,2432   03710 1                V(T2)/
 2333                          32,2433   47315 0         PDVL   VXV
 2334                          32,2434   53435 0         VXV    UNIT            UH3=UNIT(UR3 X UV3 X UR3)           PL10D
 2335                          32,2435   63361 0         VXSC   PDVL
 2336    REF   6  LAST  911    32,2436   03403 0                LNG(SPL)
 2337                          32,2437   53361 0         VXSC   VAD                                                 PL04D
 2338    REF  12  LAST  911    32,2440   03401 1                LAT(SPL)
 2340                          32,2441   43014 0         CLEAR  CLEAR           T(LS) IN MPAC
 2341    REF  11  LAST  853    32,2442   00662 0                ERADFLAG
 2342    REF  19  LAST  853    32,2443   01663 0                LUNAFLAG
 23425   REF  17  LAST  901    32,2444   16152 0         STODL  ALPHAV          ALPHAV=UR3(COSPHIE)+UH3(SINPHIE)    PL02D
 2343                          32,2445   77624 1         CALL
 2344    REF   8  LAST  806    32,2446   26453 1                LAT-LONG
 2345                          32,2447   77745 1         DLOAD
 2346    REF  11  LAST  853    32,2450   00747 0                LAT
 2347    REF  13  LAST  911    32,2451   17401 1         STODL  LAT(SPL)        LATITUDE LANDING SITE    *****
 2348    REF   9  LAST  619    32,2452   00751 1                LONG
 2349    REF   7  LAST  911    32,2453   37403 1         STCALL LNG(SPL)        LONGITUDE LANDING SITE   *****
 2350    REF   8  LAST  909    32,2454   03752 1                SPRTEX
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P 2500   INITIAL VECTOR SUBROUTINE

R 2501   DESCRIPTION
R 2502     A PRECISION INTEGRATION OF THE STATE VECTOR TO THE TIME OF IGNITION ISPERFORMED.PRECOMPUTATIONS OCCUR.

R 2504   CALLING SEQUENCE
R 2505     L        CALL
R 2506     L+1              INVC100

R 2507   NORMAL EXIT MODE
R 2508     AT L+2 OF CALLING SEQUENCE WITH MPAC = 0

R 2509   ALARM EXIT MODE
R 2510     AT L+2 OF CALLING SEQUENCE WITH MPAC = OCTAL 612 FOR STATE VECTOR IN MOONS SPHERE OF INFLUENCE

R 2512   SUBROUTINES CALLED
R 2513     CSMPREC

R 2514   ERASABLE INITIALIZATION REQUIRED
R 2515     PUSHLIST
R 2516       NONE
R 2517     MPAC
R 2518       NONE
R 2519     OTHER
R 2520       SPRTETIG    TIME OF IGNITION                                      DP       B28      CS
R 2522       CSM STATE VECTOR

R 2523   OUTPUT
R 2524     R(T1)/          INITIAL POSITION VECTOR AT TIG                      VECTOR  B29       METERS
R 2526     V(T1)/          INITIAL VELOCITY VECTOR AT TIG                      VECTOR  B7        METERS/CS
R 2528     T1              INITIAL VECTOR TIME (TIG)                           DP      B28       CS
R 2530     UR1/            UNIT INITIAL VECTOR                                 VECTOR  B1
R 2532     UH/             UNIT HORIZONTAL VECTOR                              VECTOR  B1
R 2534     CFPA            COSINE OF INITIAL FLIGHT PATH ANGLE                 DP      B1

  2600                         32,2455   71220 1  INVC100  STQ     CLOAD
  2601   REF   9  LAST  911    32,2456   03752 1                   SPRTEX
  2602   REF   2  LAST  909    32,2457   03413 1                   SPRTETIG
  2603   REF  38  LAST  783    32,2460   34041 0           STCALL  TDEC1
  2604   REF   6  LAST  746    32,2461   27145 1                   CSMPREC         PRECISION INTEGRATION  R0,V0 TO R1,V1
  2605                         32,2462   67175 0           VLOAD   SXA,2
  2606   REF  31  LAST  783    32,2463   00001 0                   RATT
  2607   REF   2  LAST  131    32,2464   03745 1                   P(T1)
  2608   REF   4  LAST  904    32,2465   27640 0           STOVL   R(T1)/
  2609   REF  24  LAST  783    32,2466   00007 0                   VATT
  2610   REF   4  LAST  910    32,2467   17672 1           STODL   V(T1)/
  2611   REF   7  LAST  515    32,2470   00015 0                   TAT
  2612   REF   5  LAST  905    32,2471   03716 1           STORE   T1
  2613                         32,2472   53135 0           SLOAD   BZE
  2614   REF   3  LAST  912    32,2473   03746 1                   P(T1)
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 2615   REF   1               32,2474   64500 0                   INVC109
 2624                         32,2475   52135 1   INVC107  SLOAD  GOTO
 2625   REF   1               32,2476   33631 0                   OCT612
 2626   REF   4  LAST  902    32,2477   64272 1                   RTEALRM        R1,V1 NOT IN PROPER SPHERE OF INFLUENCE
 2650                         32,2500   53575 0   INVC109  VLOAD  UNIT
 2651   REF   5  LAST  912    32,2501   03640 0                   R(T1)/
 2652   REF   4  LAST  910    32,2502   17554 0            STODL  UR1/           UR1/                                B1
 2653                         32,2503   00045 0                   36D
 2654   REF   5  LAST  899    32,2504   27646 0            STOVL  R(T1)          R(T1)                               B29
 2655   REF   5  LAST  912    32,2505   03672 1                   V(T1)/
 2656                         32,2506   77656 1            UNIT
 2657   REF   2  LAST  132    32,2507   03562 0            STORE  UV1/
 2658                         32,2510   72441 0            DOT    SL1
 2659   REF   5  LAST  913    32,2511   03554 0                   UR1/
 2660   REF   2  LAST  131    32,2512   03747 0            STORE  CFPA           CFPA                                B1
 2661                         32,2513   45246 0            ABS    DSU
 2662   REF   1               32,2514   33644 1                   EPC1RTE
 2663                         32,2515   71240 1            BMN    CLOAD
 2664   REF   1               32,2516   64525 1                   INVC115        NOT NEAR RECTILINEAR
 2665   REF   6  LAST  910    32,2517   15326 1                   1RTEB2
 2666                         32,2520   41525 0            PDDL   PUSH
 2668   REF   2  LAST  910    32,2521   15330 0                   ZERORTE
 2669                         32,2522   41466 0            VDEF   PUSH           N/ = (0,0,1)
 2670                         32,2523   77650 1            GOTO
 2671   REF   1               32,2524   64531 1                   INVC120
 2672                         32,2525   47375 0   INVC115  VLOAD  VXV
 2673   REF   6  LAST  913    32,2526   03554 0                   UR1/
 2674   REF   3  LAST  913    32,2527   03562 0                   UV1/
 2675                         32,2530   77606 1            PUSH                  N/ = UR X UV                        B2
 2676                         32,2531   71214 0   INVC120  CLEAR  CLOAD
 2677   REF   2  LAST  910    32,2532   02661 1                   RETROFLG
 2678                         32,2533   51006 0            PUSH   BPL
 2679   REF   1               32,2534   64540 1                   INVC125
 2680                         32,2535   57575 1            VLOAD  VCOMP          RETROGRADE ORBIT
 2681                         32,2536   43006 0            PUSH   SET
 2683   REF   3  LAST  913    32,2537   02461 0                   RETROFLG
 2684                         32,2540   77775 1   INVC125  VLOAD
 2685                         32,2541   53435 0            VXV    UNIT
 2686   REF   7  LAST  913    32,2542   03554 0                   UR1/
 2687   REF   4  LAST  910    32,2543   03562 0            STORE  UH/            UH/                                 B1
 2688                         32,2544   77650 1            GOTO
 2689   REF  10  LAST  912    32,2545   03752 1                   SPRTEX
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P3000   PRECISION TRAJECTORY COMPUTATION SUBROUTINE

R3001   DESCRIPTION
R3002     A NUMERICALLY INTEGRATED TRAJECTORY IS GENERATED WHICH FOR THE RETURN TO EARTH PROBLEM SATISFIES THE REENTRY
R3004   CONSTRAINTS (RCON AND X(T2)) ACHIEVED BY THE INITIAL CONIC TRAJECTORY AND MEETS THE DVD REQUIREMENT AS CLOSELY
R3006   AS POSSIBLE.
R3007
R3010   CALLING SEQUENCE
R3011     L      CALL
R3012     L+1           PREC100

R3013   NORMAL EXIT MODE
R3014     AT L+2 OF CALLING SEQUENCE WITH MPAC = 0

R3015   ALARM EXIT MODE
R3016     AT L+2 OF CALLING SEQUENCE WITH MPAC =
R3017          OCTAL 605        FOR EXCESS ITERATIONS
R3018          OCTAL 613        FOR REENTRY ANGLE OUT OF LIMITS

R3019   SUBROUTINES CALLED
R3020     INTSTALL
R3021     RTENCK2
R30215    RTENCK3
R3022     TIMERAD
R3023     PARAM
R3024     V2T100

R3025   ERASABLE INITIALIZATION REQUIRED
R3026     PUSHLIST
R3027       NONE
R3028     MPAC
R3029       NONE
R3030     OTHER
R3031       R(T1)/      INITIAL POSITION VECTOR                                     VECTOR  B29/B27 METERS
R3033       V2(T1)/     POST IMPULSE INITIAL VELOCITY VECTOR                        VECTOR  B7/B5   METERS/CS
R3035       V(T1)/      INITIAL VELOCITY VECTOR                                     VECTOR  B7/B5   METERS/CS
R3039       T1          INITIAL VECTOR TIME                                         DP      B28     CS
R3041       T12         INITIAL TO FINAL POSITION TIME                              DP      B28     CS
R3045       RCON        CONIC FINAL RADIUS                                          DP      B29/B27 METERS
R3047       R(T1)       MAGNITUDE OF INITIAL POSITION VECTOR                        DP      B29/B27 METERS
R3049       X(T2)       COTANGENT OF FINAL FLIGHT PATH ANGLE                        DP      B0
R3051       X(T1)       COTANGENT OF INITIAL FLIGHT PATH ANGLE                      DP      B5
R3057       RTEDVD      DELTA VELOCITY DESIRED                                      DP      B7/B5   METERS/CS
R3059       MAMAX1      MAJOR AXIS LIMIT FOR LOWER BOUND ON GAMDV ITERATOR          DP      B30/B28 METERS
R3061       MAMAX2      MAJOR AXIS LIMIT FOR UPPER BOUND ON GAMDV ITERATOR          DP      B30/B28 METERS
R3063       UR1/        UNIT INITIAL VECTOR                                         VECTOR  B1
R3065       UH/         UNIT HORIZONTAL VECTOR                                      VECTOR  B1
R3067       BETA1       1+X(T2)**2                                                  DP      B1
R3069       PHI2        PERIGEE OR APOGEE INDICATOR                                 DP      B2      -1 PERIGEE,+1 APOGEE
R3071
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R3072    OUTPUT
R3073      V2(T1)/            POST IMPULSE INITIAL VELOCITY VECTOR                                VECTOR  B7          METERS/CS
R3075      R(T2)/             FINAL POSITION VECTOR                                               VECTOR  B29         METERS
R3077      V(T2)/             FINAL VELOCITY VECTOR                                               VECTOR  B7          METERS/CS
R3079      T2                 FINAL TIME                                                          DP      B28         CENTISECONDS
R3081
R3100    DEBRIS
R3101      RD                 FINAL R DESIRED                                                     DP      B29/B27 METERS
R3111      R/APRE             R/A                                                                 DP      B6
R3113      P/RPRE             P/R                                                                 DP      B4
R3115      RPRE               MAGNITUDE OF R(T2)/                                                 DP      B29/B27 METERS
R3117      X(T2)PRE           COTANGENT OF GAMMA2                                                 DP      B0
R3119      DT12               CORRECTION TO FINAL TIME T2                                         DP      B28         CENTISECONDS
R3121      RCON               FINAL RADIUS                                                        DP      B29/B27 METERS
R3123      DRCON              DELTA RCON                                                          DP      B29/B27 METERS
R3125
  3150                              32,2546   71220 1  PREC100  STQ     DLOAD
  3151   REF  11  LAST  913         32,2547   03752 1                   SPRTEX
  3156   REF   1                    32,2550   33606 1                   1/RTE
  3157   REF   4  LAST  901         32,2551   17730 0           STODL   NN1A
  3158   REF   7  LAST  902         32,2552   03636 1                   RCON
  3159   REF   2  LAST  131         32,2553   03664 0           STORE   RD
  3164                              32,2554   77745 1  PREC120  DLOAD
  31645  REF   1                    32,2555   15344 0                   2RTEB1
  31646  REF   2  LAST  131         32,2556   17650 1           STODL   DT21PR              DT21PR = POSMAX
  3165   REF   1                    32,2557   33604 0                   M15RTE
  3166   REF   2  LAST  131         32,2560   37546 1           STCALL  NN2
  3169   REF   1                    32,2561   63652 0                   RTENCK3
  3170                              32,2562   77624 1  PREC125  CALL
  3171   REF   1                    32,2563   37727 1                   PARAM
  3172                              32,2564   77745 1           DLOAD
  3173   REF   4  LAST  675         32,2565   02742 1                   P
  3222   REF   1                    32,2566   14033 1           STODL   P/RPRE
  3223   REF   3  LAST  689         32,2567   02744 1                   R1A
  3224   REF   1                    32,2570   14035 1           STODL   R/APRE
  3225   REF   4  LAST  689         32,2571   00041 1                   R1
  3226   REF   1                    32,2572   14031 0           STODL   RPRE
  3227   REF   3  LAST  130         32,2573   03770 1                   COGA
  3228                              32,2574   77661 0           SL
  3229                              32,2575   20206 1                   5
  3230   REF   1                    32,2576   03724 0           STORE   X(T2)PRE
  3241                              32,2577   43276 0           DCOMP   DAD
  3242   REF  10  LAST  902         32,2600   03726 1                   X(T2)
  3243                              32,2601   45246 0           ABS     DSU
  3244   REF   1                    32,2602   33652 0                   EPC4RTE
  3245                              32,2603   50000 1           BOV     BMN
  32455  REF   1                    32,2604   64606 0                   PREC130
  3246   REF   1                    32,2605   64775 0                   PREC175

 R3247   DESIRED REENTRY ANGLE NOT ACHIEVED
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 3248                            32,2606   50145 1  PREC130  DLOAD  BMN
 3249   REF    3  LAST  915      32,2607   03546 0                  NN2
 3250   REF    1                 32,2610   64614 0                  PREC140
 3251                            32,2611   52135 1  PREC132  SLOAD  GOTO                TOO MANY ITERATIONS
 3252   REF    2  LAST  901      32,2612   33630 1                  CCT605                  EXIT WITH ALARM
 3253   REF    1                 32,2613   65100 0                  PRECX

R3259   DETERMINE RADIUS AT WHICH THE DESIRED REENTRY ANGLE WILL BE ACHIEVED

 3260                            32,2614   53145 1  PREC140  DLOAD  BZE
 3261   REF    5  LAST  915      32,2615   03730 0                  NN1A
 3264   REF    1                 32,2616   64654 1                  PREC162
 3265                            32,2617   62545 1  PREC150  DLOAD  SL2                                                     B2
 3266   REF    2  LAST  915      32,2620   00033 1                  P/RPRE
 3267                            32,2621   72405 0           DMP    SL1                 BETA2=BETA1*P/R                 B2 PL02
 3268   REF    3  LAST  902      32,2622   03744 0                  BETA1
 32685                           32,2623   71206 0           PUSH   DLOAD
 3269   REF    2  LAST  915      32,2624   00035 1                  R/APRE
 3270                            32,2625   41212 0           SL4    DMP
 32705                           32,2626   00001 0                  00D
 3271                            32,2627   50021 1           BDSU   BMN                 BETA3=1-BETA2*R/A
 3272   REF    1                 32,2630   31771 1                  IRTEB4
 3273   REF    1                 32,2631   64644 0                  PREC160
 3274                            32,2632   75512 0  PREC155  SL2    SQRT
 3275                            32,2633   44205 0           DMP    BDSU
 3276   REF    3  LAST  902      32,2634   03751 1                  PHI2
 3277   REF    1                 32,2635   31767 0                  1RTEB3
 3278                            32,2636   65301 0           NORM   PDDL
 3279   REF   35  LAST  903      32,2637   00047 1                  X1
 3280                            32,2640   56342 1           SR1    DDV                 BETA4=BETA2/(1-PHI2*SQRT(BETA3))
 3281                            32,2641   52057 1           SL*    GOTO                                                B1
 3282                            32,2642   20200 1                  0-1,1
 3283   REF    1                 32,2643   64662 1                  PREC165
 3284                            32,2644   60345 0  PREC160  DLOAD  NORM
 32845  REF    3  LAST  916      32,2645   00035 1                  R/APRE
 3285   REF   36  LAST  916      32,2646   00047 1                  X1
 32855                           32,2647   53665 1           BDDV   SL*                                                 B1
 3286   REF    1                 32,2650   15334 1                  1RTEB1
 32865                           32,2651   20173 0                  0-6,1
 3287                            32,2652   77650 1           GOTO
 32875  REF    2  LAST  916      32,2653   64662 1                  PREC165
 3288                            32,2654   60345 0  PREC162  DLOAD  NORM
 32885  REF    2  LAST  915      32,2655   00031 0                  RPRE
 3289   REF   37  LAST  916      32,2656   00047 1                  X1
 32895                           32,2657   53665 1           BDDV   SL*                 BETA4=RD/RPRE                   B1
 3290   REF    3  LAST  915      32,2660   03664 0                  RD
 32905                           32,2661   20200 1                  0 -1,1
 3291                            32,2662   41401 1  PREC165  SETPD  PUSH
 32915                           32,2663   00001 0                  0
 3292                            32,2664   57425 0           DSU    DCOMP
 32923  REF   2  LAST  916   32,2665   15334 1                      IRTEB1
 329235 REF   2  LAST  124   32,2666   03755 0            STORE    BETA12
 32924                       32,2667   71240 1            BMN      DLOAD
 329243 REF   1              32,2670   64701 0                     PREC168
 329247 REF   2  LAST  915   32,2671   03724 0                     X(T2)PRE
 32925                       32,2672   71240 1            BMN      DLOAD
 329253 REF   1              32,2673   64677 0                     PREC167
 329257 REF   3  LAST  917   32,2674   03755 0                     BETA12
 32926                       32,2675   77676 0            DCOMP
 329265 REF   4  LAST  917   32,2676   03755 0            STORE    BETA12
 32927                       32,2677   77745 1  PREC167   DLOAD
 329275 REF   5  LAST  917   32,2700   03755 0                     BETA12
 3293                        32,2701   45246 0  PREC168   ABS      DSU
 3294   REF   1              32,2702   33654 0                     EPC6RTE
 3295                        32,2703   71240 1            BMN      DLOAD
 3296   REF   2  LAST  915   32,2704   64775 0                     PREC175
 3297                        32,2705   72405 0            DMP      SL1
 3298   REF   3  LAST  916   32,2706   00031 0                     RPRE
 3299                        32,2707   77606 1            PUSH                           RF = NEW RADIUS
 3300                        32,2710   43345 1  PREC170   DLOAD    DAD
 3301   REF   4  LAST  916   32,2711   03546 0                     NN2
 3302   REF   2  LAST  901   32,2712   33600 1                     IRTEB28
 3303   REF   5  LAST  917   32,2713   03546 0            STORE    NN2
 3304                        32,2714   43175 0            VLOAD    SET
 3305   REF  10  LAST  911   32,2715   03656 1                     R(T2)/
 3306   REF   9  LAST  908   32,2716   03466 0                     RVSW
 3307   REF  11  LAST  910   32,2717   26657 1            STOVL    RVEC
 3308   REF   8  LAST  911   32,2720   03710 1                     V(T2)/
 3309                        32,2721   77765 0            SIGN
 3310   REF   6  LAST  917   32,2722   03755 0                     BETA12
 3311   REF  13  LAST  910   32,2723   16746 0            STODL    VVEC
 3312   REF   3  LAST  917   32,2724   15334 1                     IRTEB1
 3313                        32,2725   57565 0            SIGN     DCOMP
 3314   REF   7  LAST  917   32,2726   03755 0                     BETA12
 3315                        32,2727   71354 0            LXA,2    DLOAD
 3316   REF 287  LAST  907   32,2730   00154 1                     MPAC
 3317                        32,2731   67140 0            LXC,1    SXA,2
 3318   REF   4  LAST  908   32,2732   03550 1                     CONICX1
 3320   REF   3  LAST  906   32,2733   02756 1                     SGNRDOT
 3321   REF   4  LAST  910   32,2734   36760 0            STCALL   RDESIRED              COMPUTE DT12 (CORRECTION TO TIME OF
 3322   REF   2  LAST  908   32,2735   25607 1                     TIMERAD                     NEW RADIUS)
 3323                        32,2736   75345 1            DLOAD    SIGN
 3324   REF   5  LAST  908   32,2737   00037 0                     T
 3325   REF   8  LAST  917   32,2740   03755 0                     BETA12
 3326                        32,2741   60325 0            PDDL     NORM                  DT21=(PHI4)DT21                     PL020
 3327   REF   3  LAST  915   32,2742   03650 1                     DT21PR
 3328   REF  38  LAST  916   32,2743   00047 1                     X1
 3329                        32,2744   53665 1            BDDV     SL*
 3330                        32,2745   00001 0                     0,0
 33305                       32,2746   20176 0                        -3,1
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 3331                           32,2747   50006 1             PUSH    BMN          BETA13=(DT21)/(DT21PR)        B3 PL04D
 33315  REF   1                 32,2750   64755 1                     PREC172
 3332                           32,2751   65345 0             DLOAD   PDDL         BETA14=1                      B0 PL04D
 33325  REF   2  LAST  915      32,2752   15344 0                     2RTEB1
 3333                           32,2753   77650 1             GOTO
 33335  REF   1                 32,2754   64757 0                     PREC173
 3334                           32,2755   65345 0  PREC172    DLOAD   PDDL         BETA14=.6                     B0 PL04D
 33345  REF   1                 32,2756   33610 0                     M.6RTE
 3335                           32,2757   45271 1  PREC173    DDV     DSU
 33355                          32,2760   00003 1                     02D
 3336   REF   2  LAST  916      32,2761   31767 0                     1RTEB3
 33365                          32,2762   71240 1             BMN     DLOAD
 3337   REF   1                 32,2763   64767 0                     PREC174
 33375                          32,2764   77605 1             DMP
 3338   REF   4  LAST  917      32,2765   03650 1                     DT21PR
 33385                          32,2766   00001 0             STORE   00D          DT21=(BETA14)DT21PR           B28
 3339                           32,2767   41545 0  PREC174    DLOAD   PUSH
 33395                          32,2770   00001 0                     00D
 3340   REF   5  LAST  918      32,2771   37650 0             STCALL  DT21PR
 3341   REF   1                 32,2772   63634 0                     RTENCK2
 3342                           32,2773   77650 1             GOTO
 3343   REF   1                 32,2774   64562 1                     PREC125
 3356                           32,2775   45345 1  PREC175    DLOAD   DSU
 3357   REF   4  LAST  917      32,2776   00031 0                     RPRE
 3358   REF   4  LAST  916      32,2777   03664 0                     RD
 3359                           32,3000   51406 1             PUSH    ABS          RPRE-RD = RERR
 3360                           32,3001   50025 0             DSU     BMN
 3361   REF   1                 32,3002   33656 1                     EPC7RTE
 3362   REF   1                 32,3003   35022 1                     PREC220

R3363   DESIRED RADIUS HAS NOT BEEN ACHIEVED

 3364                           32,3004   53145 1             DLOAD   BZE
 3365   REF   6  LAST  916      32,3005   03730 0                     NN1A
 3366   REF   1                 32,3006   64611 0                     PREC132      TOO MANY ITERATIONS
 3367                           32,3007   53025 0             DSU     BZE
 3368   REF   2  LAST  915      32,3010   33606 1                     10RTE
 3369   REF   1                 32,3011   65044 1                     PREC207
 3370                           32,3012   45345 1  PREC205    DLOAD   DSU          NOT FIRST PASS OF ITERATION
 3371   REF   4  LAST  902      32,3013   03670 0                     RPRE,
 3372   REF   5  LAST  918      32,3014   00031 0                     RPRE         RPRE,-RPRE                    B29/B27
 3373                           32,3015   55301 0             NORM    BDDV
 3374   REF  19  LAST  840      32,3016   00050 1                     X2
 3375   REF   4  LAST  901      32,3017   03666 1                     ORCON
 33755                          32,3020   41457 1             SL*     PUSH         ORCON/(RPRE,-RPRE)=S              B2
 3376                           32,3021   57600 0                     0 -2,2
 33765                          32,3022   40015 1             DAD     BOV          S GR +4 OR LS -4
 3377   REF   4  LAST  917      32,3023   15334 1                     1RTEB1
 33775  REF   1                 32,3024   65031 0                     PREC209M
 3378                           32,3025   45246 0             ABS     DSU
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 33785  REF   5  LAST  918    32,3026    15334 1                    IRTEB1
 3379                         32,3027    77640 0            BMN
 33795  REF   1               32,3030    65034 0                    PREC206
 3380                         32,3031    57545 1  PREC205M  DLOAD   DCOMP           S GR 0 OR LS -4
 33805  REF   3  LAST  918    32,3032    15344 0                    2RTEB1
 3381                         32,3033    77725 1            PDDL                    S=-4                      B2
 33815                        32,3034    41345 0  PREC206   DLOAD   DMP
 3382                         32,3035    77712 0            SL2
 33825  REF   5  LAST  918    32,3036    03666 1            STORE   DRCON           DRCON=S(RERR)             B29
 3383                         32,3037    77615 0            DAD
 3384   REF   8  LAST  915    32,3040    03636 1                    RCON
 3385   REF   9  LAST  919    32,3041    03636 1            STORE   RCON            RCON+DRCON=RCON
 3386                         32,3042    77650 1            GOTO
 3387   REF   1               32,3043    65063 1                    PREC210
 3388                         32,3044    63545 0  PREC207   DLOAD   DSQ             FIRST PASS OF ITERATION
 3389   REF   5  LAST  918    32,3045    03664 0                    RD
 3390                         32,3046    70501 1            NORM    SR1
 3391   REF  39  LAST  917    32,3047    00047 1                    X1
 3392                         32,3050    60325 0            PDDL    NORM
 3393   REF   6  LAST  918    32,3051    00031 0                    RPRE
 3394   REF  20  LAST  918    32,3052    00050 1                    X2
 3395                         32,3053    55260 0            XSU,1   BDDV
 3396   REF  21  LAST  919    32,3054    00047 1                    X2
 3397                         32,3055    77657 0            SR*
 3398                         32,3056    20600 0                    0 -1,1
 3399   REF  10  LAST  919    32,3057    03636 1            STORE   RCON            RD**2/RPRE=RCON
 3400                         32,3060    77625 0            DSU
 3401   REF   8  LAST  919    32,3061    03664 0                    RD
 3402   REF   6  LAST  919    32,3062    03666 1            STORE   DRCON           RCON-RD=DRCON
 3403                         32,3063    77745 1  PREC210   DLOAD                   PREPARE FOR NEXT ITERATION
 3404   REF   7  LAST  919    32,3064    00031 0                    RPRE
 3405   REF   5  LAST  918    32,3065    17670 0            STODL   RPRE,
 3406   REF   7  LAST  918    32,3066    03730 0                    NN1A
 3407                         32,3067    77625 0            DSU
 3408   REF   3  LAST  917    32,3070    33600 1                    IRTEB28
 3409   REF   8  LAST  919    32,3071    37730 1            STCALL  NN1A
 3410   REF   2  LAST  900    32,3072    65102 1                    V2T100
 3411                         32,3073    52030 0            BHIZ    GOTO
 3412   REF   1               32,3074    64554 1                    PREC120
 3413   REF   2  LAST  916    32,3075    65100 0                    PRECX

R3414   DESIRED RADIUS ACHIEVED

 34145  REF   1               16,2000                       SETLOC  RTE2
 34146                        16,3022                       BANK
 34148  REF   1                                             COUNT*  $$/P37
 3415                         16,3022    45345 1  PREC220   DLOAD   DSU
 3416   REF  11  LAST  915    16,3023    03726 1                    X(T2)
 3417   REF   3  LAST  917    16,3024    03724 0                    X(T2)PRE
 3418                         16,3025    45246 0            ABS     DSU
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L        P37,P70                                                                            USER'S PAGE NO.  24      E7 S3

  3419   REF   1                16,3026   35035 1                    EPC8RTE
  3420                          16,3027   67240 0           BMN      SLOAD
  3421   REF   1                16,3030   65076 0                    PREC225
  3422   REF   1                16,3031   35037 0                    OCT613
  3423                          16,3032   77650 1           GOTO
  3424   REF   3  LAST   919    16,3033   65100 0                    PRECX              IF REENTRY ANGLE OUT OF LIMITS

  34241                         16,3034   00040 0  EPC8RTE  2DEC     .002
  34241                         16,3035   30447 0
  34242                         16,3036   00613 0  OCT613   OCT      613

R3425    DESIRED FINAL ANGLE HAS BEEN REACHED

  34251  REF   2  LAST   906    32,2000                     SETLOC RTE
  34252                         32,3076                     BANK
  3426   REF   2 LAST   906 TO  919:    388    388*         COUNT* $$/P37
  3429                          32,3076   77745 1  PREC225  DLOAD
  3430   REF   3  LAST   913    32,3077   15330 0                    ZERORTE
  3431                          32,3100   77650 1  PRECX    GOTO
  3432   REF  12  LAST   915    32,3101   03752 1                    SPRTEX
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P3800   INTEGRATION CALLING SUBROUTINE

R3801   DESCRIPTION
R3802     PERFORMS CONIC AND PRECISION INTEGRATIONS USING SUBROUTINE INTEGRVS. THERE ARE THREE ENTRANCES (RTENCK1,
R3804   RTENCK2 AND RTENCK3) FOR DIFFERENT SOURCES OF INPUT AND DIFFERENT OPTIONS. THERE IS A COMMON SET OF OUTPUT
R3806   WHICH INCLUDES SET UP OF INPUT FOR THE PARAM SUBROUTINE

R3807   RTENCK1 (CONIC INTEGRATION)

R3808     CALLING SEQUENCE
R3809       L    CALL
R3810       L+1          RTENCK1

R3811     ERASABLE INITIALIZATION REQUIRED
R3812       SAME AS FOR THE RTENCK3 ENTRANCE

R3813   RTENCK2 (PRECISION INTEGRATION)

R3814     CALLING SEQUENCE
R3815       L    CALL
R3816       L+1          RTENCK2

R3817     ERASABLE INITIALIZATION REQUIRED
R3818       PUSHLIST
R3819         PUSHLOC-2 INTEGRATION TIME DT12 (CORRECTION TO T2)                DP      B28     CS
R3821       OTHER
R3822         R(T2)/    FINAL POSITION VECTOR                                   VECTOR  B29     METERS
R3824         V(T2)/    FINAL VELOCITY VECTOR                                   VECTOR  B7      METERS/CS
R3826         T2        FINAL TIME                                              DP      B28     CS

R3828   RTENCK3 (PRECISION INTEGRATION)

R3829     CALLING SEQUENCE
R3830       L    CALL
R3831       L+1          RTENCK3

R3832     ERASABLE INITIALIZATION REQUIRED
R3834         R(T1)/    INITIAL POSITION VECTOR                                 VECTOR  B29     METERS
R3836         V2(T1)/   POST IMPULSE INITIAL VELOCITY VECTOR                    VECTOR  B7      M/CS
R3838         T1        INITIAL VECTOR TIME                                     DP      B28     CS
R3840         T2        FINAL TIME                                              DP      B28     CS

R3842   EXIT MODE
R3843     AT L+2 OF CALLING SEQUENCE
R3844   SUBROUTINES CALLED
R3845     INTSTALL
R3846     INTEGRVS

R3847   OUTPUT
R3848     PUSHLIST
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R3849         PUSHLOC-6     FINAL POSITION VECTOR R(T2)/                                 VECTOR  B29      METERS
R3851           X1          CONICS MUTABLE ENTRY FOR EARTH (-2)                          SP      B14
R3853        MPAC
R3854                       FINAL VELOCITY VECTOR V(T2)/                                 VECTOR  B7       M/CS
R3856        OTHER
R3857          R(T2)/       AS IN PUSHLIST
R3858          V(T2)/       AS IN MPAC
R3859          T2           FINAL TIME                                                   DP      B28      CS
R3861

  3890   REF   1                 31,2000                        SETLOC RTE3
  3891                           31,3624                        BANK
  3892   REF   1                                                COUNT* $$/P37
  3897                           31,3624   45020 1  RTENCK1     STQ    CALL
  3898   REF   8  LAST  908      31,3625   03547 1                     RTENCKEX
  3899   REF  17  LAST  641      31,3626   27516 0                     INTSTALL
  3900                           31,3627   43175 0              VLOAD  SET
  3901   REF   6  LAST  913      31,3630   03640 0                     R(T1)/
  3902   REF  11  LAST  588      31,3631   01473 0                     INTYPFLG
  3903                           31,3632   77650 1              GOTO
  3904   REF   1                 31,3633   63660 1                     RTENCK3B
 R3905

  3906                           31,3634   45020 1  RTENCK2     STQ    CALL
  3907   REF   9  LAST  922      31,3635   03547 1                     RTENCKEX
  3908   REF  18  LAST  922      31,3636   27516 0                     INTSTALL
  3909                           31,3637   77214 0              CLEAR  VLOAD
  3910   REF  12  LAST  922      31,3640   01673 1                     INTYPFLG
  3911   REF  11  LAST  917      31,3641   03656 1                     R(T2)/
  3912   REF  11  LAST  515      31,3642   25535 0              STOVL  RCV
  3913   REF   9  LAST  917      31,3643   03710 1                     V(T2)/
  3914   REF  10  LAST  514      31,3644   15543 1              STODL  VCV
  3915   REF   5  LAST  910      31,3645   03552 0                     T2
  3916   REF  13  LAST  515      31,3646   01517 0              STORE  TET
  3917                           31,3647   77615 0              DAD
  3918                           31,3650   77650 1              GOTO
  3919   REF   1                 31,3651   63666 1                     RTENCK3D

 R3920
  3921                           31,3652   45020 1  RTENCK3     STQ    CALL
  3922   REF  10  LAST  922      31,3653   03547 1                     RTENCKEX
  3923   REF  19  LAST  922      31,3654   27516 0                     INTSTALL
  3925                           31,3655   43175 0  RTENCK3A VLOAD     CLEAR
  3926   REF   7  LAST  922      31,3656   03640 0                     R(T1)/
  3927   REF  13  LAST  922      31,3657   01673 1                     INTYPFLG
  3928   REF  12  LAST  922      31,3660   25535 0  RTENCK3B STOVL     RCV
  3929   REF   6  LAST  910      31,3661   03700 0                     V2(T1)/
  3930   REF  11  LAST  922      31,3662   15543 1              STODL  VCV
  3931   REF   6  LAST  912      31,3663   03716 1                     T1
  3932   REF  14  LAST  922      31,3664   15517 0              STODL  TET
 3933    REF   6  LAST  922    31,3665   03552 0                        T2
 3934    REF  39  LAST  912    31,3666   00041 1  RTENCK3D STORE   TDEC1
 3935                          31,3667   45014 0           CLEAR   CALL
 3936    REF  13  LAST  515    31,3670   00263 0                   MOONFLAG
 3937    REF   7  LAST  514    31,3671   27211 0                   INTEGRVS
 3938                          31,3672   77775 1           VLOAD
 3939    REF  32  LAST  912    31,3673   00001 0                   RATT
 3950    REF  12  LAST  922    31,3674   03656 1           STORE   R(T2)/
 3951                          31,3675   70125 0           PDDL    LXC,1
 3952    REF   8  LAST  912    31,3676   00015 0                   TAT
 3953    REF   5  LAST  917    31,3677   03550 1                   CONICX1
 3954    REF   7  LAST  923    31,3700   27552 0           STOVL   T2
 3955    REF  25  LAST  912    31,3701   00007 0                   VATT
 3956    REF  10  LAST  922    31,3702   03710 1           STORE   V(T2)/
 3957                          31,3703   77650 1           GOTO
 3958    REF  11  LAST  922    31,3704   03547 1                   RTENCKEX
 3959    REF   3  LAST  920    32,2000                     SETLOC  RTE
 3960                          32,3102                     BANK
 3961    REF   3 LAST  920 TO  922:      4    392*         COUNT*  $$/P37
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P4000    V2(T1) COMPUTATION SUBROUTINE

R4001    DESCRIPTION
R4002    A POST IMPULSE VELOCITY VECTOR (V2(T1)) IS COMPUTED WHICH EITHER
R4003    (1) MEETS THE INPUT VELOCITY CHANGE DESIRED (RTEDVD) IN A MINIMUM TIME  OR
R4005    (2) IF A VELOCITY CHANGE ISN:T SPECIFIED (RTEDVD) = 0), A V2(T1) IS COMPUTED WHICH MINIMIZES THE IMPULSE (DV)
R4007    AND CONSEQUENTLY FUEL.

R4008    CALLING SEQUENCE
R4009      L       CALL
R4010      L+1             V2T100

R4011    NORMAL EXIT MODE
R4012      AT L+2 OF CALLING SEQUENCE WITH MPAC = 0

R4013    ALARM EXIT MODE
R4014      AT L+2 OF CALLING SEQUENCE WITH MPAC = OCTAL 605 FOR EXCESS ITERATIONS

R4015    SUBROUTINES CALLED
R4016      GAMDV10
R4017      XT1LIM
R4018      DVCALC

R4019    ERASABLE INITIALIZATION REQUIRED
R4020      PUSHLIST
R4021        NONE
R4022      MPAC
R4023        NONE
R4024      OTHER
R4025        R(T1)       MAGNITUDE OF INITIAL POSITION VECTOR                        DP       B29/B27 METERS
R4027        RCON        MAGNITUDE OF FINAL POSITION VECTOR                          DP       B29/B27 METERS
R4029        V(T1)/      INITIAL VELOCITY VECTOR                                     VECTOR   B7/B5   METERS/CS
R4031        RTEDVD      DELTA VELOCITY DESIRED                                      DP       B7/B5   METERS/CS
R4033        UR1/        UNIT INITIAL VECTOR                                         VECTOR   B1
R4035        UH/         UNIT HORIZONTAL VECTOR                                      VECTOR   B1
R4037        X(T2)       COTANGENT OF FINAL FLIGHT PATH ANGLE                        DP       B0
R4039        X(T1)       COTANGENT OF INITIAL FLIGHT PATH ANGLE(INPUT FOR PREC)      DP       B5
R4041        CFPA        COSINE OF INITIAL FLIGHT PATH ANGLE                         DP       B1
R4043        MAMAX1      MAJOR AXIS LIMIT FOR LOWER BOUND ON GAMDV ITERATOR          DP       B30/B28 METERS
R4045        MAMAX2      MAJOR AXIS LIMIT FOR UPPER BOUND ON GAMDV ITERATOR          DP       B30/B28 METERS
R4049        PHI2        REENTRY NEAR PERIGEE OR APOGEE INDICATE (RTE ONLY)          DP        B2     -1 PERIGEE,+1 APOGEE
R4051        N1          CONIC OR PRECISION ITERATION COUNTER                        DP       B28     NEGATIVE CONIC,PLUS PREC
R4053
R4054    OUTPUT
R4055        V2(T1)/     POST IMPULSE INITIAL VELOCITY VECTOR                        VECTOR   B7/B5   METERS/CS
R4057        DV          INITIAL VELOCITY CHANGE                                     DP       B7/B5   METERS/CS
R4059        X(T1)       COTANGENT OF INITIAL FLIGHT PATH ANGLE (POST IMPULSE)       DP       B5
R4061        PCON        SEMI-LATUS RECTUM                                           DP       B28/B26 METERS
R4063        BETA1       1+X(T2)**2                                                  DP       B1
R4067
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R4068    DEBRIS
R4069      PUSHLIST
R4070        00D           X(T1),,=PREVIOUS PRECISION X(T1)                          DP       B5
R4074        02D           THETA1=BETA5*LAMBDA-1                                     TP       B17
R4076        05D           THETA2=2*R(T1)*(LAMBDA-1)                                 TP       B38/B36
R4078        08D           THETA3=MU**.5/R(T1)                                       DP       B-4/B-5
R4080        10D           X(T1)MIN=LOWER BOUND ON X(T1) IN GAMDV ITERATOR           DP       B5
R4082        12D           DX(T1)MAX=MAXIMUM DELTA X(T1)                             DP       B5
R4084        14D           X(T1)MAX=UPPER BOUND ON X(T1) IN GAMDV ITERATOR           DP       B5
R4086        16D           DX(T1)=ITERATOR INCREMENT                                 DP       B5
R4088        31D           GAMDV10 SUBROUTINE RETURN ADDRESS
R4089        32D           DVCALC SUBROUTINE RETURN ADDRESS
R4090        33D           V2T100 SUBROUTINE RETURN ADDRESS

 4100                         32,3102   71220 1  V2T100    STQ     DLOAD
 41005                        32,3103   00041 1                    33D
 4101   REF  11  LAST  919    32,3104   03636 1                    RCON
 41013                        32,3105   45240 0            BMN     DSU                ABORT IF RCON NEGATIVE
 41015  REF   1               32,3106   65112 0                    V2TERROR
 4102   REF   6  LAST  913    32,3107   03646 0                    R(T1)
 41023                        32,3110   77640 0            BMN
 41025  REF   1               32,3111   65115 1                    V2T101
 4103                         32,3112   77776 1  V2TERROR EXIT                          OR IF LAMBDA LESS THAN ONE
 41035  REF   4  LAST  443    32,3113   05726 1            TC      P00D00             NO SOLUTION IF LAMBDA LESS THAN 1
 4104                         32,3114   20610 1            OCT     20610

 41045                        32,3115   43001 1  V2T101    SETPD   CLEAR
 4105                         32,3116   00001 0                    0                                             PL00D
 4106   REF   1               32,3117   00272 0                    F2RTE
 4107                         32,3120   60345 0            DLOAD   NORM
 4108   REF  12  LAST  925    32,3121   03636 1                    RCON
 4109   REF  40  LAST  919    32,3122   00047 1                    X1
 4110                         32,3123   60325 0            PDDL    NORM
 4111   REF   7  LAST  925    32,3124   03646 0                    R(T1)
 4112   REF  31  LAST  890    32,3125   00051 0                    S1
 4113                         32,3126   00013 0            STORE   10D
 4114                         32,3127   56342 1            SR1     DDV                R1/RCON = LAMBDA                B1
 4115                         32,3130   65260 0            XSU,1   PDDL                                                PL02D
 4116   REF  32  LAST  925    32,3131   00050 1                    S1
 4117   REF  12  LAST  919    32,3132   03726 1                    X(T2)
 4118                         32,3133   77716 1            DSQ
 4120                         32,3134   43342 0            SR1     DAD
 4121   REF   6  LAST  919    32,3135   15334 1                    1RTEB1
 4122   REF   4  LAST  916    32,3136   03744 0            STORE   BETA1              1+X(T2)**2 = BETA1              B1
 4123                         32,3137   77605 1            DMP
 4124                         32,3140   00001 0                    00D
 41245                        32,3141   00035 1            STORE   28D                BETA1*LAMBDA = BETA5
 41246                        32,3142   53605 1            DMP     SL*
 412461                       32,3143   00001 0                    00D
 412462                       32,3144   20172 1                    0 -7,1
 4125                          32,3145   45257 0          SL*     DSU
 4126                          32,3146   20172 1                  0 -7,1
 4127    REF   2  LAST  600    32,3147   33574 1                  1RTE2B17
 4128                          32,3150   65234 1          RTB     PDDL                BETA5*LAMBDA-1 = THETA1        B17 PL05D
 41282   REF   3  LAST  631    32,3151   45657 1                  TPMODE
 41285   REF   7  LAST  925    32,3152   15334 1                  1RTEB1
 41287                         32,3153   57457 0          SR*     DCOMP
 4129                          32,3154   20601 1                  0,1
 41295                         32,3155   41215 1          DAD     DMP
 4130                          32,3156   00001 0                  00D
 41302   REF   8  LAST  925    32,3157   03646 0                  R(T1)
 41305                         32,3160   47057 0          SL*     RTB
 41307                         32,3161   20172 1                  0 -7D,1
 4131    REF   4  LAST  926    32,3162   45657 1                  TPMODE
 4132                          32,3163   77725 1          PDDL                        2*R(T1)*(LAMBDA-1)=THETA2  B38/B36 PL08D
 4133    REF   1               32,3164   33674 1                  RTMURTE
 4134                          32,3165   70501 1          NORM    SR1
 4135    REF  22  LAST  919    32,3166   00050 1                  X2
 4136                          32,3167   56264 1          XSU,2   DDV
 4137    REF  33  LAST  925    32,3170   00050 1                  S1
 4138                          32,3171   00013 0                  10D
 4139                          32,3172   65257 1          SR*     PDDL                MU**.5/R(T1)=THETA3            B-4/B-5 PL10D
 4140                          32,3173   57170 0                  6,2
 4141    REF   3  LAST  899    32,3174   03652 0                  MAMAX1
 4142                          32,3175   41406 0          PUSH    PUSH                MAMAX1=MA
 4143                          32,3176   77624 1          CALL
 4144    REF   1               32,3177   65741 0                  XT1LIM
 4145                          32,3200   41476 1          DCOMP   PUSH                X(T1)MIN                          B5 PL12D
 4146                          32,3201   40476 0          DCOMP   SR4
 4147                          32,3202   41525 0          PDDL    PUSH                DX(T1)MAX                         B5 PL14D
 4148    REF   3  LAST  899    32,3203   03654 0                  MAMAX2
 4149                          32,3204   45006 0          PUSH    CALL
 4150    REF   2  LAST  926    32,3205   65741 0                  XT1LIM
 4151                          32,3206   50125 1          PDDL    BMN                 X(T1)MAX                          B5 PL16D
 4152    REF   9  LAST  919    32,3207   03730 0                  NN1A
 4153    REF   1               32,3210   65213 1                  V2T102
 4154                          32,3211   77650 1          GOTO
 4155    REF   1               32,3212   65225 1                  V2T110

R4156    PROCEED HERE IF NOT PRECISION COMPUTATION

 4158                          32,3213   77745 1  V2T102  DLOAD
 4159    REF   7  LAST  899    32,3214   03632 0                  RTEDVD
 4160                          32,3215   52054 1          BZE     GOTO
 4161    REF   1               32,3216   65220 1                  V2T105
 4162    REF   1               32,3217   65321 1                  V2T140
 4163                          32,3220   50145 1  V2T105  DLOAD   BMN
 4164    REF   3  LAST  913    32,3221   03747 0                  CFPA
 4165    REF   2  LAST  926    32,3222   65321 1                  V2T140
 4166                          32,3223   77650 1          GOTO
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 4167    REF   1                  32,3224   65327 1                       V2T145

R4168    DURING A PRECISION TRAJECTORY ITERATION CONSTRAIN THE INDEPENDENT
R4169    VARIABLE TO INSURE THAT ALL CONICS PASS THROUGH RCON ON THE SAME PASS
R4170    THROUGH X(T2)

 4171                             32,3225   47145 1  V2T110    DLOAD  RTB
 4172    REF   3  LAST  926       32,3226   33574 1                   1RTE817
 4173    REF   5  LAST  926       32,3227   45657 1                   TPMODE
 4174                             32,3230   65276 1            DCOMP  PDDL                -1                           B17 PL19D
 4175    REF   4  LAST  919       32,3231   15344 0                   2RTE81
 4176                             32,3232   45257 0            SR*    DSU
 41765                            32,3233   20601 1                   0,1
 4177                             32,3234   00001 0                   00D
 41775                            32,3235   53605 1            DMP    SL*
 4178                             32,3236   00035 1                   28D
 41785                            32,3237   20172 1                   0 -7,1
 4179                             32,3240   76257 0            SL*    TAD
 41795                            32,3241   20172 1                   0 -7,1
 4180                             32,3242   65234 1            RTB    PDDL                BETA5(2-LAMBDA)-1=BETA6      B17 PL19D
 4181    REF   6  LAST  927       32,3243   45657 1                   TPMODE
 4182    REF   2  LAST  131       32,3244   03722 0                   X(T1)
 4183                             32,3245   00001 0            STORE  00D                 X(T1),,                      B5
 4184                             32,3246   77751 1            TLOAD                                                      PL16D
 4185                             32,3247   53040 0            BMN    BZE
 4186    REF   1                  32,3250   65255 0                   V2T115
 41865   REF   2  LAST  927       32,3251   65255 0                   V2T115
 4187                             32,3252   52061 1            SL     GOTO
 4188                             32,3253   20210 0                   7
 4189    REF   1                  32,3254   65266 0                   V2T120
 4190                             32,3255   50145 1  V2T115    DLOAD  BMN
 4191    REF   4  LAST  916       32,3256   03751 1                   PHI2
 4192    REF   1                  32,3257   65277 0                   V2T125
 4193                             32,3260   77676 0            DCOMP
 4194    REF   5  LAST  927       32,3261   17751 1            STODL  PHI2
 4195    REF   3  LAST  918       32,3262   33606 1                   1ORTE
 4196    REF  10  LAST  926       32,3263   03730 0            STORE  NN1A
 4197                             32,3264   77650 1            GOTO
 4198    REF   2  LAST  927       32,3265   65277 0                   V2T125
 4199                             32,3266   47166 0  V2T120    SQRT   RTB
 4200    REF   1                  32,3267   45765 1                   DPMODE
 42005                            32,3270   50125 1            PDDL   BMN                 BETA6**.5=X(T1)LIM           B5 PL18D
 4201    REF   6  LAST  927       32,3271   03751 1                   PHI2
 4202    REF   1                  32,3272   65305 1                   V2T130
 4203                             32,3273   45545 1            DLOAD  STADR                                            PL16D
 4204                             32,3274   77760 0            STORE  14D                 X(T1)LIM = X(T1)MAX
 4205                             32,3275   77676 0            DCOMP
 4206                             32,3276   00013 0            STORE  10D                 -X(T1)LIM = X(T1)MIN
 4207                             32,3277   53145 1  V2T125    DLOAD  BZE
 4208    REF   3  LAST  927       32,3300   03722 0                   X(T1)
 4209   REF   3  LAST  926   32,3301   65321 1                    V2T140
 4210                        32,3302   52040 1            BMN     GOTO
 4211   REF   4  LAST  928   32,3303   65321 1                    V2T140
 4212   REF   2  LAST  927   32,3304   65327 1                    V2T145
 4213                        32,3305   53145 1  V2T130    DLOAD   BZE
 4214   REF   4  LAST  927   32,3306   03722 0                    X(T1)
 4215   REF   1              32,3307   65316 0                    V2T135
 4216                        32,3310   71240 1            BMN     DLOAD                                      PL16D
 4217   REF   2  LAST  928   32,3311   65316 0                    V2T135
 4218                        32,3312   77626 0            STADR
 4219                        32,3313   77764 1            STORE   10D          X(T1)LIM = X(T1)MIN
 4220                        32,3314   77650 1            GOTO
 4221   REF   3  LAST  928   32,3315   65327 1                    V2T145
 4222                        32,3316   57545 1  V2T135    DLOAD   DCOMP                                      PL16D
 4223                        32,3317   77626 0            STADR
 4224                        32,3320   77760 0            STORE   14D          -X(T1)LIM = X(T1)MAX
 4225                        32,3321   77745 1  V2T140    DLOAD
 4226                        32,3322   00013 0                    10D
 4227   REF   5  LAST  928   32,3323   17722 0            STODL   X(T1)        X(T1)MIN = X(T1)
 4228                        32,3324   00015 0                    12D
 4229                        32,3325   52006 0            PUSH    GOTO         DX(T1)MAX = DX(T1)            PL18D
 4230   REF   1              32,3326   65334 0                    V2T150
 4231                        32,3327   77745 1  V2T145    DLOAD
 4232                        32,3330   00017 1                    14D
 4233   REF   6  LAST  928   32,3331   17722 0            STODL   X(T1)        X(T1)MAX = X(T1)
 4234                        32,3332   00015 0                    12D
 4235                        32,3333   41476 1            DCOMP   PUSH         -DX(T1)MAX = DX(T1)           PL18D
 4236                        32,3334   77624 1  V2T150    CALL                 GOTO X(T1)-DV ITERATOR
 4237   REF   1              32,3335   65464 1                    GAMDV10
 4238                        32,3336   53145 1            DLOAD   BZE          EXIT IF MINIMUM FUEL MODE
 4239   REF   8  LAST  926   32,3337   03632 0                    RTEDVD
 4240   REF   1              32,3340   65462 1                    V2T1X

R4241   CONTINUE IF TIME CRITICAL MODE

 4242                        32,3341   50025 0            DSU     BMN
 4243   REF   3  LAST  903   32,3342   03706 0                    DV
 4244   REF   1              32,3343   65346 0                    V2T155
 4245                        32,3344   77650 1            GOTO
 4246   REF   1              32,3345   65401 1                    V2T175
 4247                        32,3346   50145 1  V2T155    DLOAD   BMN
 4248   REF  11  LAST  927   32,3347   03730 0                    NN1A
 4249   REF   1              32,3350   65353 1                    V2T160
 4250                        32,3351   77650 1            GOTO
 4251   REF   1              32,3352   65423 1                    V2T185

R4252   CONIC TRAJECTORY COMPUTATION

 4253                        32,3353   53145 1  V2T160    DLOAD   BZE
 4254   REF   7  LAST  928   32,3354   03722 0                    X(T1)
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 4255    REF   1                  32,3355   65361 0                     V2T165
 4256                             32,3356   52040 1              BMN    GOTO
 4257    REF   2  LAST   929      32,3357   65361 0                     V2T165
 4258    REF   1                  32,3360   65460 0                     V2T300
 4259                             32,3361   53145 1   V2T165     DLOAD  BZE
 4260    REF   4  LAST   926      32,3362   03747 0                     CFPA
 4261    REF   2  LAST   929      32,3363   65460 0                     V2T300
 4262                             32,3364   71240 1              BMN    DLOAD
 4263    REF   3  LAST   929      32,3365   65460 0                     V2T300
 4264                             32,3366   00017 1                     14D
 4265    REF   8  LAST   928      32,3367   17722 0              STODL  X(T1)              X(T1)MAX=X(T1)
 4266                             32,3370   00015 0                     12D
 4267                             32,3371   77676 0              DCOMP
 4268                             32,3372   34021 0              STCALL 16D                -DX(T1)MAX=DX(T1)
 4269    REF   2  LAST   928      32,3373   65464 1                     GAMDV10
 4270                             32,3374   45345 1              DLOAD  DSU
 4271    REF   9  LAST   928      32,3375   03632 0                     RTEDVD
 4272    REF   4  LAST   928      32,3376   03706 0                     DV
 4273                             32,3377   77640 0              BMN
 4274    REF   4  LAST   929      32,3400   65460 0                     V2T300
 4279                             32,3401   71214 0   V2T175     SET    DLOAD
 4280    REF   2  LAST   925      32,3402   00072 1                     F2RTE
 4281    REF   9  LAST   929      32,3403   03722 0                     X(T1)
 42811                            32,3404   77614 1              BOFF
 42812   REF   3  LAST   899      32,3405   02742 1                     SLOWFLG
 42813   REF   1                  32,3406   65413 1                     V2T177
 42814                            32,3407   14013 0              STODL  10D                  X(T1)MIN
 42815                            32,3410   00015 0                     12D                 DX(T1)MAX
 42816                            32,3411   77650 1              GOTO
 42817   REF   1                  32,3412   65416 1                     V2T179
 4282                             32,3413   14017 1   V2T177     STODL  14D
 4283                             32,3414   00015 0                     12D
 4284                             32,3415   77676 0              DCOMP
 4285                             32,3416   34021 0   V2T179     STCALL 16D                   DX(T1)
 4286    REF   3  LAST   929      32,3417   65464 1                     GAMDV10
 4287                             32,3420   50145 1              DLOAD  BMN
 42875   REF  12  LAST   928      32,3421   03730 0                     NN1A
 4288    REF   5  LAST   929      32,3422   65460 0                     V2T300

R42885  PREVENT A LARGE CHANGE IN INDEPENDENT VARIABLE DURING AN ITERATION FOR A
R428851 PRECISION TRAJECTORY

 4289                             32,3423   45345 1   V2T185     DLOAD  DSU
 4290    REF  10  LAST   929      32,3424   03722 0                     X(T1)
 4291                             32,3425   00001 0                     00D
 4292                             32,3426   65246 1              ABS    PDDL               /X(T1)-X(T1),,/ = BETA7
 4293                             32,3427   00015 0                     12D
 4294                             32,3430   44352 0              SL1    BDSU
 4295                             32,3431   71240 1              BMN    DLOAD
 4296    REF   6  LAST   929      32,3432   65460 0                     V2T300
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  4297                           32,3433  00001 0                        00D          CONTINUE IF BETA7 LARGER THAN 2DX(T1)MAX
  4298   REF  11  LAST  929      32,3434  03722 0              STORE     X(T1)        X(T1),, = X(T1)
  4299                           32,3435  50025 0              DSU       BMN
  4300                           32,3436  00017 1                        14D
  4301   REF   1                 32,3437  65445 1                        V2T195
  4302                           32,3440  77745 1              DLOAD
  4303                           32,3441  00017 1                        14D
  4304   REF  12  LAST  930      32,3442  03722 0              STORE     X(T1)        X(T1)MAX = X(T1)
  4305                           32,3443  77650 1              GOTO
  4306   REF   1                 32,3444  65456 0                        V2T205
  4307                           32,3445  45345 1   V2T195     DLOAD     DSU
  4308   REF  13  LAST  930      32,3446  03722 0                        X(T1)
  4309                           32,3447  00013 0                        10D
  4310                           32,3450  52040 1              BMN       GOTO
  4311   REF   1                 32,3451  65453 0                        V2T200
  4312   REF   2  LAST  930      32,3452  65456 0                        V2T205
  4313                           32,3453  77745 1   V2T200     DLOAD
  4314                           32,3454  00013 0                        10D
  4315   REF  14  LAST  930      32,3455  03722 0              STORE     X(T1)        X(T1)MIN = X(T1)
  4316                           32,3456  77624 1   V2T205     CALL
  4317   REF   1                 32,3457  65665 1                        DVCALC
  4318                           32,3460  77745 1   V2T300     DLOAD
  4319   REF   4  LAST  920      32,3461  15330 0                        ZERORTE
  4320                           32,3462  77650 1   V2T1X      GOTO
  4321                           32,3463  00041 1                        33D
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P4400   X(T1)-DV ITERATOR SUBROUTINE

R4401   DESCRIPTION
R4402       COMPUTES A POST IMPULSE VELOCITY VECTOR (V2(T1)) WHICH REQUIRES A MINIMUM DV.
R4404   CALLING SEQUENCE
R4405     L      CALL
R4406     L+1           GAMDV10

R4407   NORMAL EXIT MODE
R4410     AT L+2 OF CALLING SEQUENCE

R4411   ALARM EXIT MODE
R4412     AT V2T1X WITH MPAC = OCTAL 605 FOR EXCESS ITERATIONS

R4413   SUBROUTINES CALLED
R4414     DVCALC

R4415   ERASABLE INITIALIZATION REQUIRED
R4416     PUSHLIST
R4417       02D         THETA1=BETA5*LAMBDA-1                                    TP      B17
R4419       05D         THETA2=2*R(T1)*(LAMBDA-1)                                TP      B38/B36
R4421       08D         THETA3=MU**.5/R(T1)                                      DP      B-4/B-5
R4423       10D         X(T1)MIN=LOWER BOUND ON INDEPENDENT VARIABLE X(T1)       DP      B5
R4425       12D         DX(T1)MAX=MAXIMUM DX(T1)                                 DP      B5
R4427       14D         X(T1)MAX=UPPER BOUND ON INDEPENDENT VARIABLE X(T1)       DP      B5
R4429       16D         DX(T1)=ITERATOR INCREMENT                                DP      B5
R4431     MPAC
R4432       NONE
R4433     OTHER
R4434       V(T1)/      INITIAL VELOCITY VECTOR                                  VECTOR  B7/B5   METERS/CS
R4436       RTEDVD      DELTA VELOCITY DESIRED                                   DP      B7/B5   METERS/CS
R4438       UR1/        UNIT INITIAL VECTOR                                      VECTOR  B1
R4440       UH/         UNIT HORIZONTAL VECTOR                                   VECTOR  B1
R4442       X(T1)       COTANGENT OF INITIAL FLIGHT PATH ANGLE (FROM VERTICAL)   DP      B5
R4444       F2RTE       TIME CRITICAL OR MINIMUM FUEL MODE INDICATOR             STATE AREA      0 MIN. FUEL, 1 MIN. TIME
R4446
R4447   OUTPUT
R4448       V2(T1)/     POST IMPULSE INITIAL VELOCITY VECTOR                     VECTOR  B7/B5   METERS/CS
R4450       DV          INITIAL VELOCITY CHANGE                                  DP      B7/B5   METERS/CS
R4452       X(T1)       COTANGENT OF INITIAL FPA MEASURED FROM VERTICAL          DP      B5
R4454       PCON        SEMI-LATUS RECTUM                                        DP      B28/B26 METERS
R4456
R4457   DEBRIS
R4458     PUSHLIST
R4459       00D         X(T1),,
R4462       02D         THETA1
R4463       05D         THETA2
R4464       08D         THETA3
R4465       10D         X(T1)MIN
R4466       12D         DX(T1)MAX
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R4467        140            X(T1)MAX
R4468        160            DX(T1)
R4473        220            DV,=PREVIOUS DV                                                    DP        B7/B5
R4475        240            BETA9=X(T1)+1.1DX(T1)                                              DP        B5
R4477        310            GAMDV10 SUBROUTINE RETURN ADDRESS
R4478        320            DVCALC SUBROUTINE RETURN ADDRESS
R4479        330            V2T100 SUBROUTINE RETURN ADDRESS
 4490                             32,3464   77620 0  GAMDV10  STQ
 4491                             32,3465   00037 0                    310
 4500                             32,3466   45001 1           SETPD    CALL
 4501                             32,3467   00023 0                    180                                                   PL18D
 4502    REF   2  LAST  930       32,3470   65665 1                    DVCALC
 4503                             32,3471   45345 1           DLOAD    DSU
 4504                             32,3472   00017 1                    140
 4505                             32,3473   00013 0                    100
 4506                             32,3474   77600 1           BOV
 4507    REF   1                  32,3475   65515 0                    GAMDV20
 4508                             32,3476   45206 1           PUSH     DSU             X(T1)MAX-X(T1)MIN=BETA8         B5 PL200
 4509    REF   1                  32,3477   33576 0                    EPC9RTE
 4510                             32,3500   71240 1           BMN      DLOAD
 4511    REF   1                  32,3501   65663 1                    GAMDVX          BOUNDS CLOSE TOGETHER
 4512                             32,3502   00023 0                    180
 4513                             32,3503   50025 0           DSU      BMN             BETA8-DX(T1)MAX
 4514                             32,3504   00015 0                    120
 4515    REF   1                  32,3505   65511 1                    GAMDV15
 4516                             32,3506   52001 1           SETPD    GOTO                                            PL18D
 4517                             32,3507   00023 0                    18D
 45175   REF   2  LAST  932       32,3510   65515 0                    GAMDV20
 4516                             32,3511   77745 1  GAMDV15  DLOAD                                                    PL18D
 4519                             32,3512   70565 0           SIGN     SR1
 4520                             32,3513   00021 1                    160
 4521                             32,3514   00021 1           STORE    160             BETA8(SIGNDX(T1))/2=DX(T1)
 4522                             32,3515   77745 1  GAMDV20  DLOAD
 4523    REF   1                  32,3516   33602 0                    MI44RTE
 4524    REF   6  LAST  917       32,3517   03546 0           STORE    NN2
 4525                             32,3520   43345 1  GAMDV25  DLOAD    DAD
 4526    REF   7  LAST  932       32,3521   03546 0                    NN2
 4527    REF   4  LAST  919       32,3522   33600 1                    1RTEB28
 4528                             32,3523   67240 0           BMN      SLOAD
 4529    REF   1                  32,3524   65530 1                    GAMDV30
 4530    REF   3  LAST  916       32,3525   33630 1                    OCT605
 4531                             32,3526   77650 1           GOTO
 4532    REF   2  LAST  928       32,3527   65462 1                    V2T1X
 4533    REF   8  LAST  932       32,3530   03546 0  GAMDV30  STORE    NN2             NN2=NN2+1
 4534                             32,3531   65345 0           DLOAD    PDDL            X(T1)=X(T1),                    B5 PL200
 4535    REF  15  LAST  930       32,3532   03722 0                    X(T1)
 4536    REF   5  LAST  929       32,3533   03706 0                    DV
 4537                             32,3534   43325 1           PDDL     DAD             DV=DV,                       B7/B5 PL220
 4538    REF  16  LAST  932       32,3535   03722 0                    X(T1)
 4539                             32,3536   00021 1                    160
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  4540     REF  17  LAST  932    32,3537    37722 1             STCALL  X(T1)           X(T1)+DX(T1)=X(T1)                 B5
  4541     REF   3  LAST  932    32,3540    65665 1                     DVCALC
  4542                           32,3541    71214 0             BON     DLOAD
  4543     REF   3  LAST  929    32,3542    00312 1                     F2RTE
  4544     REF   1               32,3543    65557 0                     GAMDV35
  4545     REF   6  LAST  932    32,3544    03706 0                     DV
  4546                           32,3545    50025 0             DSU     BMN             CONTINUE IF FUEL CRITICAL MODE
  4547                           32,3546    00025 0                     20D
  4548     REF   1               32,3547    65554 0                     GAMDV33
  4549                           32,3550    57545 1   GAMDV32   DLOAD   DCOMP
  4550                           32,3551    00021 1                     16D
  4551                           32,3552    77742 0             SR1
  4552                           32,3553    00021 1             STORE   16D
  4553                           32,3554    52001 1   GAMDV33   SETPD   GOTO
  4554                           32,3555    00023 0                     18D                                                 PL18D
  4555     REF   1               32,3556    65622 1                     GAMDV50

R4556      TIME CRITICAL MODE

  4557                           32,3557    45345 1   GAMDV35   DLOAD   DSU
  4558     REF  10  LAST  929    32,3560    03632 0                     RTEDVD
  4559     REF   7  LAST  933    32,3561    03706 0                     DV
  4560                           32,3562    41525 0             PDDL    PUSH            DVD-DV=DVERR                 B7/B5 PL22D
  4561                           32,3563    51545 1   GAMDV40   DLOAD   ABS             DV,                                PL24D
  4562                           32,3564    00025 0                     20D
  4563                           32,3565    50025 0             DSU     BMN
  4564     REF   1               32,3566    33660 1                     EPCL0RTE
  4565     REF   2  LAST  932    32,3567    65663 1                     GAMDVX
  4566                           32,3570    71204 1   GAMDV45   BOVB    DLOAD
  45661    REF   8  LAST  880    32,3571    57544 0                     TCDANZIG         ASSURE DVFIND IS 0
  4567                           32,3572    60221 0             BDSU    NORM
  4568     REF   8  LAST  933    32,3573    03706 0                     DV
  4569     REF  23  LAST  926    32,3574    00050 1                     X2
  4570                           32,3575    77725 1             PDDL                    DV-DV,                    B7/B5-N2 PL22D
  4571                           32,3576    70501 1             NORM    SR1             DVERR                    B8/B6-N1
  4572     REF  41  LAST  925    32,3577    00047 1                     X1
  4573                           32,3600    65271 0             DDV     PDDL             DVERR/ DV - DV
  4576                           32,3601    41221 0             BDSU    DMP                                                PL18D
  4577     REF  18  LAST  933    32,3602    03722 0                     X(T1)
  4578                           32,3603    77660 1             XSU,1
  4579     REF  24  LAST  933    32,3604    00047 1                     X2
  45791                          32,3605    00021 1             STORE   16D              PRESERVE SIGN IF OVERFLOW
  45792                          32,3606    40057 1             SR*     BOV
  4580                           32,3607    20600 0                     0 -1,1
  45801    REF   1               32,3610    65616 0                     GAMDV47
  4581                           32,3611    00021 1             STORE   16D             (X(T1)-X(T1),)DVERR/(DV-DV,)=DX(T1)
  4582                           32,3612    45246 0             ABS     DSU
  4583                           32,3613    00015 0                     12D
  4584                           32,3614    77640 0             BMN
  4585     REF   2  LAST  933    32,3615    65622 1                     GAMDV50
  4586                        32,3616   75345 1  GAMDV47   DLOAD  SIGN
  4587                        32,3617   00015 0                   12D
  4588                        32,3620   00021 1                   16D
  4589                        32,3621   00021 1            STORE  16D              DX(T1)MAX(SIGNDX(T1))=DX(T1)

R4590   CHECK TO KEEP INDEPENDENT VARIABLE IN BOUNDS

  4591                        32,3622   41345 0  GAMDV50   DLOAD  DMP
  4592                        32,3623   00021 1                   16D
  4593  REF  1                32,3624   33612 1                   1.1RTEB1
  4594                        32,3625   43352 1            SL1    DAD
  4595  REF 19  LAST  933     32,3626   03722 0                   X(T1)
  4596                        32,3627   00031 0            STORE  24D              X(T1)+1.1DX(T1)=BETA9             B5
  4597                        32,3630   50025 0            DSU    BMN
  4598                        32,3631   00017 1                   14D
  4599  REF  1                32,3632   65641 1                   GAMDV55
  4600                        32,3633   45345 1            DLOAD  DSU
  4601                        32,3634   00017 1                   14D
  4602  REF 20  LAST  934     32,3635   03722 0                   X(T1)
  4603                        32,3636   77742 0            SR1
  4604                        32,3637   34021 0            STCALL 16D              (X(T1)MAX-X(T1))/2=DX(T1)         B5
  4605  REF  1                32,3640   65654 0                   GAMDV65
  4606                        32,3641   45345 1  GAMDV55   DLOAD  DSU
  4607                        32,3642   00031 0                   24D
  4608                        32,3643   00013 0                   10D
  4609                        32,3644   52040 1            BMN    GOTO
  4610  REF  1                32,3645   65647 1                   GAMDV60
  4611  REF  2  LAST  934     32,3646   65654 0                   GAMDV65
  4612                        32,3647   45345 1  GAMDV60   DLOAD  DSU
  4613                        32,3650   00013 0                   10D
  4614  REF 21  LAST  934     32,3651   03722 0                   X(T1)
  4615                        32,3652   77742 0            SR1
  4616                        32,3653   00021 1            STORE  16D              (X(T1)MIN-X(T1))/2=DX(T1)         B5
  4617                        32,3654   51545 1  GAMDV65   DLOAD  ABS
  4618                        32,3655   00021 1                   16D
  4619                        32,3656   50025 0            DSU    BMN
  4620  REF  2  LAST  932     32,3657   33576 0                   EPC9RTE
  4621  REF  3  LAST  933     32,3660   65663 1                   GAMDVX
  4622                        32,3661   77650 1            GOTO
  4623  REF  1                32,3662   65520 0                   GAMDV25
  4624                        32,3663   77650 1  GAMDVX    GOTO
  4625                        32,3664   00037 0                   31D
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L          F37,P70                                                                           USER'S PAGE NO. 39       E7 S3

P4700    DV CALCULATION SUBROUTINE

R4701    INPUT
R4702      PUSHLIST
R4703        02D           THETA1=BETA5*LAMBDA-1                                    TP       B17
R4705        05D           THETA2=2*R(T1)*(LAMBDA-1)                                TP       B38/B36
R4707        08D           THETA3=MU**.5/R(T1)                                      DP       B-4/B-5
R4709      OTHER
R4710        X(T1)         COTANGENT OF POST IMPULSE INITIAL FLIGHT PATH ANGLE      DP       B5
R4712        V(T1)/        INITIAL VELOCITY VECTOR (PRE IMPULSE)                    VECTOR   B7/B5    METERS/CS
R4714        UR1/          UNIT INITIAL VECTOR                                      VECTOR   B1
R4716        UH/           UNIT HORIZONTAL VECTOR                                   VECTOR   B1
R4718
R4719    OUTPUT
R4720        V2(T1)/       POST IMPULSE INITIAL VELOCITY VECTOR                     VECTOR   B7/B5    METERS/CS
R4722        DV            INITIAL VELOCITY CHANGE                                  DP       B7/B5    METERS/CS
R4724        PCON          SEMI-LATUS RECTUM                                        DP       B28/B26 METERS
R4726
R4727    DEBRIS
R4728        28D           THETA3*PCON**.5                                          DP       B10/B8-N1
R4730        C(PUSLOC)     THETA3(PCON**.5)*X(T1)*UR1/                              VECTOR   B7/B5
R4732        32D           DVCALC SUBROUTINE RETURN ADDRESS
R4733        X1            NORMALIZATION FACTOR FOR VALUE IN 28D

R4734    PUSHLOC IS RESTORED TO ITS ENTRANCE VALUE UPON EXITING DVCALC

 4750                          32,3665   71220 1  DVCALC    STQ       DLOAD
 4751                          32,3666   00040 0                      32D
 4752    REF  22  LAST  934    32,3667   03722 0                      X(T1)
 4753                          32,3670   54316 1            DSQ       SR
 4754                          32,3671   20610 1                      7
 4755                          32,3672   76276 0            DCOMP     TAD
 4756                          32,3673   00003 1                      02D
 4757                          32,3674   41501 0            NORM      PUSH
 4758    REF  42  LAST  933    32,3675   00047 1                      X1
 4759                          32,3676   60351 0            TLOAD     NORM
 4760                          32,3677   00006 1                      05D
 4761    REF  25  LAST  933    32,3700   00050 1                      X2
 4762                          32,3701   70434 0            RTB       SR1
 47625    REF   2  LAST  927    32,3702   45765 1                      DPMODE
 476251                        32,3703   56264 1            XSU,2     DDV
 4763    REF  43  LAST  935    32,3704   00046 0                      X1
 47635                         32,3705   77657 0            SR*
 476351                        32,3706   57170 0                      0,2
 4764    REF   3  LAST  902    32,3707   03720 1            STORE     PCON                  THETA2/(THETA1-X(T1)**2)=PCON B26/26
 4765                          32,3710   41366 1            SQRT      DMP
 4766                          32,3711   00011 1                      08D
 4767                          32,3712   77701 1            NORM
 4768    REF  44  LAST  935    32,3713   00047 1                      X1
 4769                          32,3714   14035 1            STODL     28D                   THETA3*PCON**.5           B10/B8 -N1
 4770   REF  23  LAST  935   32,3715   03722 0               X(T1)
 4771                        32,3716   74301 0      NORM     VXSC
 4772   REF  26  LAST  935   32,3717   00050 1               X2
 4773   REF   8  LAST  913   32,3720   03554 0               UR1/           X(T1)*UR1/              B5+B1 -N2
 4774                        32,3721   74274 0      XAD,2    VXSC
 4775   REF  45  LAST  935   32,3722   00046 0               X1
 4776                        32,3723   00035 1               28D
 4777                        32,3724   63257 1      VSR*     POVL           THETA3(PCON**.5)X(T1)*UR1/ B7/B5
 4778                        32,3725   57207 0               0 -9D,2                  +
 4779   REF   5  LAST  913   32,3726   03562 0               UH/
 4780                        32,3727   53761 1      VXSC     VSR*           THETA3(PCON**.5)UH/        B7/B5
 4781                        32,3730   00035 1               28D
 4782                        32,3731   20575 1               0 -4,1                   =
 4783                        32,3732   45455 1      VAD      STADR
 4784   REF   7  LAST  922   32,3733   74077 1      STORE    V2(T1)/        V2(T1)/                    B7/B5
 4785                        32,3734   51451 0      VSU      ABVAL
 4786   REF   6  LAST  913   32,3735   03672 1               V(T1)/
 4787   REF   9  LAST  933   32,3736   03706 0      STORE    DV             ABVAL(V2(T1)/-V1(T)/)=DV   B7/B5
 4788                        32,3737   77650 1      GOTO
 4789                        32,3740   00040 0               32D
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P4800   SUBROUTINE TO COMPUTE BOUNDS ON INDEPENDENT VARIABLE X(T1)

R4801   INPUT
R4802     PUSHLIST
R4803       PUSHLOC -4  MAJOR AXIS (MA)                                         DP     B30/B28
R4805       PUSHLOC -2  MAJOR AXIS (MA) AGAIN                                   DP     B30/B28
R4807       28D         BETA5=LAMBDA*BETA1                                      DP     B9
R4809     OTHER
R4810       RCON                                                                DP     B29/B27
R4812       R(T1)                                                               DP     B29/B27
R4814   OUTPUT
R4815     MPAC
R4816       X(T1)LIM    LIMIT ON INDEPENDENT VARIABLE X(T1)                     DP     B5
R4818   DEBRIS
R4819     PUSHLIST
R4820       C(PUSHLOC)  MA-RCON                                                 DP     (B30/28)-N1
R4823       C(PSHLOC)+2 MA                                                      DP     B30/B28
R4825       X1          NORMALIZATION FACTOR FOR MA-RCON
R4826       200         XTILIM SUBROUTINE RETURN ADDRESS
R4827   PUSHLOC IS RESTORED TO ITS ENTRANCE VALUE UPON EXITING XTILIM

  4850                        32,3741   71220 1  XTILIM   STQ      CLOAD
  4851                        32,3742   00024 1                    20D
  4852   REF  13  LAST  925   32,3743   03636 1                    RCON
  4853                        32,3744   44342 1           SR1      BDSU
  4854                        32,3745   65301 0           NORM     PDDL            MA-RCON                     B30-N1
  4855   REF  27  LAST  936   32,3746   00050 1                    X2
  4856                        32,3747   70525 1           PDDL     SR1
  4857   REF   9  LAST  926   32,3750   03646 0                    R(T1)
  4858                        32,3751   56221 0           BDSU     DDV
  4859                        32,3752   41257 1           SL*      DMP
  4860                        32,3753   57601 1                    0-3,2                                       B3
  48605                       32,3754   00035 1                    28D
  4861                        32,3755   45257 0           SL*      DSU             BETA10=BETA5(MA-RT)/(MA-RC)-1   B11
  48615                       32,3756   20173 0                    0-6,1
  4862   REF   1              32,3757   33577 1                    IRTEB25 +1      1.0 B-11
  48625                       32,3760   40152 0           SL1      BDV                                         B10
  4863   REF   1              32,3761   65765 0                    XTILIM2
  48635                       32,3762   52040 1           BMN      GOTO
  4864   REF   1              32,3763   65771 0                    XTILIM5
  48645  REF   1              32,3764   65767 1                    XTILIM3
  4865                        32,3765   77745 1  XTILIM2  DLOAD                    BETA10=POSMAX IF OVERFLOW
  48655  REF   5  LAST  927   32,3766   15344 0                    2RTEB1
  4866                        32,3767   52166 1  XTILIM3  SQRT     GOTO            X(T1)=SQRT(BETA10)          B5
  48665  REF   1              32,3770   65773 1                    XTILIMX
  4867                        32,3771   77745 1  XTILIM5  DLOAD
  4868   REF   5  LAST  930   32,3772   15330 0                    ZERORTE
  4869                        32,3773   77650 1  XTILIMX  GOTO
  4870                        32,3774   00024 1                    200
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L         P37,P70                                                                          USER'S PAGE NO.  42     E7 S3

P4900     CONSTANTS FOR THE P37 AND P70 PROGRAMS AND SUBROUTINES

  49006  REF    1                35,2000                           SETLOC  RTECON1
  49007                          35,3571                           BANK

  49008  REF    1                                                  COUNT*  $$/P37
  4901   REF    4  LAST   35     26,3333             1RTEB1        =       UNITX
  4902   REF    8  LAST  688     26,3325             1RTEB2        =       DP1/4TH
  4903   REF    1                34,3766             1RTEB3        =       DP2(-3)          1 B-3
  4904   REF    5  LAST  887     34,3770             1RTEB4        =       DP2(-4)          1 B-4
  4913                           35,3571    00002 0  1RTEB13       2DEC    1.B-13
  4913                           35,3572    00000 1
  4917                           35,3573    00000 1  1RTEB17       2DEC    1.B-17
  4917                           35,3574    04000 0
  4925                           35,3575    00000 1  1RTEB25       2DEC    1.B-25
  4925                           35,3576    00010 0
 A4926                                                                                      * * B25 AND B28 MUST BE CONSECUTIVE * *
  4928                           35,3577    00000 1  1RTEB28       2DEC    1.B-28
  4928                           35,3600    00001 0
  4929   REF    4  LAST  783     26,3327             ZERORTE       =       UNITZ
  4930                           35,3601    77777 0  M144RTE       2DEC    -144.B-28
  4930                           35,3602    77557 0
  49301                          35,3603    77777 0  M15RTE        2DEC    -15
  49301                          35,3604    77760 0
  49302                          35,3605    00000 1  10RTE         2DEC    10
  49302                          35,3606    00012 1
  49303                          35,3607    54631 1  M.6RTE        2DEC    -.6
  49303                          35,3610    63145 1
  4931                           35,3611    21463 0  1.1RTEB1      2DEC    1.1B-1
  4931                           35,3612    06315 0
  49312  REF   10  LAST  641     26,3343             2RTEB1        =       DPPOSMAX
  4932                           35,3613    77777 0  M9RTEB28      2DEC    -9
  4932                           35,3614    77766 0
  4933                           35,3615    77777 0  M8RTEB28      2DEC    -8
  4933                           35,3616    77767 1
  4934                           35,3617    00000 1  30480RTE      2DEC    30480.B-29
  4934                           35,3620    35610 0
  4935                           35,3621    37405 1  VCSPS         2DEC    31.510396 B-5    (SEE 2VEXHUST)
  4935                           35,3622    12250 0
  4936                           35,3623    33041 1  VCRCS         2DEC    27.0664B-5
  4936                           35,3624    37714 1
  4937                           35,3625    00003 1  MDOTRCS       2DEC    .0016375B-3
  4937                           35,3626    13241 1
  4938   REF    5  LAST  938     26,3333             CSUBT         =       UNITX
  4940                           35,3627    00605 1  OCT605        OCT     00605
  4941                           35,3630    00612 1  OCT612        OCT     00612
  4943                           35,3631    40214 1  MCOS7.5       2DEC    -.99144486
  4943                           35,3632    45266 1
  4944                           35,3633    73645 1  MSIN7.5       2DEC    -.13052619
  4944                           35,3634    56536 1
  4945                         35,3635   70467 0  MCOS22.5 2DEC    -.92387953B-2
  4945                         35,3636   71205 0
  4946                         35,3637   16525 1  THETA165 2DEC    .458333333
  4946                         35,3640   12525 0
  4947                         35,3641   22525 0  THETA210 2DEC    .583333333
  4947                         35,3642   12525 0
  4951                         35,3643   17775 1  EPC1RTE  2DEC    .99966B-1
  4951                         35,3644   06676 0
  4952                         35,3645   00000 1  EPC2RTE  2DEC    100.B-29
  4952                         35,3646   00062 0
  4953                         35,3647   00020 0  EPC3RTE  2DEC    .001
  4953                         35,3650   14223 1
  4954                         35,3651   00000 1  EPC4RTE  2DEC    .00001
  4954                         35,3652   05174 0
  4956                         35,3653   00000 1  EPC6RTE  2DEC    .000007B-1
  4956                         35,3654   01654 1
  4957                         35,3655   00000 1  EPC7RTE  2DEC    1000.B-29
  4957                         35,3656   00764 1
  4959   REF   2  LAST  937    35,3575            EPC9RTE  =       1RTEB25
  4960                         35,3657   00000 1  EPC10RTE 2DEC    .0001B-7
  4960                         35,3660   00322 1
  4961                         35,3661                     BANK    35
  4962   REF   2  LAST  938    35,2000                     SETLOC  RTECON1
  4963                         35,3661                     BANK
  49635  REF   2 LAST  938 TO  939:     56    56*          COUNT*  $$/P37
  4964                         35,3661   75725 0  C4RTE    2DEC    -6.986643 E7B-30
  4964                         35,3662   75417 1
  4971                         35,3663   00325 0  K1RTE    2DEC    7.E6B-29
  4971                         35,3664   23740 0
  4972                         35,3665   00306 1  K2RTE    2DEC    6495000.B-29
  4972                         35,3666   06614 1
  4973                         35,3667   76027 0  K3RTE    2DEC    -.06105
  4973                         35,3670   70156 1
  4974                         35,3671   74517 1  K4RTE    2DEC    -.10453
  4974                         35,3672   54131 0
  4980                         35,3673   30276 1  RTMURTE  2DEC    199650.501B-18
  4980                         35,3674   05001 0
  4995                         35,3675   00003 1  E3RTE    2DEC    121920.B-29
  4995                         35,3676   27040 0
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L          S-BAND ANTENNA FOR CM                                                             USER'S PAGE NO.   1       EO 53

  2001    REF   1                  42,2000                            SETLOC SBAND
  2002                             42,3504                            BANK

  2003    REF   1                                                     COUNT* $$/R05
  2004    REF   3  LAST  812      E4,1417                             EBANK= EMSALT

  2007    REF 225  LAST  905      42,3504   0 6006 1  SBANDANT  TC      INTPRET
  2008                             42,3505   45034 1            RTB     CALL
  2009    REF  25  LAST  783      42,3506   51751 0                     LOADTIME          PICKUP CURRENT TIME SCALED B-28
  2010    REF   9  LAST  782      42,3507   47530 1                     CDUTRIG           COMPUTE SINES AND COSINES OF CDU ANGLES
  2012    REF  40  LAST  923      42,3510   34041 0            STCALL  TDEC1             ADVANCE INTEGRATION TO TIME IN TDEC1
  2013    REF  10  LAST  783      42,3511   27170 1                     CSMCONIC          USING CONIC INTEGRATION
  2014                             42,3512   46135 1            SLOAD   BHIZ              ORIGIN OF REFERENCE INERTIAL SYSTEM IS
  2015    REF  28  LAST  937      42,3513   00050 1                     X2                EARTH = 0, MOON = 2
  2016    REF   1                  42,3514   65527 1                     EISOI
  2017                             42,3515   77775 1            VLOAD
  2018    REF  33  LAST  923      42,3516   00001 0                     RATT
  2019    REF   1                  42,3517   00003 1            STORE   RCM               MOVE RATT TO PREVENT WIPEOUT
  2020                             42,3520   45145 0            DLOAD   CALL              MOON, PUSH ON
  2021    REF   9  LAST  923      42,3521   00015 0                     TAT               GET ORIGINAL TIME
  2022    REF   2  LAST  634      42,3522   54141 1                     LUNPOS            COMPUTE POSITION VECTOR OF MOON
  2023                             42,3523   57455 1            VAD     VCOMP             R= -(REM+RCM) = NEG. OF S/C POS. VEC
  2024    REF   2  LAST  940      42,3524   00003 1                     RCM
  2025                             42,3525   77650 1            GOTO
  2026    REF   2  LAST  940      42,3526   65531 0                     EISOI +2
  2027                             42,3527   57575 1  EISOI     VLOAD   VCOMP             EARTH, R= -RCM
  2028    REF  34  LAST  940      42,3530   00001 0                     RATT
  2029                             42,3531   64201 0            SETPD   MXV               RCS TO STABLE MEMBER- B-1X B-29X B+1
  2030                             42,3532   00003 1                     2D                2D
  2031    REF  48  LAST  892      42,3533   01734 0                     REFSMMAT          STABLE MEMBER.  B-1X B-29X B+1= B-29
  2032                             42,3534   65372 1            VSL1    PDDL              8D
  2033    REF  25  LAST  887      42,3535   15336 0                     HI6ZEROS
  2034    REF   1                  42,3536   24025 0            STOVL   YAWANG            ZERO OUT YAWANG, SET UP FOR SMNB
  2035    REF   3  LAST  940      42,3537   00003 1                     RCM               TRANSFORMATION. SM COORD. SCALED B-29
  2036                             42,3540   77624 1            CALL
  2037    REF   5  LAST  727      42,3541   47633 1                     *SMNB*
  2038    REF   1                  42,3542   00003 1            STORE   R                 SAVE NAV. BASE COORDINATES
  2039                             42,3543   63256 0            UNIT    PDVL              14D
  2040    REF   2  LAST  940      42,3544   00003 1                     R
  2041                             42,3545   72431 1            VPROJ   VSL2              COMPUTE PROJECTION OF VECTOR INTO CM
  2042    REF   2  LAST  298      42,3546   15330 0                     HIUNITZ           XY-PLANE, R-(R.UZ)UZ
  2043                             42,3547   40045 1            BVSU    BOV               CLEAR OVERFLOW INDICATOR IF SET
  2044    REF   3  LAST  940      42,3550   00003 1                     R
  2045    REF   1                  42,3551   65552 0                     COVCNV
  2046                             42,3552   40056 0  COVCNV    UNIT    BOV               TEST OVERFLOW FOR INDICATION OF NULL
  2047    REF   1                  42,3553   65567 0                     NOADJUST          VECTOR
  2048                             42,3554   50206 0            PUSH    DOT               20D
  2049    REF   4  LAST  400      42,3555   15334 1                     HIUNITX           COMPUTE YAW ANGLE = ACOS (URP.UX)
  2050                             42,3556   65552 0            SL1     ACOS              REVOLUTIONS SCALED B0
  2051                             42,3557   50315 0            PDVL    DOT               22D YAWANG
```

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L         S-BAND ANTENNA FOR CM                                                           USER'S PAGE NO.  2      E4 S4

  2052    REF   1              42,3560   00017 1                     URP
  2053    REF   2  LAST  298   42,3561   15332 1                     HIUNITY        COMPUTE FOLLOWING- URP.UY
  2054                         42,3562   51152 0              SL1    BPL            POSITIVE
  2055    REF   2  LAST  940   42,3563   65567 0                     NOADJUST       YES, 0- 180 DEGREES
  2056                         42,3564   45345 1              DLOAD  DSU            NO, 181-360 DEGREES 20D
  2057    REF  11  LAST  938   42,3565   15344 0                     DPPOSMAX       COMPUTE 2 PI MINUS YAW ANGLE
  2058                         42,3566   77606 1              PUSH                  22D YAWANG
  2059                         42,3567   50375 0   NOADJUST   VLOAD  DOT            COMPUTE PITCH ANGLE
  2060    REF   1              42,3570   00011 1                     UR             ACOS (UR.UZ) - PI/2
  2061    REF   3  LAST  940   42,3571   15330 0                     HIUNITZ
  2062                         42,3572   65552 0              SL1    ACOS           REVOLUTIONS B0
  2063                         42,3573   77625 0              DSU
  2064    REF   3  LAST  889   42,3574   15326 1                     HIDPI/4
  2065    REF   4  LAST  292   42,3575   16312 0              STODL  RHOSB
  2066    REF   2  LAST  940   42,3576   00025 0                     YAWANG
  2067    REF   2  LAST  292   42,3577   02314 0              STORE  GAMMASB        PATCH FOR CHECKOUT
  2068                         42,3600   77776 1              EXIT
  206805  REF   7  LAST  555   42,3601 3 5047 1               CAF    PRIO5
  206806  REF  14  LAST  869   42,3602 0 5176 1               TC     PRIOCHNG

  20681   REF  16  LAST  793   42,3603 3 1247 1               CA     EXTVBACT       IS BIT 5 STILL ON
  20682   REF  25  LAST  748   42,3604 7 4764 1               MASK   BIT5
  20683                        42,3605 0 0006 1               EXTEND
  20684   REF  33  LAST  641   42,3606 1 5524 0               BZF    ENDEXT         NO, WE HAVE BEEN ANSWERED
  2069    REF   1              42,3607 3 3625 0               CAF    V06N51         DISPLAY ANGLES
  2070    REF 211  LAST  907   42,3610 0 4636 0               TC     BANKCALL
  2071    REF   3  LAST  568   42,3611  20607 1               CADR   GOMARKFR
  2072    REF   7  LAST  521   42,3612 0 5626 0               TC     B5OFF          TERMINATE
  2073    REF   8  LAST  941   42,3613 0 5626 0               TC     B5OFF
  2074    REF  85  LAST  905   42,3614 0 5205 0               TC     ENDOFJOB       RECYCLE
  2075    REF  34  LAST  738   42,3615 3 4766 1               CAF    BIT3           IMMEDIATE RETURN
  2076    REF  12  LAST  905   42,3616 0 5516 0               TC     BLANKET        BLANK R3
  20763   REF   2  LAST  261   42,3617 3 4755 1               CAF    PRIO4
  20766   REF  15  LAST  941   42,3620 0 5176 1               TC     PRIOCHNG

  2077    REF  47  LAST  776   42,3621 3 4770 0               CAF    BIT1           DELAY MINIMUM TIME TO ALLOW DISPLAY IN
  2078    REF 212  LAST  941   42,3622 0 4636 0               TC     BANKCALL
  2079    REF  16  LAST  809   42,3623  01731 0               CADR   DELAYJOB
  2080    REF   2  LAST  261   42,3624 1 3504 1               TCF    SBANDANT
  2086                         42,3625  01463 1    V06N51     VN     0651
  2087                              0002           RCM        EQUALS 2D
  2088                              0010           UR         EQUALS 8D
  2089                              0016           URP        EQUALS 14D
  2090                              0024           YAWANG     EQUALS 20D
  2091                              0026           PITCHANG   EQUALS 22D
  2092    REF   4  LAST  940        0002           R          EQUALS RCM
  2093    REF  12  LAST  743   30,2000                        SBANK= LOWSUPER
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L        LUNAR LANDMARK SELECTION FOR CM                                      USER'S PAGE NO.   1       EQ 57

*** END OF MENELAUS.061 ***
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L        TVCINITIALIZE                                                                   USER'S PAGE NO.   1      EC S?

R1000    NAME      TVCDAPON (TVC DAP INITIALIZATION AND STARTUP CALL)
R1001    LOG SECTION...TVCINITIALIZE                    SUBROUTINE...DAPCSM
R1002    MODIFIED BY SCHLUNDT                           21 OCTOBER 1968
R10025   MODIFIED BY BEALS TO ELIMINATE CSMMASS UPDATE LOGIC (NOW DONE IN S40.8)
R1003    FUNCTIONAL DESCRIPTION
R1004         PERFORMS TVCDAP INITIALIZATION (GAINS, TIMING PARAMETERS, FILTER VARIABLES, ETC.)
R1006         COMPUTES STEERING (S40.8) GAIN KPRIMEDT, AND ZEROES PASTDELV,+1 VARIABLE
R1008         MAKES INITIALIZATION CALL TO ..NEEDLER.. FOR TVC DAP NEEDLES-SETUP
R1009         PERFORMS INITIALIZATION FOR ROLL DAP
R1010         CALLS TVCEXECUTIVE AT TVCEXEC, VIA WAITLIST
R1011         CALLS TVCDAP CDU-RATE INITIALIZATION PKG AT DAPINIT  VIA T5
R1012         PROVIDES FOR LOADING OF LOW-BANDWIDTH COEFFS AND GAINS AT SWICHOVR
R1013    CALLING SEQUENCE - T5LOC=2CADR(TVCDAPON,EBANK=BZERO), T5=.6SECT5
R1014         IN PARTICULAR, CALLED BY ..DOTVCON.. IN P40
R10141        MRCLEAN AND TVCINIT4 ARE POSSIBLE RESTART ENTRY POINTS
R1015    NORMAL EXIT MODE
R1016         TCF RESUME
R1017    SUBROUTINES CALLED
R1018         NEEDLER, MASSPROP
R1019    ALARM OR ABORT EXIT MODES
R1020         NONE
R1021    ERASABLE INITIALIZATION REQUIRED
R1022         CSMMASS, LEMMASS, DAPDATR1 (FOR MASSPROP SUBROUTINE)
R1023         TVC PAD LOADS (SEE EBANK6 IN ERASABLE ASSIGNMENTS)
R1024         PACTOFF, YACTOFF, CDUX
R1025         TVCPHASE AND THE T5 BITS OF FLAGWRD6 (SET AT DOTVCON IN P40)
R1026    OUTPUT
R1027         ALL TVC AND ROLL DAP ERASABLES, FLAGWRD6 (BITS 13,14), T5, WAITLIST
R1028    DEBRIS
R1029         NONE

  1032   REF   1                 17,2000                                SETLOC DAPS7
  1033                           17,2163                                BANK

  10335 *REF   1                                                        COUNT* $$/INIT
  1034   REF  16  LAST  719      E6,1446                                EBANK= CNTR
  1035   REF   7  LAST  734      17,2163  22 016 0   TVCDAPON LXCH     BANKRUPT        T5 RUPT ARRIVAL (CALL BY DOTVCON - P40)
  1036                           17,2164  0 0006 1            EXTEND                     SAVE Q REQUIRED IN RESTARTS (MRCLEAN AND
  10361  REF   7  LAST  734      17,2165  22 012 1            QXCH     QRUPT                   TVCINIT4 ARE ENTRIES)
  1038   REF   1                 17,2166  3 2524 0   MRCLEAN  CAF      NZERO           NUMBER TO ZERO, LESS ONE  (MUST BE ODD)
 A1039                                                                                       TVC RESTARTS ENTER HERE  (NEW BANK)
  1040   REF 190  LAST  895      17,2167  10 000 0     +1     CCS      A
  1041   REF  17  LAST  943      17,2170  55'446 1            TS       CNTR
  1042   REF 148  LAST  904      17,2171  3 4772 1            CAF      ZERO
  1043   REF  85  LAST  895      17,2172  54 001 1            TS       L
  1044   REF  18  LAST  943      17,2173  51'446 0            INDEX    CNTR
  1045   REF   1                 17,2174  53'530 1            DXCH     OMEGAYC         FIRST (LAST) TWO LOCATIONS
  1046   REF  19  LAST  943      17,2175  11'446 1            CCS      CNTR
  1047   REF   1                 17,2176  1 2167 1            TCF      MRCLEAN +1
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L          TVCINITIALIZE                                                          USER'S PAGE NO.  2        E6 S3

10471                      17,2177  0 0006 1            EXTEND             SET UP ANOTHER T5 RUPT TO CONTINUE
10472  REF   1             17,2200  3 2540 1            DCA     INITLOC2         INITIALIZATION AT TVCINIT1
10473  REF  11  LAST  735  17,2201  52 113 0            DXCH    T5LOC      THE PHSCHK2 ENTRY  (REDOTVC) AT TVCDAPON
10474  REF  16  LAST  706  17,2202  3 4750 1            CAF     POSMAX           +3 IS IN ANOTHER BANK. MUST RESET
10475  REF   8  LAST  735  17,2203  54 030 0            TS      TIME5            BBCON TOO (FULL 2CADR), FOR THAT
10476  REF  26  LAST  734  17,2204  1 5323 1  ENDMRC    TCF     RESUME           ENTRY.

10477  REF   8  LAST  943  17,2205  22 016 0  TVCINIT1  LXCH    BANKRUPT
10478                      17,2206  0 0006 1            EXTEND
10479  REF   8  LAST  943  17,2207  22 012 1            QXCH    QRUPT

1048   REF  28  LAST  711  17,2210  0 4714 1            TC      IBNKCALL   UPDATE IXX, IAVG/TLX FOR DAP GAINS (R03
1049   REF   4  LAST  704  17,2211   13313 1            CADR    MASSPROP         OR NOUNS 46 AND 47 MUST BE CORRECT)

1059   REF  56  LAST  737  17,2212  31'465 1            CAE     DAPDATR1   CHECK LEM-ON/OFF
1060   REF  37  LAST  796  17,2213  7 4753 0            MASK    BIT14
1061   REF 191  LAST  943  17,2214  10 000 0            CCS     A
1062   REF  48  LAST  941  17,2215  3 4770 0            CAF     BIT1       LEM-ON (BIT1)
1063   REF  20  LAST  943  17,2216  55'446 1            TS      CNTR       LEM-OFF (ZERO)

106302 REF  21  LAST  944  17,2217  51'446 0            INDEX   CNTR       LOAD THE FILTER COEFFICIENTS
106304 REF   1             17,2220  3 2521 0            CAF     CSMCFADR
106306 REF   2  LAST  110  17,2221  55'704 1            TS      COEFFADR
106308 REF   1             17,2222  0 2412 1            TC      LOADCOEF

10631  REF  22  LAST  944  17,2223  51'446 0            INDEX   CNTR       PICK UP LM-OFF,-ON KTLX/I
106312 REF   1             17,2224  31'416 0            CAE     EKTLX/I          SCALED (1.08 B+2) 1/SECSQ CSM/LM
106314 REF   2  LAST  109  17,2225  55'630 1            TS      KTLX/I                 (  "  B+4)     "    CSM

10632  REF   1             17,2226  0 2452 0            TCR     S40.15     COMPUTE 1/CONACC , VARK

1064   REF  23  LAST  944  17,2227  4 1446 1  TVCINIT2  CS      CNTR       PICK LM-OFF,-ON VALUE FOR FILTER PERIOD
1065   REF 192  LAST  944  17,2230  50 000 1            INDEX   A          DETERMINATION:
1066   REF  28  LAST  745  17,2231  3 4767 0            CAF     BIT2             BIT2 FOR CSM ONLY 40MS FILTER
1067   REF   3  LAST  727  17,2232  55'626 0            TS      KPRIMEDT         BIT3 FOR CSM/LM 80MS FILTER

1070                       17,2233  4 0000 0            COM                PREPARE T5TVCDT
1071   REF  17  LAST  944  17,2234  6 4750 1            AD      POSMAX
1072   REF  49  LAST  944  17,2235  6 4770 0            AD      BIT1
1073   REF   2  LAST  109  17,2236  55'625 0            TS      T5TVCDT

10732  REF   1             17,2237  4 4752 1            CS      SWTOVBIT   RESET SWTOVER FLAG
10733  REF   8  LAST  559  17,2240  7 0105 1            MASK    FLAGWRD9
10734  REF   9  LAST  944  17,2241  54 105 1            TS      FLAGWRD9
1074   REF  24  LAST  944  17,2242  51'446 0            INDEX   CNTR       PICK UP LEM-OFF,-ON KPRIME
1075   REF   1             17,2243  31'414 1            CAE     EKPRIME          SCALED (100 PI)/16
1076                       17,2244  0 0006 1            EXTEND
1077   REF   4  LAST  944  17,2245  7 1626 0            MP      KPRIMEDT   (TVCDT/2, SC.AT B+14CS)
1078   REF 193  LAST  944  17,2246  22 000 1            LXCH    A                SC.AT PI/8    (DIMENSIONLESS)
1079   REF   5  LAST  944  17,2247  53'627 1            DXCH    KPRIMEDT
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L         TVCINITIALIZE                                                                         USER'S PAGE NO.   3       E6 53

  1080    REF  25  LAST  944   17,2250  51'446 0             INDEX  CNTR           PICK UP LEM-OFF,-ON REPFRAC
  1081    REF   2  LAST  726   17,2251  31'421 1             CAE    EREPFRAC
  1082    REF   5  LAST  726   17,2252  55'633 1             TS     REPFRAC

  10821   REF  26  LAST  945   17,2253  51'446 0             INDEX  CNTR           PICK UP ONE-SHOT CORRECTION TIME
  10822   REF   1              17,2254  3 2530 0             CAF    TCORR
  10823   REF  27  LAST  945   17,2255  55'446 1             TS     CNTR

  1085    REF   1              17,2256  3 4351 1             CAF    NINETEEN       SET VCNTR FOR VARIABLE-GAIN UPDATES IN
  1086    REF   2  LAST  109   17,2257  55'634 0             TS     VCNTR          10 SECS (TVCEXEC 1/2 SEC RATE)
  1095    REF  14  LAST  719   17,2260  31'423 0  TVCINIT3   CAE    PACTOFF        TRIM VALUES TO TRIM-TRACKERS, OUTPUT
  1096    REF   2  LAST  109   17,2261  55'605 1             TS     PDELOFF             TRACKERS, OFFSET-UPDATES, AND
  1097    REF   5  LAST  180   17,2262  55'623 0             TS     PCMD                OFFSET-TRACKER FILTERS
  1099    REF   3  LAST  705   17,2263  55'601 0             TS     DELPBAR             NOTE, LO-ORDER DELOFF,DELBAR ZEROED

  1100    REF   7  LAST  719   17,2264  31'424 1             CAE    YACTOFF
  1101    REF   2  LAST  109   17,2265  55'607 0             TS     YDELOFF
  1102    REF   4  LAST  182   17,2266  55'624 1             TS     YCMD
  1103    REF   3  LAST  705   17,2267  55'603 1             TS     DELYBAR

  11031   REF  57  LAST  944   17,2270  31'465 1  ATTINIT    CAE    DAPDATR1       ATTITUDE-ERROR INITIALIZATION LOGIC
  11032   REF  28  LAST  721   17,2271  7 4754 1             MASK   BIT13               TEST FOR CSM OR CSM/LM
  11033                        17,2272  0 0006 1             EXTEND
  1104    REF   1              17,2273  1 2321 1             BZF    NEEDLEIN            BYPASS INITIALIZATION FOR CSM/LM

  110401  REF  50  LAST  944   17,2274  3 4770 0             CAF    BIT1                SET UP TEMPORARY COUNTER
  110402  REF   3  LAST  110   17,2275  55'611 1     +5      TS     TTMP1

  110403  REF   4  LAST  945   17,2276  51'611 0             INDEX  TTMP1
  110404  REF   3  LAST  703   17,2277  3 1664 1             CA     ERRBTMP        ERRBTMP CONTAINS RCS ATTITUDE ERRORS
  110405                       17,2300  0 0006 1             EXTEND                      ERRORY & ERRORZ (P40 AT DOTVCON)
  110406  REF   1              17,2301  7 2527 1             MP     1/ATTLIM       .007325(ERROR) = 0 IF ERROR < 1.5 DEG
  110407                       17,2302  0 0006 1             EXTEND
  110408                       17,2303  1 2313 0             BZF    +8D                 |ERROR| LESS THAN 1.5 DEG
  110409                       17,2304  0 0006 1             EXTEND
  11041                        17,2305  6 2310 1             BZMF   +3                  |ERROR| > 1.5 DEG, AND NEG
  110411  REF   1              17,2306  3 2526 1             CA     ATTLIM              |ERROR| > 1.5 DEG, AND POS
  110412                       17,2307  1 2311 1             TCF    +2
  110413  REF   2  LAST  945   17,2310  4 2526 0     +3      CS     ATTLIM
  110414  REF   5  LAST  945   17,2311  51'611 0     +2      INDEX  TTMP1
  110415  REF   4  LAST  945   17,2312  55'664 0             TS     ERRBTMP
  110416  REF   6  LAST  945   17,2313  11'611 1     +8      CCS    TTMP1               TEST TEMPORARY COUNTER
  110417  REF   1              17,2314  1 2275 1             TCF    ATTINIT +5          BACK TO REPEAT FOR PITCH ERROR

  110418  REF   5  LAST  945   17,2315  3 1664 1             CA     ERRBTMP        ERRORS ESTABLISHED AND LIMITED
  110419  REF   2  LAST  109   17,2316  55'575 0             TS     PERRB
  11042   REF   6  LAST  945   17,2317  3 1665 0             CA     ERRBTMP +1
  110421  REF   2  LAST  109   17,2320  55'577 1             TS     YERRB

  1111    REF  15  LAST  735   17,2321  4 1501 0  NEEDLEIN   CS     RCSFLAGS       SET BIT 3 FOR INITIALIZATION PASS AND GO
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 1112   REF  35  LAST  941   17,2322  7 4766 0             MASK    BIT3               TO NEEDLER.  WILL CLEAR FOR TVC DAP
 1113   REF  16  LAST  945   17,2323  27'501 0             ADS     RCSFLAGS           (RETURNS AFTER CADR)
 1114   REF  29  LAST  944   17,2324  0 4714 1             TC      IBNKCALL
 1115   REF   6  LAST  551   17,2325   42425 1             CADR    NEEDLER

 1116   REF 149  LAST  943   17,2326  3 4772 1  TVCINIT4 CAF     ZERO            SET TVCPHASE TO INDICATE TVCDAPON-THRU-
 1117   REF   4  LAST  705   17,2327  55'635 1           TS      TVCPHASE              NEEDLEIN INITIALIZATION FINISHED.
A1118                                                                                  (POSSIBLE TVC-RESTART ENTRY)

 1119   REF  18  LAST  786   17,2330  30 032 0           CAE     CDUX            PREPARE ROLL DAP
 1120   REF   6  LAST  205   17,2331  55'645 0           TS      OGANOW

 1125  *REF   2  LAST  943   17,2332  3 2524 0           CAF     NZERO           CALL TVCEXECUTIVE IN 0.51 SEC
 1126   REF  24  LAST  829   17,2333  0 5233 0           TC      WAITLIST
 1127   REF  28  LAST  945   E6,1446                     EBANK=  CNTR
 1128   REF   2  LAST  200   17,2334   03037 0           2CADR   TVCEXEC
 1128                        17,2335   34066 0


 1129                        17,2336  0 0006 1           EXTEND                  CALL FOR DAPINIT
 1130   REF   1              17,2337  3 2536 0           DCA     DAPINIT5
 1131   REF  12  LAST  944   17,2340  52 113 0           DXCH    T5LOC
 1132   REF   3  LAST  944   17,2341  31'625 1           CAE     T5TVCDT         (ALLOW TIME FOR RESTART COMPUTATIONS)
 1133   REF   9  LAST  944   17,2342  54 030 0           TS      TIME5

 1134   REF  27  LAST  944   17,2343  1 5323 1  ENDTVCIN TCF     RESUME


 1138                        17,2344  0 0004 0  SWICHOVR INHINT
 1139   REF   5  LAST  946   17,2345  3 1635 0           CA      TVCPHASE        SAVE TVCPHASE
 1140   REF   1              17,2346  55'611 1           TS      PHASETMP
 1141   REF  29  LAST  944   17,2347  4 4767 1           CS      BIT2            SET TVCPHASE = -2 (INDICATES SWITCH-OVER
 1142   REF   6  LAST  946   17,2350  55'635 1           TS      TVCPHASE              TO RESTART LOGIC)

 1143                        17,2351  0 0006 1     +5    EXTEND                  SAVE Q FOR RETURN (RESTART ENTRY POINT,
 1144   REF   1              17,2352  23'613 1           QXCH    RTRNLOC               TVCPHASE AND PHASETMP ALREADY SET)

 1145   REF   1              17,2353  3 2525 1           CAF     NZEROJR         ZEROING LOOP FOR FILTER STORAGE LOCS
 1146   REF   2  LAST  110   17,2354  55'661 0     +8    TS      CNTRTMP

 1147   REF 150  LAST  946   17,2355  3 4772 1  MCLEANJR CA      ZERO
 1148   REF  86  LAST  943   17,2356  54 001 1           TS      L
 1149   REF   3  LAST  946   17,2357  51'661 1           INDEX   CNTRTMP
 1150   REF   2  LAST  108   17,2360  53'541 1           DXCH    PTMP1 -1
 1151   REF   4  LAST  946   17,2361  11'661 0           CCS     CNTRTMP
 1152   REF 194  LAST  944   17,2362  10 000 0           CCS     A
 1153   REF   2  LAST  262   17,2363  1 2354 0           TCF     SWICHOVR +8D

 1154   REF  10  LAST  944   17,2364  4 0105 1           CS      FLAGWRD9        SET SWITCHOVER FLAG FOR DOWNLINK
 1155   REF   2  LAST  944   17,2365  7 4752 1           MASK    SWTOVBIT
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  1156    REF  11  LAST  946   17,2366  26 105 1               ADS     FLAGWRD9

  1157    REF   2  LAST  944   17,2367  31'420 0               CAE     EKTLX/I +2          LOW BANDWIDTH GAINS - DAP
  1158    REF   3  LAST  944   17,2370  55'630 1               TS      KTLX/I
  1159    REF   2  LAST  944   17,2371  0 2461 0               TCR     S40.15 +7

  1160    REF   1              17,2372  3 2532 1               CAF     FKPRIMDT                                - STEERING
  1161    REF   6  LAST  944   17,2373  55'626 0               TS      KPRIMEDT

  1162    REF   2  LAST  727   17,2374  3 2533 0               CAF     FREPFRAC                                - TMC LOOP
  1163    REF   6  LAST  945   17,2375  55'633 1               TS      REPFRAC

  11631                        17,2376  0 0006 1               EXTEND                      UPDATE TRIM ESTIMATES
  11632   REF   4  LAST  945   17,2377  3 1602 1               DCA     DELPBAR
  11633   REF   3  LAST  945   17,2400  53'606 1               DXCH    PDELOFF
  11634                        17,2401  0 0006 1               EXTEND
  11635   REF   4  LAST  945   17,2402  3 1604 1               DCA     DELYBAR
  11636   REF   3  LAST  945   17,2403  53'610 0               DXCH    YDELOFF

  1164    REF   1              17,2404  3 2523 1               CA      LBCFADR
  1165    REF   3  LAST  944   17,2405  55'704 1               TS      COEFFADR
  1166    REF   2  LAST  944   17,2406  0 2412 1               TC      LOADCOEF

  1167    REF   2  LAST  946   17,2407  31'611 0               CAE     PHASETMP            RESTORE TVCPHASE
  1168    REF   7  LAST  946   17,2410  55'635 1               TS      TVCPHASE

  1169    REF   2  LAST  946   17,2411  0 1613 1               TC      RTRNLOC             BACK TO PRESWTCH OR TVCRESTARTS


  1170                         17,2412  0 0006 1     LOADCOEF  EXTEND                      LOAD DAP FILTER COEFFICIENTS
  1171    REF   4  LAST  947   17,2413  5 1704 0               INDEX   COEFFADR              FROM: ERASABLE FOR CSM/LM HB
  1172                         17,2414  3 0001 0               DCA     0                             FIXED    FOR CSM/LM LB
  1173    REF   2  LAST  110   17,2415  53'706 0               DXCH    N10                           FIXED    FOR CSM

  1174                         17,2416  0 0006 1               EXTEND                      NOTE: FOR CSM/LM, NORMAL COEFFICIENT
  1175    REF   5  LAST  947   17,2417  5 1704 0               INDEX   COEFFADR            LOAD WILL BE HIGH BANDWIDTH PAD LOAD
  1176                         17,2420  3 0003 1               DCA     2                   ERASABLES. DURING CSM/LM SWITCHOVER,
  1177    REF   3  LAST  947   17,2421  53'710 1               DXCH    N10 +2              THIS LOGIC IS USED TO LOAD LOW BANDWIDTH
 R1178                                                                                     COEFFICIENTS FROM FIXED MEMORY.

  1180                         17,2422  0 0006 1               EXTEND
  1181    REF   6  LAST  947   17,2423  5 1704 0               INDEX   COEFFADR
  1182                         17,2424  3 0005 1               DCA     4
  1183    REF   4  LAST  947   17,2425  53'712 0               DXCH    N10 +4

  1184                         17,2426  0 0006 1               EXTEND
  1185    REF   7  LAST  947   17,2427  5 1704 0               INDEX   COEFFADR
  1186                         17,2430  3 0007 0               DCA     6
  1187    REF   5  LAST  947   17,2431  53'714 0               DXCH    N10 +6
  1188                          17,2432   0 0006 1             EXTEND
  1189    REF    8  LAST  947   17,2433   5 1704 0             INDEX    COEFFADR
  1190                          17,2434   3 0011 1             DCA      8D
  1191    REF    6  LAST  947   17,2435   53'716 1             DXCH     N10 +8D

  1192                          17,2436   0 0006 1             EXTEND
  1193    REF    9  LAST  948   17,2437   5 1704 0             INDEX    COEFFADR
  1194                          17,2440   3 0013 0             DCA      10D
  1195    REF    7  LAST  948   17,2441   53'720 1             DXCH     N10 +10D

  1196                          17,2442   0 0006 1             EXTEND
  1197    REF   10  LAST  948   17,2443   5 1704 0             INDEX    COEFFADR
  1198                          17,2444   3 0015 0             DCA      12D
  1199    REF    8  LAST  948   17,2445   53'722 0             DXCH     N10 +12D

  1200    REF   11  LAST  948   17,2446   51'704 0             INDEX    COEFFADR
  1201                          17,2447   3 0016 0             CA       14D
  1202    REF    9  LAST  948   17,2450   55'723 1             TS       N10 +14D

  1203    REF  155  LAST  895   17,2451   0 0002 0             TC       Q

  1204    REF    3  LAST  734   17,2452   31'467 0   S40.15    CAE      IXX                 GAIN COMPUTATIONS (1/CONACC, VARK)
  1205                          17,2453   0 0006 1             EXTEND                       ENTERED FROM TVCINITIALIZE AND TVCEXEC
  1206    REF    1              17,2454   7 2534 0             MP       2PI/M                   2PI/M SCALED 1/(B+8 N M)
  1207                          17,2455   20 001 1             DDOUBL                           IXX   SCALED B+20 KG-MSQ
  1208                          17,2456   20 001 1             DDOUBL
  1209                          17,2457   20 001 1             DDOUBL
  1210    REF    2  LAST  109   17,2460   55'631 0             TS       1/CONACC                       SCALED B+9 SEC-SQ/REV


 A12102                                                                                   ENTRY FROM CSM/LM V46 SWITCHOVER
  1211    REF    4  LAST  947   17,2461   31'630 0     +7      CAE      KTLX/I                  SCALED (1.08 B+2) 1/SECSQ CSM/LM
  1212                          17,2462   0 0006 1             EXTEND                                 (  "  B+4)   CSM
  1213    REF    1              17,2463   7 1471 0             MP       IAVG/TLX                       SCALED B+2 SECSQ
  1214                          17,2464   20 001 1             DDOUBL
  1215                          17,2465   20 001 1             DDOUBL
  1216    REF    2  LAST  109   17,2466   55'632 0             TS       VARK                    SCALED (1.08 B+2)   CSM/LM
  1217    REF  156  LAST  948   17,2467   0 0002 0             TC       Q                               (  "  B+4)   CSM


  1218                          17,2470    37777 1   CSMN10    DEC      .99999              N10     CSM ONLY FILTER COEFFICIENTS
  1219                          17,2471    67657 1             DEC      -.2549              N11/2
  1220                          17,2472    01703 1             DEC      .0588               N12
  1221                          17,2473    47472 0             DEC      -.7620              D11/2
  1222                          17,2474    27656 1             DEC      .7450               D12

  1223                          17,2475    37777 1             DEC      .99999              N20
  1224                          17,2476    60361 0             DEC      -.4852              N21/2
  1225                          17,2477    00000 1             DEC      0                   N22
  1226                          17,2500   67304 1            DEC      -.2692          D22/2
  1227                          17,2501   00000 1            DEC      0               D22

  1228                          17,2502   37777 1  LBN10     DEC      +.99999         N10    LOW BANDWIDTH FILTER COEFFICIENTS
  1229                          17,2503   65371 1            DEC      -.3285          N11/2
  1230                          17,2504   65337 0            DEC      -.3301          N12
  1231                          17,2505   42700 0            DEC      -.9101          D11/2
  1232                          17,2506   33045 0            DEC      +.8460          D12

  1233                          17,2507   01000 0            DEC      +.03125         N20
  1234                          17,2510   00000 1            DEC      0               N21/2
  1235                          17,2511   00000 1            DEC      0               N22
  1236                          17,2512   42700 0            DEC      -.9101          D21/2
  1237                          17,2513   33045 0            DEC      +.8460          D22

  1238                          17,2514   20000 0            DEC      +.5000          N30
  1239                          17,2515   60730 0            DEC      -.47115         N31/2
  1240                          17,2516   17145 1            DEC      +.4749          N32
  1241                          17,2517   41323 0            DEC      -.9558          D31/2
  1242                          17,2520   35773 1            DEC      +.9372          D32


  1243   REF    1               17,2521   02470 0  CSMCFADR GENADR  CSMN10          CSM ONLY COEFFICIENTS ADDRESS
  1244   REF    1               17,2522   01425 0  HBCFADR  GENADR  HBN10           HIGH BANDWIDTH COEFFICIENTS ADDRESS
  1245   REF    1               17,2523   02502 1  LBCFADR  GENADR  LBN10           LOW BANDWIDTH COEFFICIENTS ADDRESS

  1246                          17,2524   00063 1  NZERO     DEC      51              MUST BE ODD FOR MRCLEAN
  1247                          17,2525   00027 1  NZEROJR   DEC      23              MUST BE ODD FOR MCLEANJR

  12471                         17,2526   00210 1  ATTLIM    DEC      0.00833         INITIAL ATTITUDE ERROR LIMIT (1.5 DEG)
  12472                         17,2527   00170 1  1/ATTLIM DEC      0.007325        .007325(ERROR) = 0 IF ERROR < 1.5 DEG

  1248                          17,2530   00005 1  TCORR     OCT      00005           CSM
  1249                          17,2531   00000 1     +1     OCT      00000           CSM/LM (HB,LB)

  1250                          17,2532   00247 0  FKPRIMDT DEC      .0102           CSM/LM (LB), (.05 X .08) SCALED AT PI/8
  1251                          17,2533   00232 1  FREPFRAC DEC      .0375 B-2       CSM/LM (LB),  0.0375 SCALED AT B+2

  1252   REF    7  LAST  448       4351            NINETEEN =        VD1
  1253                          17,2534   33074 1  2PI/M     DEC      .00331017 B+8   2PI/M, SCALED AT 1/(B+8 N-M)

  1255   REF   29  LAST  946    E6,1446                      EBANK=  CNTR
  1256   REF    1               17,2535   03227 0  DAPINIT5 2CADR   DAPINIT
  1256   REF    1               17,2536   40066 0


  1257   REF   30  LAST  949    E6,1446                      EBANK=  CNTR
  1258   REF    1               17,2537   02205 1  INITLOC2 2CADR   TVCINIT1
  1258   REF    1               17,2540   36066 1
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R1000   PROGRAM NAME.... TVCEXECUTIVE, CONSISTING OF TVCEXEC, NEEDLEUP, VARGAINS
R1001                    1SHOTCHK, REPCHEK, CG.CORR, COPYCYCLES, ETC.
R1002   LOG SECTION...TVCEXECUTIVE                SUBROUTINE...DAPCSM
R1003   MODIFIED BY SCHLUNDT                      21 OCTOBER 1968
R10035  MODIFIED BY BEALS TO ELIMINATE CSMMASS UPDATE LOGIC (NOW DONE IN S40.8)
R1004   FUNCTIONAL DESCRIPTION....

R1005       *A SELF-PERPETUATING WAITLIST TASK AT 1/2 SECOND INTERVALS WHICH:
R1006        PREPARES THE ROLL DAP WITH OGA (CDUX)
R1007        PREPARES THE ROLL FDAI NEEDLE (FLY-TO  OGA ERROR)
R1008        PREPARES THE ROLL PHASE PLANE  OGAERR  (FLY-FROM  OGA ERROR)
R1009        PREPARES THE TVC ROLLDAP TASK WAITLIST CALL (3 CS DELAY)
R1010        UPDATES THE NEEDLES DISPLAY
R1011        CALLS MASSPROP TO UPDATE INERTIA DATA
R10111       UPDATES PITCH, YAW, AND ROLL DAP GAINS FROM MASSPROP DATA
R1012        PERFORMS ONE-SHOT CORRECTION FOR TMC LOOP 0-3 SEC AFTER IGNITION
R1013        PERFORMS REPETITIVE UPDATES FOR TMC LOOP AFTER THE ONE-SHOT CORR.

R1017   CALLING SEQUENCE....

R1018       *TVCEXEC CALLED AS A WAITLIST TASK, IN PARTICULAR BY TVCINIT4 AND BY
R1019        ITSELF, BOTH AT 1/2 SECOND INTERVALS

R1020   NORMAL EXIT MODE.... TASKOVER

R1021   ALARM OR ABORT EXIT MODES.... NONE

R1022   SUBROUTINES CALLED....NEEDLER, S40.15, MASSPROP, TASKOVER, IBNKCALL

R1023   OTHER INTERFACES....

R1024       *TVCRESTART PACKAGE FOR RESTARTS
R1025       *PITCHDAP, YAWDAP FOR VARIABLE GAINS AND ENGINE TRIM ANGLES
R1027   ERASABLE INITIALIZATION REQUIRED....

R1028       *SEE TVCDAPON....TVCINIT4
R1029       *VARK AND 1/CONACC (S40.15 OF TVCINITIALIZE)
R1032       *PAD LOAD EREPFRAC
R1033       *BITS 15,14 OF FLAGWRD6 (T5 BITS)
R1034       *TVCEXPHS FOR RESTARTS
R1035       *ENGINE-ON BIT (11.13) FOR RESTARTS
R1036       *CDUX, OGAD

R1037   OUTPUT....

R1038       *ROLL DAP OGANOW, FDAI NEEDLE (AK), AND PHASE PLANE OGAERR
R1039       *VARIABLE GAINS FOR PITCH/YAW AND ROLL TVC DAPS
R1040       *SINGLE-SHOT AND REPETITIVE CORRECTIONS TO ENGINE TRIM ANGLES
R1041        PACTOFF AND YACTOFF
R1046   DEBRIS.... MUCH, BUT SHAREABLE WITH RCS/ENTRY, ALL IN EBANK6
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L        TVCEXECUTIVE                                                                       USER'S PAGE NO.  2       EO S3

  1048   REF   1                16,2000                          SETLOC DAPROLL
  1049                          16,3037                          BANK
  1050   REF  31  LAST  949     E6,1446                          EBANK= CNTR
  1051   REF   1                                                 COUNT* $$/TVCX

  1052   REF  25  LAST  735     16,3037  4 0102 0  TVCEXEC  CS     FLAGWRD6        CHECK FOR TERMINATION (BITS 15,14 READ
  1053   REF  15  LAST  735     16,3040  7 4076 0           MASK   DPCONFIG        10 FROM TVCDAPON TO RCSDAPON
  1054                          16,3041  0 0006 1           EXTEND
  1055   REF   1                16,3042  6 3217 0           BZMF   TVCEXFIN        TERMINATE

  1056   REF   8  LAST  828     16,3043  3 5011 1           CAF    .5SEC           W.L. CALL TO PERPETUATE TVCEXEC
  1057   REF  18  LAST  829     16,3044  0 5223 1           TC     TWIDDLE
  1058   REF   3  LAST  946     16,3045   03037 0           ADRES  TVCEXEC
  1060   REF  19  LAST  946     16,3046  30 032 0  ROLLPREP CAE    CDUX            UPDATE ROLL LADDERS (NO NEED TO RESTART-
  1061   REF   7  LAST  946     16,3047  57'645 1           XCH    OGANOW                PROTECT, SINCE ROLL DAPS RE-START)
  1062   REF   2  LAST  110     16,3050  57'646 1           XCH    OGAPAST

  1063   REF   2  LAST  702     16,3051  31'447 1           CAE    OGAD            PREPARE ROLL FDAI NEEDLE  WITH FLY-TO
  1064                          16,3052  0 0006 1           EXTEND                       ERROR (COMMAND - MEASURED)
  1065   REF   8  LAST  951     16,3053  21'645 0           MSU    OGANOW
  1066   REF  16  LAST  551     16,3054  55'476 1           TS     AK              FLY-TO OGA ERROR, SC.AT B-1 REVS

  1067                          16,3055  0 0006 1           EXTEND                 PREPARE ROLL DAP PHASE PLANE  OGAERR
  1068   REF   2  LAST  720     16,3056  7 4751 1           MP     -BIT14
  1069   REF   1                16,3057  55'647 1           TS     OGAERR          PHASE-PLANE (FLY-FROM) OGAERROR,
 A1070                                                                                   SC.AT B+0 REVS

  1071   REF  30  LAST  829     16,3060  3 6214 0           CAF    THREE           SET UP ROLL DAP TASK (ALLOW SOME TIME)
  1072   REF  19  LAST  951     16,3061  0 5223 1           TC     TWIDDLE
  1073   REF   1                16,3062   03342 1           ADRES  ROLLDAP
  1075   REF  30  LAST  946     16,3063  0 4714 1  NEEDLEUP TC     IBNKCALL        DO A NEEDLES UPDATE (RETURNS AFTER CADR)
  1076   REF   7  LAST  946     16,3064   42425 1           CADR   NEEDLER               (NEEDLES RESTARTS ITSELF)

  10823  REF   3  LAST  945     16,3065  11'634 0  VARGAINS CCS    VCNTR           TEST FOR GAIN UPDATE TIME
  10824  REF   1                16,3066  1 3074 0           TCF    EXECCOPY        NOT YET
  1085   REF  31  LAST  951     16,3067  0 4714 1  GAINCHNG TC     IBNKCALL        UPDATE IXX, IAVG, IAVG/TLX
  1086   REF   1                16,3070   13347 0           CADR   FIXCW           MASSPROP ENTRY  (ALREADY INITIALIZED)
  1087   REF  32  LAST  951     16,3071  0 4714 1           TC     IBNKCALL        UPDATE 1/CONACC, VARK
  10871  REF   3  LAST  947     16,3072   36452 1           CADR   S40.15                (S40.15 IS IN TVCINITIALIZE)
  1092   REF   2  LAST  945     16,3073  3 4351 1           CAF    NINETEEN        RESET THE VARIABLE-GAIN UPDATE COUNTER
  1093   REF   4  LAST  951     16,3074  55'634 0  EXECCOPY TS     VCNTR
  1100   REF  32  LAST  951     16,3075  11'446 1  1SHOTCHK CCS    CNTR            CHECK TIME FOR ONE-SHOT OR REPCORR
  1101                          16,3076  1 3102 0           TCF    +4                    NOT YET
  1102   REF   1                16,3077  1 3115 0           TCF    1SHOTOK               NOW
  1103   REF   1                16,3100  1 3106 1           TCF    REPCHEK               ONE-SHOT OVER, ON TO REPCORR
  1104   REF   2  LAST  951     16,3101  1 3115 0           TCF    1SHOTOK               NOW  (ONE-SHOT ONLY, NO REPCORR)

  1105   REF   5  LAST  946     16,3102  55'661 0     +4    TS     CNTRTMP         COUNT DOWN
  1106   REF  11  LAST  902     16,3103  3 4766 1           CAF    FOUR            SET UP TVCEXPHS FOR ENTRY AT CNTRCOPY
  1107   REF   3  LAST  703    16,3104  55'644 1              TS      TVCEXPHS
  1108   REF   1               16,3105  1 3215 0              TCF     CNTRCOPY

  1109   REF   7  LAST  947    16,3106  31'633 0   REPCHEK    CAE     REPFRAC           CHECK FOR REPETITIVE UPDATES
  1110                         16,3107  0 0006 1              EXTEND
  1111   REF   2  LAST  951    16,3110  6 3217 0              BZMF    TVCEXFIN              NO, OVER-AND-OUT
  1112   REF   2  LAST  107    16,3111  55'445 1              TS      TEMPDAP +1            YES, SET UP CORRECTION FRACTION
  1113   REF  33  LAST  832    16,3112  3 4767 0              CAF     TWO               SET UP TVCEXPHS FOR ENTRY AT CORSETUP
  1114   REF   4  LAST  952    16,3113  55'644 1              TS      TVCEXPHS
  1115   REF   1               16,3114  1 3126 0              TCF     CORSETUP

  1119   REF   6  LAST  704    16,3115  3 4762 0   1SHOTOK    CAF     ENGONBIT
  1120   REF  14  LAST  704    16,3116  7 0101 0              MASK    FLAGWRD5
  1122   REF 195  LAST  946    16,3117  10 000 0              CCS     A
  1123                         16,3120  1 3122 1              TCF     +2                    ONE-SHOT OK
  1124   REF   3  LAST  952    16,3121  1 3217 1              TCF     TVCEXFIN              NO, TERMINATE

  1125   REF   5  LAST  952    16,3122  25'644 0              INCR    TVCEXPHS                                              (1)
  1168   REF   1               16,3123  3 4754 0   TEMPSET    CAF     FCORFRAC              SET UP CORRECTION FRACTION
  1169   REF   3  LAST  952    16,3124  55'445 1              TS      TEMPDAP +1

  1170   REF   6  LAST  952    16,3125  25'644 0              INCR    TVCEXPHS          ENTRY FROM REPCHECK AT NEXT LOCATION (2)
  1171   REF  58  LAST  945    16,3126  31'465 1   CORSETUP   CAE     DAPDATR1          CHECK FOR LEM-OFF/ON
  1172   REF  29  LAST  945    16,3127  7 4754 1              MASK    BIT13             (NOTE, SHOWS LEM-OFF)
  1173                         16,3130  0 0006 1              EXTEND
  1174                         16,3131  1 3133 1              BZF     +2                LEM IS ON,  PICK UP   TEMPDAP+1
  1175   REF   4  LAST  952    16,3132  31'445 0              CAE     TEMPDAP +1        LEM IS OFF, PICK UP 2(TEMPDAP+1)
  1176   REF   5  LAST  952    16,3133  6 1445 0              AD      TEMPDAP +1
  1177   REF   6  LAST  952    16,3134  55'444 0              TS      TEMPDAP           CG.CORR USES TEMPDAP

  1178   REF  14  LAST  570    16,3135  3 7702 0              CAF     NEGONE            SET UP FOR CNTR = -1 (ONE-SHOT DONE)
  1179   REF   6  LAST  951    16,3136  55'661 0              TS      CNTRTMP                (COPYCYCLE AT  .CNTRCOPY. )

  1180                         16,3137  0 0006 1   CG.CORR    EXTEND                    PITCH TMC LOOP
  1181   REF   4  LAST  947    16,3140  3 1606 0              DCA     PDELOFF
  1182   REF   2  LAST  110    16,3141  53'656 1              DXCH    PACTTMP
  1183                         16,3142  0 0006 1              EXTEND
  1184   REF   5  LAST  952    16,3143  4 1606 1              DCS     PDELOFF
  1185                         16,3144  20 001 1              DDOUBL
  1186                         16,3145  20 001 1              DDOUBL
  1187   REF   7  LAST  945    16,3146  53'612 1              DXCH    TTMP1
  1188                         16,3147  0 0006 1              EXTEND
  1189   REF   5  LAST  947    16,3150  3 1602 1              DCA     DELPBAR
  1190                         16,3151  20 001 1              DDOUBL
  1191                         16,3152  20 001 1              DDOUBL
  1192   REF   8  LAST  952    16,3153  21'612 1              DAS     TTMP1
  1193                         16,3154  0 0006 1              EXTEND
  1194   REF   9  LAST  952    16,3155  3 1612 0              DCA     TTMP1
  1195                         16,3156  0 0006 1              EXTEND
  1196   REF   7  LAST  952    16,3157  7 1444 0              MP      TEMPDAP
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 1197  REF   3  LAST  952   16,3160  21'656 1           DAS     PACTTMP

 1198                       16,3161  0 0006 1           EXTEND                  YAW TMC LOOP
 1199  REF   4  LAST  947   16,3162  3 1610 1           DCA     YDELOFF
 1200  REF   2  LAST  110   16,3163  53'660 1           DXCH    YACTTMP
 1201                       16,3164  0 0006 1           EXTEND
 1202  REF   5  LAST  953   16,3165  4 1610 0           DCS     YDELOFF
 1203                       16,3166  20 001 1           DDOUBL
 1204                       16,3167  20 001 1           DDOUBL
 1205  REF  10  LAST  952   16,3170  53'612 1           DXCH    TTMP1
 1206                       16,3171  0 0006 1           EXTEND
 1207  REF   5  LAST  947   16,3172  3 1604 1           DCA     DELYBAR
 1208                       16,3173  20 001 1           DDOUBL
 1209                       16,3174  20 001 1           DDOUBL
 1210  REF  11  LAST  953   16,3175  21'612 1           DAS     TTMP1
 1211                       16,3176  0 0006 1           EXTEND
 1212  REF  12  LAST  953   16,3177  3 1612 0           DCA     TTMP1
 1213                       16,3200  0 0006 1           EXTEND
 1214  REF   8  LAST  952   16,3201  7 1444 0           MP      TEMPDAP
 1215  REF   3  LAST  953   16,3202  21'660 1           DAS     YACTTMP

 1216  REF   7  LAST  952   16,3203  25'644 0  CORCOPY  INCR    TVCEXPHS        RESTART PROTECT THE COPYCYCLE        (3)
 1217                       16,3204  0 0006 1           EXTEND                  TRIM-ESTIMATES, AND
 1218  REF   4  LAST  953   16,3205  3 1656 0           DCA     PACTTMP
 1219  REF  15  LAST  945   16,3206  55'423 1           TS      PACTOFF               TRIMS
 1220  REF   6  LAST  952   16,3207  53'606 1           DXCH    PDELOFF

 1221                       16,3210  0 0006 1           EXTEND
 1222  REF   4  LAST  953   16,3211  3 1660 0           DCA     YACTTMP
 1223  REF   8  LAST  945   16,3212  55'424 0           TS      YACTOFF
 1224  REF   6  LAST  953   16,3213  53'610 0           DXCH    YDELOFF

 1225  REF   8  LAST  953   16,3214  25'644 0           INCR    TVCEXPHS        ENTRY FROM 1SHOTCHK AT NEXT LOCATION (4)
 1226  REF   7  LAST  952   16,3215  31'661 1  CNTRCOPY CAE     CNTRTMP         UPDATE CNTR (RESTARTS OK, FOLLOWS CPYCY)
 1227  REF  33  LAST  951   16,3216  55'446 1           TS      CNTR

 1228  REF 151  LAST  946   16,3217  3 4772 1  TVCEXFIN CAF     ZERO            RESET TVCEXPHS
 1229  REF   9  LAST  953   16,3220  55'644 1           TS      TVCEXPHS
 1230  REF  43  LAST  838   16,3221  1 5314 0           TCF     TASKOVER        TVCEXECUTIVE FINISHED


 1231  REF  30  LAST  952      4754             FCORFRAC =       BIT13           ONE-SHOT CORRECTION FRACTION
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L       TVCMASSPROP                                                               USER'S PAGE NO.   1      EU 53

R1000   PROGRAM NAME....MASSPROP
R1001   LOG SECTION....TVCMASSPROP        PROGRAMMER...MELANSON (ENGEL, SCHLUNDT)

R1002   FUNCTIONAL DESCRIPTION:

R1003        MASSPROP OPERATES IN TWO MODES:(1)IF LEM MASS OR CONFIGURATION ARE UPDATED (MASSPROP DOES NOT TEST
R1005   FOR THIS) THE ENTIRE PROGRAM MUST BE RUN THROUGH, BREAKPOINT VALUES AND DERIVATIVES OF THE OUTPUTS WITH
R1007   RESPECT TO CSM MASS BEING CALCULATED PRIOR TO CALCULATION OF THE OUTPUTS. (2)OTHERWISE, THE OUTPUTS CAN BE
R1009   CALCULATED USING PREVIOUSLY COMPUTED BREAKPOINT VALUES AND DERIVATIVES.

R10055  CALLING SEQUENCES

R1010      IF LEM MASS OR CONFIGURATION HAS BEEN UPDATED, TRANSFER TO MASSPROP, OTHERWISE TRANSFER TO FIXCW.
R1012             L       TC      BANKCALL OR IBNKCALL
R1013             L+1     CADR    MASSPROP
R1014                        OR
R1015             L+1     CADR    FIXCW

R1016             L+2     RETURNS VIA Q

R1017   CALLED   IN PARTICULAR BY DONOUN47 (JOB) AND TVCEXECUTIVE (TASK)

R1019   JOBS OR TASKS INITIATED - NONE

R1020   SUBROUTINES CALLED - NONE

R1021   ERASABLE INITIALIZATION REQUIRED

R1022        LEMMASS MUST CONTAIN LEM MASS SCALED AT B+16 IN KILOGRAMS
R1023        CSMMASS MUST CONTAIN CSM MASS SCALED AT B+16 IN KILOGRAMS

R1024        DAPDATR1 MUST BE SET TO INDICATE VEHICLE CONFIGURATION.
R10241                BITS (15,14,13)  =  ( 0 , 0 , 1 )     LEM OFF
R102411                                   ( 0 , 1 , 0 )     LEM ON (ASCNT,DSCNT)
R102412                                   ( 1 , 1 , 0 )     LEM ON (ASCNT ONLY)

R1025   ALARMS - NONE

R1026   EXIT -   TC      Q

R1027   OUTPUTS:

R1028        (1)IXX, SINGLE PRECISION SCALED AT B+20 IN KG-M SQ.
R1029        (2)IAVG, SINGLE PRECISION SCALED AT B+20 IN KG-M SQ.
R1030        (3)IAVG/TLX, SINGLE PRECISION, SCALED AT B+2 SEC-SQD
R1031        THEY ARE STORED IN CONSECUTIVE REGISTERS IXX0, IXX1, IXX2

R10311       CONVERSION FACTOR :  (SLUG-FTSQ) = 0.737562 (KG-MSQ)
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L        TVCMASSPROP                                                          USER'S PAGE NO.   2        E0 S3

R1032    OUTPUTS ARE CALCULATED AS FOLLOWS :

R1033     (1) IF LEM DOCKED, LEMMASS IS FIRST ELIMINATED AS A PARAMETER

R1034          VARST0 = INTVALUE0 + LEMMASS(SLOPEVAL0)      IXX       BREAKPOINT VALUE
R1036          VARST1 = INTVALUE1 + LEMMASS(SLOPEVAL1)      IAVG      BREAKPOINT VALUE
R1038          VARST2 = INTVALUE2 + LEMMASS(SLOPEVAL2)      IAVG/TLX  BREAKPOINT VALUE

R1040          VARST3 = INTVALUE3 + LEMMASS(SLOPEVAL3)      IAVG/TLX  SLOPE  FOR CSMMASS > 33956 LBS  ( SPS > 10000 LBS)
R1042          VARST4 = INTVALUE4 + LEMMASS(SLOPEVAL4)      IAVG      SLOPE  FOR CSMMASS > 33956 LBS  ( SPS > 10000 LBS)

R1044          VARST5 = INTVALUE5 + LEMMASS(SLOPEVAL5)      IXX       SLOPE  FOR ALL VALUES OF CSMMASS

R1046          VARST6 = INTVALUE6 + LEMMASS(SLOPEVAL6)      IAVG      SLOPE  FOR CSMMASS < 33956 LBS  ( SPS < 10000 LBS)
R1048          VARST7 = INTVALUE7 + LEMMASS(SLOPEVAL7)      IAVG/TLX  SLOPE  FOR CSMMASS < 33956 LBS  ( SPS < 10000 LBS)

R1050          VARST8 = INTVALUE8 + LEMMASS(SLOPEVAL8)      IAVG      DECREMENT  TO BRKPT VALUE WHEN LEM DSCNT STAGE OFF
R1052          VARST9 = INTVALUE9 + LEMMASS(SLOPEVAL9)      IAVG/TLX  DECREMENT  TO BRKPT VALUE WHEN LEM DSCNT STAGE OFF


R1054     (2) IF LEM NOT DOCKED

R1055          VARST0 = NOLEMVAL0    WHERE THE MEANING AND SCALING OF VARST0
R1056            .         .         TO VARST9 ARE THE SAME AS GIVEN ABOVE
R1057            .         .
R1058            .         .         NOTE... FOR THIS CASE, VARST8,9 HAVE NO
R1059          VARST9 = NOLEMVAL9    MEANING (THEY ARE COMPUTED BUT NOT USED)


R1060     (3) THE FINAL OUTPUT CALCULATIONS ARE THEN DONE

R1061          IXX0 =  VARST0 + (CSMMASS + NEGBPW)VARST5           IXX

R1062          IXX1 =  VARST1 + (CSMMASS + NEGBPW)VARST(4 OR 6)    IAVG

R1063          IXX2 =  VARST2 + (CSMMASS + NEGBPW)VARST(3 OR 7)    IAVG/TLX


R1064    THE DATA USED CAME FROM CSM/LM SPACECRAFT OPERATIONAL DATA BOOK.
R10641        VOL. 3, NASA DOCUMENT SNA-8-D-027 (MARCH 1968)

R1065    PERTINENT MASS DATA :                CSM WEIGHT  (FULL)  64100 LBS
R1066                                                     (EMPTY) 23956 LBS
R1067                                         LEM WEIGHT  (FULL)  32000 LBS
R1068                                                     (EMPTY) 14116 LBS

R10681   (WEIGHTS ARE FROM AMENDMENT #1 (APRIL 24,1968) TO ABOVE DATA BOOK)
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L        TVCMASSPROP                                                                       USER'S PAGE NO.   3       E0 S3

  1070   REF   1               05,2000                     SETLOC DAPMASS
  1071                         05,3313                     BANK
  1072   REF  34  LAST  953    E6,1446                     EBANK= CNTR
  1073   REF   1                                           COUNT* $$/MASP

  1074   REF   2  LAST  447    05,3313  3 4322 0  MASSPROP CAF    NINE              MASSPROP USES TVC/RCS INTERUPT TEMPS
  1075  *REF   2  LAST  108    05,3314  55'506 1    +1     TS     PHI333            SET UP TEN PASSES
  1076   REF  59  LAST  952    05,3315  31'465 1  LEMTEST  CAE    DAPDATR1          DETERMINE LEM STATUS
  1077   REF  31  LAST  953    05,3316  7 4754 1           MASK   BIT13
  1078                         05,3317  0 0006 1           EXTEND
  1079   REF   1               05,3320  1 3324 0           BZF    LEMYES

  1080   REF   3  LAST  956    05,3321  51'506 0  LEMNO    INDEX  PHI333            LEM NOT ATTACHED
  1081   REF   1               05,3322  3 3410 1           CAF    NOLEMVAL
  1082   REF   1               05,3323  1 3334 1           TCF    STOINST

  1083   REF   5  LAST  292    05,3324  31'472 1  LEMYES   CAE    LEMMASS           LEM IS ATTACHED
  1084                         05,3325  6 0000 1           DOUBLE
  1085                         05,3326  0 0006 1           EXTEND
  1086   REF   4  LAST  956    05,3327  5 1506 0           INDEX  PHI333
  1087   REF   1               05,3330  7 3432 0           MP     SLOPEVAL
  1088                         05,3331  20 001 1           DDOUBL
  1089   REF   5  LAST  956    05,3332  51'506 0           INDEX  PHI333
  1090   REF   1               05,3333  6 3420 1           AD     INTVALUE

  1091   REF   6  LAST  956    05,3334  51'506 0  STOINST  INDEX  PHI333            STORAGE INST BEGIN HERE
  1092   REF   3  LAST  108    05,3335  55'511 1           TS     VARST0
  1093   REF   7  LAST  956    05,3336  11'506 1           CCS    PHI333            ARE ALL TEN PASSES COMPLETED
  1094   REF   5  LAST  944    05,3337  1 3314 0           TCF    MASSPROP +1       NO - GO DECREMENT PHI333

  1098   REF  60  LAST  956    05,3340  11'465 0  DXTEST   CCS    DAPDATR1          IF NEG, BIT15 IS 1, LEM DSCNT STAGE OFF
  1099   REF   2  LAST  951    05,3341  1 3347 0           TCF    FIXCW
  1100   REF   3  LAST  956    05,3342  1 3347 0           TCF    FIXCW
  1101   REF   4  LAST  956    05,3343  53'522 1           DXCH   VARST0 +8D
  1102   REF   5  LAST  956    05,3344  21'513 0           DAS    VARST0 +1
  1103   REF   1               05,3345  3 3445 1           CA     DXITFIX
  1104   REF   6  LAST  956    05,3346  27'520 0           ADS    VARST0 +7

  1105   REF  30  LAST  946    05,3347  3 4767 0  FIXCW    CAF    BIT2              COMPUTATION PHASE BEGINS HERE.  SET UP
  1106   REF   8  LAST  956    05,3350  55'506 1           TS     PHI333            THREE PASSES
  1107   REF   2  LAST  108    05,3351  55'507 0           TS     PSI333

  1108   REF  12  LAST  726    05,3352  31'473 0           CAE    CSMMASS           GET DELTA CSM WEIGHT - SIGN DETERMINES
  1109   REF   1               05,3353  6 3444 0           AD     NEGBPW            SLOPE LOCATIONS.
  1110                         05,3354  6 0000 1           DOUBLE
  1111   REF   2  LAST  108    05,3355  55'510 0           TS     TEMP333

  1112                         05,3356  0 0006 1           EXTEND
  1113   REF   1               05,3357  6 3362 0           BZMF   PEGGY             DETERMINE CORRECT SLOPE
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 1114   REF   7  LAST  579   05,3360  3 7701 0             CAF     NEG2
 1115   REF   9  LAST  956   05,3361  55'506 1             TS      PHI333

 1116   REF  10  LAST  957   05,3362  51'506 0  PEGGY      INDEX   PHI333             ALL IS READY - CALCULATE OUTPUTS NOW
 1117   REF   1              05,3363  31'516 1             CAE     VARST5             GET SLOPE
 1118                        05,3364  0 0006 1             EXTEND
 1119   REF   3  LAST  956   05,3365  7 1510 0             MP      TEMP333            MULT BY DELTA CSM WEIGHT
 1120                        05,3366  6 0000 1             DOUBLE
 1121   REF   3  LAST  956   05,3367  51'507 1             INDEX   PSI333
 1122   REF   7  LAST  956   05,3370  6 1511 0             AD      VARST0             ADD BREAKPOINT VALUE
 1123   REF   4  LAST  957   05,3371  51'507 1             INDEX   PSI333
 1124   REF   4  LAST  948   05,3372  55'467 1             TS      IXX                ****** OUTPUTS (IXX0, IXX1, IXX2) ******


 1125   REF   5  LAST  957   05,3373  11'507 0             CCS     PSI333             BOOKKEEPING  - MASSPROP FINISHED OR NOT
 1126   REF   1              05,3374  1 3404 0             TCF     BOKKEP2            NO - GO TAKE CARE OF INDEXING REGISTERS

 1127   REF  61  LAST  956   05,3375  31'465 1             CAE     DAPDATR1           UPDATE WEIGHT/G
 1128   REF  38  LAST  944   05,3376  7 4753 0             MASK    BIT14
 1129   REF 196  LAST  952   05,3377  10 000 0             CCS     A
 1130   REF   6  LAST  956   05,3400  3 1472 1             CA      LEMMASS
 1131   REF  13  LAST  956   05,3401  6 1473 0             AD      CSMMASS
 1132   REF   6  LAST  904   05,3402  55'475 1             TS      WEIGHT/G           SCALED AT B+16 IN KILOGRAMS
 1133   REF 157  LAST  948   05,3403  0 0002 0  ENDMASSP   TC      Q

 1134   REF   6  LAST  957   05,3404  55'507 0  BOKKEP2    TS      PSI333             REDUCE PSI BY ONE
 1135                        05,3405  0 0006 1             EXTEND
 1136   REF  11  LAST  957   05,3406  27'506 1             DIM     PHI333
 1137   REF   2  LAST  956   05,3407  1 3362 1             TCF     PEGGY
 1138                          05,3410   00616 0  NOLEMVAL DEC     25445. B-20
 1139                          05,3411   02526 1           DEC     87450. B-20
 1140                          05,3412   02352 1           DEC     .30715 B-2
 1141                          05,3413   01471 1           DEC     1.22877 E-5 B+12
 1142                          05,3414   00634 0           DEC     1.6096 B-6
 1143                          05,3415   00612 1           DEC     1.54 B-6
 1144                          05,3416   03706 0           DEC     7.77177 B-6
 1145                          05,3417   04425 0           DEC     3.46458 E-5 B+12

 1146                          05,3420   00644 1  INTVALUE DEC     26850 B-20
 1147                          05,3421   03710 1           DEC     127518 B-20
 1148                          05,3422   04246 0           DEC     .54059 B-2
 1149                          05,3423   02011 0           DEC     .153964 E-4 B+12
 1150                          05,3424   77501 0           DEC     -.742923 B-6
 1151                          05,3425   00612 1           DEC     1.5398 B-6
 1152                          05,3426   04656 0           DEC     9.68 B-6
 1153                          05,3427   10372 0           DEC     .647625 E-4 B+12
 1154                          05,3430   77126 1           DEC     -27228. B-20
 1155                          05,3431   76261 0           DEC     -.206476 B-2

 1156                          05,3432   00767 1  SLOPEVAL DEC     1.96307 B-6
 1157                          05,3433   15624 0           DEC     27.5774 B-6
 1158                          05,3434   03054 0           DEC     2.3548 E-5 B+12
 1159                          05,3435   04532 1           DEC     2.1777 E-9 B+26
 1160                          05,3436   10433 1           DEC     1.044 E-3 B+8
 1161                          05,3437   00000 1           DEC     0
 1162                          05,3440   22070 0           DEC     2.21068 E-3 B+8
 1163                          05,3441   03204 1           DEC     1.5166 E-9 B+26
 1164                          05,3442   77266 0           DEC     -1.284 B-6
 1165                          05,3443   02476 0           DEC     2. E-5 B+12

 1166                          05,3444   70364 1  NEGBPW   DEC     -15402.17 B-16
 1167                          05,3445   75420 0  DXITFIX  DEC*    -1.88275 E-5 B+12*
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L       TVCRESTARTS                                                                 USER'S PAGE NO.   1       E 53

R1000   NAME....TVCRESTART PACKAGE,  CONSISTING OF REDOTVC, ENABL1, 2, CMDSOUT, PHSCHK2, ETC.
R1002   LOG SECTION...TVCRESTARTS                        SUBROUTINE...DAPCSM
R1003   MODIFIED BY SCHLUNDT                             21 OCTOBER 1968
R10035  MODIFIED BY BEALS TO ELIMINATE CSMMASS UPDATE LOGIC (NOW DONE IN S40.8)
R1004   FUNCTIONAL DESCRIPTION....

R1005       *RESTART-PROOFS THE TVC DAPS, INCLUDING PITCHDAP, YAWDAP,
R1006        TVCEXECUTIVE, ROLLDAP, TVCINIT4, TVCDAPON, AND CSM/LM V46 SWTCHOVR.
R1007       *TVC RESTARTS DESERVE SPECIAL CONSIDERATION IN SEVERAL AREAS.
R1008        RESTART DOWN-TIME IS IMPORTANT BECAUSE OF THE TRANSIENTS INTRODUCED
R1009        BY THE THRUST VECTOR RETURN TO THE ACTUATOR MECHANICAL NULLS
R1010        FOLLOWING TVC- AND OPTICS-ERROR-COUNTER-DISENABLES (CHANNEL 12).
R1011        TVC    USES A MIXTURE OF WAITLIST, T5, T6, AND JOB CALLS. THERE IS
R1012        FILTER MEMORY (UP TO 6TH ORDER) TO BE PROTECTED IF WILD TRANSIENTS
R1013        ARE TO BE AVOIDED. COUNTERS ARE INVOLVED FOR ONE-SHOT
R1015        CORRECTIONS AND GAIN UPDATES. THE GIMBAL TRIM ESTIMATORS AND THE
R1016        BODY AXIS ATTITUDE ERROR INTEGRATORS INVOLVE DIGITAL SUMMATION.
R1017        DIGITAL DIFFERENTIATORS ARE INVOLVED IN THE BODY AXIS RATE ESTIMA-
R1018        TIONS AND IN THE OUTPUTTING OF ACTUATOR COMMANDS. THERE IS AN
R1019        OFFSET-TRACKER-FILTER TO PROTECT, ETC., ETC.
R1020       *THOSE QUANTITIES WHICH MUST BE PROTECTED ARE STORED IN TEMPORARY
R1021        REGISTERS AS THEY ARE COMPUTED, FOR UPDATING THE REAL REGISTERS
R1022        DURING COPYCYCLES.
R1023       *THE SEVERAL COPYCYCLES ARE EACH PROTECTED BY PHASE POINTS AT THEIR
R1024        BEGINNING AND AT THEIR TERMINATION. THE PHASE POINTS ARE SIMPLY
R1025        ..INCR.. INSTRUCTIONS,   EITHER ..INCR TVCEXPHS.. FOR COPYCYCLES
R1026        IN THE TVCEXECUTIVE, OR ..INCR TVCPHASE.. FOR THE PITCH AND YAW
R1027        COPYCYCLES. INDEXING ON EACH OF THESE POINTERS THEN PERMITS A
R1028        RETURN TO THE APPROPRIATE RESTART POINTS.
R1029       *IF A RESTART OCCURS DURING EITHER COPYCYCLE, THAT COPYCYCLE IS
R1030        COMPLETED. THEN THE NORMAL TVCINIT4....DAPINIT....PITCHDAP STARTUP
R1031        SEQUENCE IS CALLED UPON TO GET THINGS GOING AGAIN.
R1032       *TVC-ENABLE AND OPTICS-ERROR-COUNTER ENABLE MUST BE SET ASAP
R1033        (ALLOWING FOR PROCEDURAL DELAYS). THEN THE ENGINES ARE COMMANDED
R1034        TO THE P,YACTOFF TRIM VALUES. THE DAPS ARE THEN READY TO GO ON THE
R1035        AIR, WITH THE REGULAR STARTUP SEQUENCE, EITHER AT MRCLEAN FOR A
R1036        COMPLETE INITIALIZATION OR AT TVCINIT4 FOR A PARTIAL INITIALIZATION
R1037       *FOR RESTARTS PRIOR TO THE SETTING OF THE T5 BITS AT DOTVCON THE
R1038        PRE40.6 SECTION OF S40.6 TAKES CARE OF RE-ESTABLISHING TRIMS.
R1039       *IF A RESTART OCCURS DURING THE TVCEXEC....TVCEXFIN SEQUENCE THE
R1040        COMPUTATIONS WILL BE COMPLETED, STARTING AT THE APPROPRIATE RESTART
R1041        POINT, AFTER THE DAPS ARE READY TO GO ON THE AIR.
R1042       *IF A RESTART OCCURS PRIOR TO TVCINIT4 (TVCPHASE = -1) E.G. DURING
R1043        THE EARLY DAP INITIALIZATION PHASE, THE DAP STARTUP SEQUENCE IS
R1044        ENTERED AT MRCLEAN FOR A FULL INITIALIZATION.
R10441      *FOR RESTARTS DURING CSM/LM V46 SWITCH-OVER, TVCPHASE IS SET TO -2,
R10442       AND THE RESTART LOGIC GOES BACK TO REDO SWITCH-OVER (AFTER THE
R10443       NORMAL DAP RESTART SEQUENCE IS FOLLOWED).
R1045       *RESTARTS ARE NOT CRITICAL TO THE ROLL DAP PERFORMANCE$ HENCE THE
R1046        THE ROLL DAP IS MERELY RESTARTED.
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R1054        *REDOTVC IS REACHED FOLLOWING ANY RESTART WHICH FINDS THE T5 BITS
R1055         (BITS 15,14 OF FLAGWRD6) SET FOR TVC. DOTVCON SETS TVCPHASE = -1
R1056         AND TVC EXPHS = 0 JUST BEFORE SETTING THESE BITS, JUST BEFORE
R1057         MAKING THE T5 CALL TO TVCDAPON. ON A NORMAL SHUTDOWN DOTVCRCS
R1058         CALLS RCSDAPON, WHICH RESETS THE T5 BITS FOR RCS.
R1060    CALLING SEQUENCE....T5, IN PARTICULAR BY ELRSKIP OF FRESH START/RESTART

R1061    NORMAL EXIT MODES....RESUME, NOQRSM, POSTJUMP (TO TVCINIT4 OR MRCLEAN)

R1062    ALARM OR ABORT EXIT MODES....NONE

R1063    SUBROUTINES CALLED....

R1064        *PCOPY+1, YCOPY+1 (PITCH AND YAW COPYCYCLES)
R1065        *ENABLE1,2, CMDSOUT (RE-ESTABLISH ACTUATOR TRIMS)
R1067        *MRCLEAN OR TVCINIT4 (TVCDAP INITIALIZATIONS)
R10671       *SWICHOVR +5  (CSM/LM V46 SWITCH-OVER)
R1068        *EXRSTRT AND TVCEXECUTIVE PHASE POINTS 1 THRU 6
R1069        *WAITLIST, IBNKCALL, POSTJUMP, ISWCALL

R1070    OTHER INTERFACES....DOTVCON AND RCSDAPON (T5 BITS), ELRSKIP (CALLS IT)
R1071    ERASABLE INITIALIZATION REQUIRED....

R1072        *T5 BITS (1,0), TVCPHASE (-2,-1,0,1,2,3), TVCEXPHS (1 THRU 6)
R1073        *TVC DAP VARIABLES
R1074        *OPERATIONS PERFORMED BY REDOTVC ARE BASED ON THE ASSUMPTION THAT
R1075         THE TVC DAPS ARE RUNNING NORMALLY

R1076    OUTPUT....

R1077        *PITCH AND YAW TVC DAP COPYCYCLES COMPLETED IF INTERUPTED
R1078        *TVCEXECUTIVE COMPLETED IF INTERUPTED
R10791       *CSM/LM V46 SWITCH-OVER REPEATED IF INTERRUPTED
R1080        *ACTUATOR TRIMS RE-ESTABLISHED (ACTUATORS BACK ON THE AIR)
R1081        *TVC DAP INITIALIZATION AS REQUIRED
R1082        *ALL TVC DAP OPERATIONS ON THE AIR

R1083    DEBRIS....TVC TEMPORARIES IN EBANK6
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L          TVCRESTARTS                                                                      USER'S PAGE NO.   3      EC S3

  1085    REF   2  LAST  951   16,2000                          SETLOC  DAPROLL
  1086                         16,3222                          BANK
  1087    REF   8  LAST  947   E6,1635                          EBANK=  TVCPHASE
  1088    REF   1                                               COUNT*  $$/RSRT

  1089    REF   9  LAST  944   16,3222  22 016 0  REDOTVC       LXCH    BANKRUPT          TVC RESTART PACKAGE
  1090                         16,3223   0 0006 1               EXTEND
  1091    REF   9  LAST  944   16,3224  22 012 1                QXCH    QRUPT             (  ..TCR..  IN  ..FINCOPY..  )

  1092    REF  10  LAST  953   16,3225  11'644 1  EXECPHS       CCS     TVCEXPHS          CHECK TVCEXECUTIVE PHASE
  1093                         16,3226   1 3230 1               TCF     +2                     MUST RESTART TVCEXECUTIVE
  1094    REF   1              16,3227   1 3233 1               TCF     TVCDAPHS               NO NEED TO RESTART TVCEXECUTIVE

  1095    REF   3  LAST  956   16,3230   3 4322 0               CAF     NINE              9CS DELAY TO FORCE EXRSTRT TO OCCUR
  1096    REF  20  LAST  951   16,3231   0 5223 1               TC      TWIDDLE              BEFORE PITCHDAP, AFTER CMDSOUT
  1097    REF   1              16,3232    03325 0               ADRES   EXRSTRT
  1099    REF   2  LAST  145   16,3233   4 7663 1  TVCDAPHS      CS      OCT37776          CHECK BITS 15 AND 1 OF TVCPHASE TO SEE
  1100    REF   9  LAST  961   16,3234   7 1635 1               MASK    TVCPHASE               DAP RESTART LOCATION  (-1,1,2,3)
  1101    REF 197  LAST  957   16,3235  10 000 0                CCS     A
  1102    REF   1              16,3236   1 3315 1               TCF     FINCOPY                FINISH THE COPYCYCLE FIRST
  1103    REF   1              16,3237   1 3244 1               TCF     ENABL1                 JUST PREPARE THE OUTCOUNTERS AND GO

  1104    REF  10  LAST  961   16,3240   4 1635 1               CS      TVCPHASE          TEST FOR TVCPHASE = -2
  11041   REF  31  LAST  956   16,3241   7 4767 1               MASK    BIT2                   (THIS INDICATES RESTART OCCURRED
  11042                        16,3242   0 0006 1               EXTEND                          DURING CSM/LM V46 SWITCH-OVER)
  11043   REF   1              16,3243   1 3321 0               BZF     TRIM/CMD          NO, TVCPHASE = -1, RSTRT WAS IN TVCINIT

  1105    REF  27  LAST  444   16,3244   3 4761 0  ENABL1        CAF     BIT8              TVC ENABLE, FOLLOWED BY 40 MS (MIN) WAIT
  11052   REF  20  LAST  719   16,3245   6 4756 1               AD      BIT11             SET BIT FOR OPTICS-DAC-ENABLE ALSO
  1106                         16,3246   0 0006 1               EXTEND                    (ENABL1 ENTERED FROM TVCDAPHS / FINCOPY)
  1107    REF  39  LAST  719   16,3247  05 012 1                WOR     CHAN12
  1108    REF   1              16,3250   3 3331 0               CAF     TVCADDR           WAIT,  CALLING ENABL2  (BBCON THERE)
  1109    REF  13  LAST  946   16,3251  54 112 1                TS      T5LOC
  1110    REF   2  LAST  961   16,3252   3 3335 1               CAF     TVCADDR +4             60MS  (TVCEXADR)
  1111    REF  10  LAST  946   16,3253  54 030 0                TS      TIME5

  1112    REF  28  LAST  946   16,3254   1 5323 1               TCF     RESUME

  1113    REF  10  LAST  961   16,3255  22 016 0  ENABL2        LXCH    BANKRUPT          CONTINUE PREPARATION OF OUTCOUNTERS

  1114    REF  32  LAST  961   16,3256   3 4767 0               CAF     BIT2              OPTICS ERROR CNTR ENABLE, 4MS MIN WAIT
  1115                         16,3257   0 0006 1               EXTEND
  1116    REF  40  LAST  961   16,3260  05 012 1                WOR     CHAN12
  1117    REF   3  LAST  961   16,3261   3 3333 1               CAF     TVCADDR +2        WAIT, CALLING CMDSOUT (BBCON THERE)
  1118    REF  14  LAST  961   16,3262  54 112 1                TS      T5LOC
  1119    REF   3  LAST  961   16,3263   3 7663 0               CAF     OCT37776               20MS
  1120    REF  11  LAST  961   16,3264  54 030 0                TS      TIME5
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 1121    REF   2  LAST  204   16,3265  1 5325 1             TCF     NCQRSM


 1122    REF  11  LAST  961   16,3266  22 016 0  CMDSOUT   LXCH    BANKRUPT          CONTINUE PREPARATION OF OUTCOUNTERS
 1123                         16,3267  0 0006 1            EXTEND
 1124    REF  10  LAST  961   16,3270  22 012 1            QXCH    QRUPT

 1125    REF 152  LAST  953   16,3271  4 4772 0            CS      ZERO              MOST RECENT ACTUATOR COMMANDS
 1126    REF   6  LAST  945   16,3272  6 1623 1            AD      PCMD                   (AVOID +0)
 1127    REF   3  LAST  719   16,3273  54 054 1            TS      TVCPITCH
 1128    REF 153  LAST  962   16,3274  4 4772 0            CS      ZERO
 1129    REF   5  LAST  945   16,3275  6 1624 0            AD      YCMD
 1130    REF   2  LAST  719   16,3276  54 053 0            TS      TVCYAW

 1131    REF   3  LAST  719   16,3277  3 5050 1            CAF     PRIO6             RELEASE THE COUNTERS (BITS 11,12)
 1132                         16,3300  0 0006 1            EXTEND
 1133    REF   7  LAST  720   16,3301  05 014 1            WOR     CHAN14

 1138    REF  11  LAST  961   16,3302  11'635 1  PHSCHK2   CCS     TVCPHASE          CHECK TVCPHASE AGAIN
 1139    REF   1              16,3303  1 3313 1            TCF     JUMPTVC4
 1140    REF   2  LAST  962   16,3304  1 3313 1            TCF     JUMPTVC4
 1141    REF 198  LAST  961   16,3305  10 000 0            CCS     A                 A CONTAINS THE DIMINISHED ABSOLUTE OF
 1142                         16,3306  0 3311 1            TC      +3                TVCPHASE (-2 BECOMES +1, -1 BECOMES +0)

 114201  REF  51  LAST  907   16,3307  0 4655 0            TC      POSTJUMP               REPEAT TVC INITIALIZATION
 114202  REF   2  LAST  943   16,3310    36166 0           CADR    MRCLEAN                (DO NOT RETURN)

 114203  REF  33  LAST  951   16,3311  0 4714 1    +3      TC      IBNKCALL               REPEAT CSM/LM V46 SWITCH-OVER
 114204  REF   3  LAST  946   16,3312    36351 0           CADR    SWICHOVR +5            (RETURN TO CHECK FOR STROKE TEST)

 1143    REF  52  LAST  962   16,3313  0 4655 0  JUMPTVC4  TC      POSTJUMP              IF POSITIVE OR ZERO, RESTART AT
 1144    REF   1              16,3314    36326 0           CADR    TVCINIT4                    TVCINIT4 (ZEROS TVCPHASE, AND
A1145                                                                                          CALLS TVC DAPS VIA DAPINIT)
 1146    REF  12  LAST  962   16,3315  51'635 0  FINCOPY   INDEX   TVCPHASE          PICK UP THE APPROPRIATE COPYCYCLE
 1147    REF   1              16,3316  3 3331 0            CAF     TVCCADR
 1148    REF   1              16,3317  0 4720 0            TCR     ISWCALL           RE-ENTER THE COPYCYCLE, RETURN AT END
 1149    REF   2  LAST  961   16,3320  1 3244 1            TCF     ENABL1            NOW PREPARE THE OUTCOUNTERS


 1150                         16,3321  0 0006 1  TRIM/CMD  EXTEND                    TVCDAPON INITIALIZATION NOT COMPLETED,
 1151    REF  16  LAST  953   16,3322  3 1424 1            DCA     PACTOFF                EG. P,YCMD MAY NOT BE SET.  SET...
 1152    REF   7  LAST  962   16,3323  53'624 1            DXCH    PCMD
 1153    REF   3  LAST  962   16,3324  1 3244 1            TCF     ENABL1            NOW PREPARE THE OUTCOUNTERS


 1161    REF  11  LAST  961   16,3325  51'644 0  EXRSTRT   INDEX   TVCEXPHS          TVCEXECUTIVE RESTARTS....GO TO
 1162    REF   1              16,3326  3 3335 1            CAF     TVCEXADR               APPROPRIATE RESTART POINT
 1163    REF 199  LAST  962   16,3327  50 000 1            INDEX   A
 1164                         16,3330  1 0000 0            TCF     0
```

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L        TVCRESTARTS                                                                       USER'S PAGE NO.  5      F6 S3

R1165    TVC RESTART TABLES.... ORDER IS REQUIRED.   HI-ORDER WORDS ONLY, OF 2CADRS, SINCE BBCON IS ALREADY THERE.

  1167   REF    2  LAST   962   16,3331               TVCADDR   =        TVCCADR          TABLE OF CADRS, UNUSED LOCS FOR GENADRS
  1168   REF    1               16,3331    03255 0    TVCCADR   GENADR  ENABL2           (FOR T5 CALL, UNUSED TABLE LOC)
  1169   REF    1               16,3332    41005 1      +1      CADR    PCOPY +1         PITCH COPYCYCLE
  1170   REF    1               16,3333    03266 0      +2      GENADR  CMDSOUT          (FOR T5 CALL, UNUSED TABLE LOC)
  1171   REF    1               16,3334    41171 0      +3      CADR    YCOPY +1         YAW COPYCYCLE
  1172                          16,3335    37772 1    TVCEXADR  OCT     37772            (UNUSED TABLE.LOC, FILL WITH 60MS, T5)
  1173   REF    1               16,3336    03123 1      +1      GENADR  TEMPSET          TVCEXECUTIVE RESTART POINTS (ORDERED)
  1174   REF    2  LAST   952   16,3337    03126 1      +2      GENADR  CORSETUP
  1175   REF    1               16,3340    03204 1      +3      GENADR  CORCOPY +1
  1176   REF    2  LAST   952   16,3341    03215 1      +4      GENADR  CNTRCOPY
```

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L        TVCDAPS                                                                USER'S PAGE NO.   1       EO 53

R1000    PROGRAM NAME....TVCDAP, CONSISTING OF PITCHDAP, YAWDAP, ETC.
R1001    LOG SECTION...TVCDAPS                     SUBROUTINE...DAPCSM
R1002    MODIFIED BY SCHLUNDT                      21 OCTOBER 1968
R1003    FUNCTIONAL DESCRIPTION....

R1004         SELF-PERPETUATING T5 TASKS WHICH GENERATE THE COMMAND SIGNALS
R1005         FOR THE PITCH AND YAW SPS GIMBAL ACTUATORS DURING TVC (SPS) BURNS,
R1006         IN RESPONSE TO BODY-AXIS RATE COMMANDS FROM CROSS-PRODUCT STEERING
R1007         (S40.8).  IF NO STEERING (IMPULSIVE BURNS) MAINTAINS ATTITUDE-HOLD
R1008         ABOUT THE REFERENCE (INITIAL) DIRECTIONS (ZERO RATE COMMANDS).

R1009         THE PITCH AND YAW LOOPS ARE SEPARATE, BUT STRUCTURED IDENTICALLY.
R1010         EACH ATTITUDE-RATE LOOP INCLUDES GIMBAL ANGLE RATE DERIVATION,
R1011         GIMBAL/BODY AXIS TRANSFORMATION, BODY-AXIS ATTITUDE ERROR
R1012         INTEGRATION WITH ERROR LIMITING, THE GENERALIZED 6TH-ORDER FILTER
R1013         FOR CSM OR CSM/LM OPERATION, A FILTER OUTPUT LIMITER,
R1014         CG-OFFSET TRACKER FILTER, AND THE CG-TRACKER MINOR LOOP.

R1015         THE DAPS ARE CYCLIC, CALLING EACH OTHER AT 1/2  THE DAP SAMPLE
R1016         TIME, AS DETERMINED BY T5TVCDT. THE ACTUATOR COMMANDS ARE
R1017         REGENERATED AS ANALOG VOLTAGES BY THE OPTICS ERROR COUNTERS, WHICH
R1018         TRANSMIT THE SIGNAL TO THE ACTUATOR SERVOS WHEN THERE IS PROPER CDU
R1019         MODING.

R1027    CALLING SEQUENCE.... (TYPICALLY)

R1028         T5 CALL OF TVCDAPON (TVCINITIALIZE) BY DOTVCON (P40)
R1029         T5 CALL OF DAPINIT (TVCDAPS) BY TVCINIT4 (TVCINITIALIZE)
R1031         T5 CALL OF PITCHDAP BY DAPINIT
R1032         T5 CALL OF YAWDAP BY PITCHDAP
R1033         T5 CALL OF PITCHDAP BY YAWDAP
R1034                       ETC.
R1035         (AUTOMATIC SEQUENCING FROM TVCDAPON)

R1036    NORMAL EXIT MODE....RESUME

R1037    ALARM OR ABORT EXIT MODES....NONE

R1038    SUBROUTINES CALLED....

R1039              HACK FOR STROKE TEST (V68) WAVEFORM GENERATION
R1041              PCOPY, YCOPY FOR COPY-CYCLES (USED ALSO BY TVC RESTART PACKAGE)
R1042              DAPINIT FOR INITIAL CDUS FOR RATE MEASUREMENTS
R1043              ERRORLIM, ACTLIM FOR INPUT (ATTITUDE-ERROR INTEGRATION) AND
R1044                   OUTPUT (ACTUATOR COMMAND) LIMITING, COMMON TO PITCH AND
R1045                   YAW DAPS
R1046              FWDFLTR (INCLUDING OPTVARK) AND PRECOMP, TO COMPUTE FILTER
R1047                  OUTPUTS AND STORAGE VALUES
R1048              RESUME
```

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R1049   OTHER INTERFACES....

R1050          S40.8 CROSS-PRODUCT STEERING FOR BODY AXIS RATE  COMMANDS OMEGAY,ZC
R1051          S40.15 FOR THE INITIAL DAP GAINS VARK AND 1/CONACC
R1052          TVCEXECUTIVE FOR DAP GAIN UPDATES AND TMC LOOP OPERATIONS
R1055          TVCRESTART PACKAGE FOR TVC RESTART PROTECTION.

R1056   ERASABLE INITIALIZATION REQUIRED....

R1057          PAD-LOAD ERASABLES ( SEE ERASABLE ASSIGNMENTS )
R1059          CONFIGURATION BITS  (14, 13)  OF DAPDATR1 AS IN R03
R1060          ENGINE-ON BIT (11.13) FOR RESTARTS
R1061          TVCPHASE FOR RESTARTS ( SEE DOTVCON, AND TVCINIT4 )
R1062          T5 BITS (15,14 OF FLAGWRD6) FOR RESTARTS
R1063          MISCELLANEOUS VARIABLES SET UP OR COMPUTED BY TVCDAPON....TVCINIT4,
R1064              INCLUDING THE ZEROING OF TEMPORARIES BY  MRCLEAN
R1065          CDUX,Y,Z AND SINCDUX....COSCDUZ AS PREPARED BY QUICTRIG (WITH
R1066              UPDATES EVERY 1/2 SECOND)
R1067          ALSO G+N PRIMARY, TVC ENABLE, AND OPTICS ERROR COUNTER ENABLE
R1068              UNLESS BENCH-TESTING.

R1069   OUTPUT....

R1070          TVCPITCH AND TVCYAW WITH COUNTER RELEASE (11.14 AND 11.13 INCREMEN-
R1071              TAL  COMMANDS TO OPTICS ERROR COUNTERS), FILTER NODES, BODY-
R1072              AXIS ATTITUDE ERROR INTEGRATOR, TOTAL ACTUATOR COMMANDS,
R1073              OFFSET-TRACKER-FILTER OUTPUTS, ETC.
R1074   DEBRIS....

R1075          MUCH, SHAREABLE WITH RCS/ENTRY, IN EBANK6 ONLY


 1077   REF   1             20,2000                       SETLOC DAPS2
 1078                       20,2644                       BANK

 1079   REF  35  LAST  956  E6,1446                       EBANK= CNTR

 1080   REF   1                                           COUNT* $$/DAPS
```

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P1081   PITCH TVCDAP STARTS HERE....(INCORPORATES CSM/LEM DAP FILTER,  MODOR DESIGN)

 1083   REF  12  LAST  962    20,2644  22 016 0  PITCHDAP LXCH    BANKRUPT        T5 ENTRY,  NORMAL OR VIA DAPINIT
 1084                         20,2645  0 0006 1           EXTEND
 1085   REF  11  LAST  962    20,2646  22 012 1           QXCH    QRUPT

 1086   REF   1               20,2647  3 3620 0           CAF     YAWT5           SET UP T5 CALL FOR YAW AUTOPILOT (LOW-
 1087   REF  15  LAST  961    20,2650  54 112 1           TS      T5LOC                 ORDER PART OF 2CADR ALREADY THERE)
 1088   REF   4  LAST  946    20,2651  31'625 1           CAE     T5TVCDT
 1089   REF  12  LAST  961    20,2652  54 030 0           TS      TIME5

 1094   REF   9  LAST  786    20,2653  30 033 1  PCDUDOTS CAE     CDUY            COMPUTE CDUYDOT
 1095   REF   2  LAST  109    20,2654  57'636 0           XCH     PCDUYPST
 1096                         20,2655  0 0006 1           EXTEND
 1097   REF   3  LAST  966    20,2656  21'636 1           MSU     PCDUYPST
 1098   REF   1               20,2657  0 2670 1           TCR     RLIMTEST              RATE TEST
 1099   REF   2  LAST  109    20,2660  55'642 1           TS      MCDUYDOT              (MINUS,  SC.AT  1/2TVCDT REVS/SEC)

 1100   REF  13  LAST  786    20,2661  30 034 0           CAE     CDUZ            COMPUTE CDUZDOT
 1101   REF   2  LAST  109    20,2662  57'637 1           XCH     PCDUZPST
 1102                         20,2663  0 0006 1           EXTEND
 1103   REF   3  LAST  966    20,2664  21'637 0           MSU     PCDUZPST
 1104   REF   2  LAST  966    20,2665  0 2670 1           TCR     RLIMTEST              RATE TEST
 1105   REF   2  LAST  110    20,2666  55'643 0           TS      MCDUZDOT              (MINUS,  SC.AT  1/2TVCDT REVS/SEC)
 1106   REF   1               20,2667  1 2701 1           TCF     PINTEGRL

 1107   REF  13  LAST  953    20,2670  55'611 1  RLIMTEST TS      TTMP1           TEST FOR EXCESSIVE CDU RATES (GREATER
 1108                         20,2671  0 0006 1           EXTEND                        THAN 2.33 DEG IN ONE SAMPLE PERIOD)
 1109   REF   1               20,2672  7 3621 0           MP      1/RTLIM               (USED BY PITCH AND YAW PASSES)
 1110                         20,2673  0 0006 1           EXTEND
 1111                         20,2674  1 2677 1           BZF     +3
 1112   REF 154  LAST  962    20,2675  3 4772 1           CAF     ZERO
 1113   REF  14  LAST  966    20,2676  55'611 1           TS      TTMP1
 1114   REF  15  LAST  966    20,2677  31'611 0           CAE     TTMP1
 1115   REF 158  LAST  957    20,2700  0 0002 0           TC      Q

 1116                         20,2701  0 0006 1  PINTEGRL EXTEND                  COMPUTE INTEGRAL OF BODY-AXIS PITCH-RATE
 1117   REF   3  LAST  945    20,2702  3 1576 1           DCA     PERRB                 ERROR, SC.AT B-1 REVS
 1118   REF   7  LAST  945    20,2703  53'665 1           DXCH    ERRBTMP

 1119                         20,2704  0 0006 1           EXTEND
 1120   REF   2  LAST  943    20,2705  3 1530 0           DCA     OMEGAYC
 1121   REF   8  LAST  966    20,2706  21'665 1           DAS     ERRBTMP

 1122   REF   5  LAST  770    20,2707  4 1151 1           CS      COSCDUZ         PREPARE BODY-AXIS PITCH RATE, OMEGAYB
 1123                         20,2710  0 0006 1           EXTEND
 1124   REF   5  LAST  770    20,2711  7 1153 0           MP      COSCDUX
 1125                         20,2712  20 001 1           DDOUBL
 1126                         20,2713  0 0006 1           EXTEND
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  1127    REF   3  LAST  966    20,2714  7 1642 1             MP       MCDUYDOT
  1128                          20,2715  20 001 1             DDOUBL
  1129    REF   1               20,2716  53'536 1             DXCH     OMEGAYB

  1130    REF   3  LAST  966    20,2717  4 1643 0             CS       MCDUZDOT
  1131                          20,2720  0 0006 1             EXTEND
  1132    REF   5  LAST  770    20,2721  7 1145 1             MP       SINCDUX
  1133                          20,2722  20 001 1             DDOUBL
  1134    REF   2  LAST  967    20,2723  21'536 1             DAS      OMEGAYB           OMEGAYB, SCALED (B-1)/TVCDT  REVS/SEC

  1135                          20,2724  0 0006 1             EXTEND                     PICK UP -OMEGAYB (SIGN CHNG, INTEGRATE)
  1136    REF   3  LAST  967    20,2725  4 1536 1             DCS      OMEGAYB
  1137    REF   9  LAST  966    20,2726  21'665 1             DAS      ERRBTMP

  1138    REF   1               20,2727  0 3246 1  PERORLIM TCR      ERRORLIM          PITCH BODY-AXIS-ERROR  INPUT LIMITER

  1139                          20,2730  0 0006 1  PFORWARD EXTEND                          PREPARE THE FILTER STORAGE LOCATIONS
  1140    REF   3  LAST  946    20,2731  3 1542 0             DCA      PTMP1                FOR THE PITCH CHANNEL
  1141    REF   2  LAST  110    20,2732  53'671 1             DXCH     TMP1
  1142                          20,2733  0 0006 1             EXTEND
  1143    REF   2  LAST  108    20,2734  3 1546 1             DCA      PTMP3
  1144    REF   2  LAST  110    20,2735  53'675 0             DXCH     TMP3
  1145                          20,2736  0 0006 1             EXTEND
  1146    REF   2  LAST  109    20,2737  3 1552 1             DCA      PTMP5
  1147    REF   2  LAST  110    20,2740  53'701 1             DXCH     TMP5

  1148    REF   1               20,2741  0 3300 1             TCR      FWDFLTR           GO COMPUTE PRESENT OUTPUT
 A1149                                                                                   (INCLUDES VARIABLE GAIN PACKAGE)

  1150                          20,2742  0 0006 1  POFFSET  EXTEND
  1151    REF   7  LAST  953    20,2743  3 1606 0             DCA      PDELOFF
  1152    REF   2  LAST  110    20,2744  21'667 0             DAS      CMDTMP            NOW SCALED AT B+0 ASCREV

  1153    REF   1               20,2745  0 3261 1  PACLIM   TCR      ACTLIM            ROUND OFF & LIMIT PITCH ACTUATOR COMMAND

  1154    REF   8  LAST  962    20,2746  4 1623 0  POUT     CS       PCMD              INCREMENTAL PITCH COMMAND
  1155    REF   3  LAST  967    20,2747  6 1666 0             AD       CMDTMP
  1156    REF   4  LAST  962    20,2750  26 054 1             ADS      TVCPITCH          UPDATE THE ERROR COUNTER (NO RESTART-
 A1157                                                                                         PROTECT, SINCE ERROR CNTR ZEROED)

  1158    REF  21  LAST  961    20,2751  3 4756 1             CAF      BIT11             BIT FOR TVCPITCH COUNT RELEASE
  1159                          20,2752  0 0006 1             EXTEND
  1160    REF   8  LAST  962    20,2753  05 014 1             WOR      CHAN14

  1161                          20,2754  0 0006 1  PPRECOMP EXTEND                          PREPARE THE FILTER STORAGE FOR PITCH
  1162    REF   2  LAST  108    20,2755  3 1544 0             DCA      PTMP2
  1163    REF   2  LAST  110    20,2756  53'673 0             DXCH     TMP2
  1164                          20,2757  0 0006 1             EXTEND
  1165    REF   2  LAST  109    20,2760  3 1550 0             DCA      PTMP4
  1166    REF   2  LAST  110    20,2761  53'677 1             DXCH     TMP4
 1167                          20,2762  0 0006 1                EXTEND
 1168    REF   2  LAST  109    20,2763  3 1554 1                DCA     PTMP6
 1169    REF   2  LAST  110    20,2764  53'703 0                DXCH    TMP6

 1170    REF   1               20,2765  0 3372 1                TCR     PRECOMP                TO THE FILTER FOR PRECOMPUTATION

 1171    REF   6  LAST  952    20,2766  31'602 1  DELBARP       CAE     DELPBAR +1         UPDATE PITCH OFFSET-TRACKER-FILTER
 1172                          20,2767  0 0006 1                EXTEND
 1173    REF   1               20,2770  7 3623 1                MP      E(-AT)
 1174    REF   2  LAST  110    20,2771  55'663 1                TS      DELBRTMP +1
 1175    REF   7  LAST  968    20,2772  31'601 1                CAE     DELPBAR
 1176                          20,2773  0 0006 1                EXTEND
 1177    REF   2  LAST  968    20,2774  7 3623 1                MP      E(-AT)
 1178    REF   3  LAST  968    20,2775  21'663 1                DAS     DELBRTMP
 1179    REF   4  LAST  967    20,2776  31'666 0                CAE     CMDTMP
 1180                          20,2777  0 0006 1                EXTEND
 1181    REF   1               20,3000  7 3622 0                MP      1-E(-AT)
 1182    REF   4  LAST  968    20,3001  21'663 1                DAS     DELBRTMP

 1183    REF   2  LAST  963    20,3002  0 3004 0  PCOPYCYC      TCR     PCOPY              PITCH COPYCYCLE

 1184    REF  29  LAST  961    20,3003  1 5323 1  PDAPEND       TCF     RESUME             PITCH DAP COMPLETED
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L        TVCDAPS                                                                                USER'S PAGE NO.  6      E6 S3

P1185    PITCH TVCDAP COPYCYCLE SUBROUTINE (CALLED VIA PITCH TVCDAP OR TVC RESTART PACKAGE)

 1187    REF  13  LAST  962    20,3004  25'635 0  PCOPY     INCR    TVCPHASE         RESTART-PROTECT THE COPYCYCLE.        (1)
A1188                                                                                       NOTE POSSIBLE RE-ENTRY FROM RESTART
A1189                                                                                       PACKAGE, SHOULD A RESTART OCCUR
A1190                                                                                       DURING PITCH COPYCYCLE.

 1191                          20,3005  0 0006 1            EXTEND
 1192    REF   3  LAST  967    20,3006  3 1671 0            DCA     TMP1
 1193    REF   4  LAST  967    20,3007  53'542 1            DXCH    PTMP1
 1194                          20,3010  0 0006 1            EXTEND
 1195    REF   3  LAST  967    20,3011  3 1673 1            DCA     TMP2
 1196    REF   3  LAST  967    20,3012  53'544 1            DXCH    PTMP2
 1197                          20,3013  0 0006 1            EXTEND
 1198    REF   3  LAST  967    20,3014  3 1675 1            DCA     TMP3
 1199    REF   3  LAST  967    20,3015  53'546 0            DXCH    PTMP3
 1200                          20,3016  0 0006 1            EXTEND
 1201    REF   3  LAST  967    20,3017  3 1677 0            DCA     TMP4
 1202    REF   3  LAST  967    20,3020  53'550 1            DXCH    PTMP4
 1203                          20,3021  0 0006 1            EXTEND
 1204    REF   3  LAST  967    20,3022  3 1701 0            DCA     TMP5
 1205    REF   3  LAST  967    20,3023  53'552 0            DXCH    PTMP5
 1206                          20,3024  0 0006 1            EXTEND
 1207    REF   3  LAST  968    20,3025  3 1703 1            DCA     TMP6
 1208    REF   3  LAST  968    20,3026  53'554 0            DXCH    PTMP6

 1209                          20,3027  0 0006 1  PMISC     EXTEND                   MISC....PITCH-RATE-ERROR INTEGRATOR
 1210    REF  10  LAST  967    20,3030  3 1665 0            DCA     ERRBTMP
 1211    REF   7  LAST  551    20,3031  55'477 0            TS      AK1                     FOR PITCH NEEDLES, SC.AT B-1 REVS
 1212    REF   4  LAST  966    20,3032  53'576 0            DXCH    PERRB

 1213    REF   5  LAST  968    20,3033  31'666 0            CAE     CMDTMP                  PITCH ACTUATOR COMMAND
 1214    REF   9  LAST  967    20,3034  55'623 0            TS      PCMD

 1215                          20,3035  0 0006 1            EXTEND                          PITCH OFFSET-TRACKER-FILTER
 1216    REF   5  LAST  968    20,3036  3 1663 0            DCA     DELBRTMP
 1217    REF   8  LAST  968    20,3037  53'602 0            DXCH    DELPBAR

 1218    REF  14  LAST  969    20,3040  25'635 0            INCR    TVCPHASE         PITCH COPYCYCLE COMPLETED             (2)

 1219    REF 159  LAST  966    20,3041  0 0002 0            TC      Q
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L         TVCDAPS                                                                                USER'S PAGE NO.   7        E6 S3

P1220     YAW    TVCDAP STARTS HERE....(INCORPORATES CSM/LEM DAP FILTER,  MODOR DESIGN)

  1222     REF  13  LAST  966   20,3042  22 016 0  YAWDAP    LXCH    BANKRUPT          T5 ENTRY,  NORMAL
  1223                          20,3043  0 0006 1            EXTEND
  1224     REF  12  LAST  966   20,3044  22 012 1            QXCH    QRUPT

  1225     REF   1              20,3045  3 3616 0            CAF     PITCHT5           SET UP T5 CALL FOR PITCH AUTOPILOT (LOW-
  1226     REF  16  LAST  966   20,3046  54 112 1            TS      T5LOC                  ORDER PART OF 2CADR ALREADY THERE)
  1227     REF   5  LAST  966   20,3047  31'625 1            CAE     T5TVCDT
  1228     REF  13  LAST  966   20,3050  54 030 0            TS      TIME5

  123302 REF  10  LAST  966   20,3051  30 033 1  YCDUDOTS  CAE     CDUY              COMPUTE CDUYDOT
  123304 REF   2  LAST  109   20,3052  57'640 1            XCH     YCDUYPST
  123306                        20,3053  0 0006 1            EXTEND
  123308 REF   3  LAST  970   20,3054  21'640 0            MSU     YCDUYPST
  12331    REF   3  LAST  966   20,3055  0 2670 1            TCR     RLIMTEST               RATE TEST
  123312 REF   4  LAST  967   20,3056  55'642 1            TS      MCDUYDOT               (MINUS, SCALED 1/2TVCDT REV/SEC)

  123314 REF  14  LAST  966   20,3057  30 034 0            CAE     CDUZ              COMPUTE CDUZDOT
  123316 REF   2  LAST  109   20,3060  57'641 0            XCH     YCDUZPST
  123318                        20,3061  0 0006 1            EXTEND
  12332    REF   3  LAST  970   20,3062  21'641 1            MSU     YCDUZPST
  123322 REF   4  LAST  970   20,3063  0 2670 1            TCR     RLIMTEST               RATE TEST
  123324 REF   4  LAST  967   20,3064  55'643 0            TS      MCDUZDOT               (MINUS, SCALED 1/2TVCDT REV/SEC)

  1234                          20,3065  0 0006 1  YINTEGRL  EXTEND                    COMPUTE INTEGRAL OF BODY-AXIS YAW-RATE
  1235     REF   3  LAST  945   20,3066  3 1600 0            DCA     YERRB                  ERROR, SC.AT B-1 REVS
  1236     REF  11  LAST  969   20,3067  53'665 1            DXCH    ERRBTMP

  1237                          20,3070  0 0006 1            EXTEND
  1238     REF   1              20,3071  3 1532 1            DCA     OMEGAZC
  1239     REF  12  LAST  970   20,3072  21'665 1            DAS     ERRBTMP

  1240     REF   6  LAST  966   20,3073  31'151 0            CAE     COSCDUZ           PREPARE BODY-AXIS YAW-RATE, OMEGAZB
  1241                          20,3074  0 0006 1            EXTEND
  1242     REF   6  LAST  967   20,3075  7 1145 1            MP      SINCDUX
  1243                          20,3076  20 001 1            DDOUBL
  1244                          20,3077  0 0006 1            EXTEND
  1245     REF   5  LAST  970   20,3100  7 1642 1            MP      MCDUYDOT
  1246                          20,3101  20 001 1            DDOUBL
  1247     REF   1              20,3102  53'540 0            DXCH    OMEGAZB

  1248     REF   5  LAST  970   20,3103  4 1643 0            CS      MCDUZDOT
  1249                          20,3104  0 0006 1            EXTEND
  1250     REF   6  LAST  966   20,3105  7 1153 0            MP      COSCDUX
  1251                          20,3106  20 001 1            DDOUBL
  1252     REF   2  LAST  970   20,3107  21'540 0            DAS     OMEGAZB           OMEGAZB, SCALED (B-1)/TVCDT  REVS/SEC

  1253                          20,3110  0 0006 1            EXTEND                    PICK UP -OMEGAZB (SIGN CHNG, INTEGRATE)
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 1254   REF   3  LAST  970   20,3111  4 1540 0              DCS     OMEGAZB
 1255   REF  13  LAST  970   20,3112  21'665 1              DAS     ERRBTMP

 1256   REF   2  LAST  967   20,3113  0 3246 1  YERORLIM TCR     ERRORLIM          YAW   BODY-AXIS-ERROR  INPUT LIMITER

 1257                        20,3114  0 0006 1  YFORWARD EXTEND                        PREPARE THE FILTER STORAGE LOCATIONS
 1258   REF   2  LAST  109   20,3115  3 1556 0           DCA     YTMP1                 FOR THE YAW CHANNEL
 1259   REF   4  LAST  969   20,3116  53'671 1           DXCH    TMP1
 1260                        20,3117  0 0006 1           EXTEND
 1261   REF   2  LAST  109   20,3120  3 1562 1           DCA     YTMP3
 1262   REF   4  LAST  969   20,3121  53'675 0           DXCH    TMP3
 1263                        20,3122  0 0006 1           EXTEND
 1264   REF   2  LAST  109   20,3123  3 1566 0           DCA     YTMP5
 1265   REF   4  LAST  969   20,3124  53'701 1           DXCH    TMP5

 1266   REF   2  LAST  967   20,3125  0 3300 1           TCR     FWDFLTR           GO COMPUTE PRESENT OUTPUT
A1267                                                                              (INCLUDES VARIABLE GAIN PACKAGE)

 1268                        20,3126  0 0006 1  YOFFSET  EXTEND
 1269   REF   7  LAST  953   20,3127  3 1610 1           DCA     YDELOFF
 1270   REF   6  LAST  969   20,3130  21'667 0           DAS     CMDTMP            NOW SCALED AT B+0 ASCREV

 1271   REF   2  LAST  967   20,3131  0 3261 1  YACLIM   TCR     ACTLIM            ROUND OFF & LIMIT YAW ACTUATOR COMMAND

 1272   REF   6  LAST  962   20,3132  4 1624 1  YOUT     CS      YCMD              INCREMENTAL YAW   COMMAND
 1273   REF   7  LAST  971   20,3133  6 1666 0           AD      CMDTMP
 1274   REF   3  LAST  962   20,3134  26 053 0           ADS     TVCYAW            UPDATE THE ERROR COUNTER (NO RESTART-
A1275                                                                                   PROTECT, SINCE ERROR CNTR ZEROED)

 1276   REF  25  LAST  702   20,3135  3 4755 1           CAF     BIT12             BIT FOR TVCYAW COUNT RELEASE
 1277                        20,3136  0 0006 1           EXTEND
 1278   REF   9  LAST  967   20,3137  05 014 1           WOR     CHAN14

 1279                        20,3140  0 0006 1  YPRECOMP EXTEND                        PREPARE THE FILTER STORAGE FOR YAW
 1280   REF   2  LAST  109   20,3141  3 1560 0           DCA     YTMP2
 1281   REF   4  LAST  969   20,3142  53'673 0           DXCH    TMP2
 1282                        20,3143  0 0006 1           EXTEND
 1283   REF   2  LAST  109   20,3144  3 1564 1           DCA     YTMP4
 1284   REF   4  LAST  969   20,3145  53'677 1           DXCH    TMP4
 1285                        20,3146  0 0006 1           EXTEND
 1286   REF   2  LAST  109   20,3147  3 1570 1           DCA     YTMP6
 1287   REF   4  LAST  969   20,3150  53'703 0           DXCH    TMP6

 1288   REF   2  LAST  968   20,3151  0 3372 1           TCR     PRECOMP               TO THE FILTER FOR PRECOMPUTATION

 1289   REF   6  LAST  953   20,3152  31'604 1  DELBARY  CAE     DELYBAR +1        UPDATE YAW   OFFSET-TRACKER-FILTER
 1290                        20,3153  0 0006 1           EXTEND
 1291   REF   3  LAST  968   20,3154  7 3623 1           MP      E(-AT)
 1292   REF   6  LAST  969   20,3155  55'663 1           TS      DELBRTMP +1
 1293   REF   7  LAST  971   20,3156  31'603 0           CAE     DELYBAR
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  1294                             20,3157  0 0006 1               EXTEND
  1295    REF   4  LAST  971       20,3160  7 3623 1               MP       E(-AT)
  1296    REF   7  LAST  971       20,3161  21'663 1               DAS      DELBRTMP
  1297    REF   8  LAST  971       20,3162  31'666 0               CAE      CMDTMP
  1298                             20,3163  0 0006 1               EXTEND
  1299    REF   2  LAST  968       20,3164  7 3622 0               MP       1-E(-AT)
  1300    REF   8  LAST  972       20,3165  21'663 1               DAS      DELBRTMP

  1301    REF   2  LAST  963       20,3166  0 3170 1   YCOPYCYC TCR      YCOPY              YAW   COPYCYCLE

  1302    REF  30  LAST  968       20,3167  1 5323 1   YCAPEND  TCF      RESUME             YAW   DAP COMPLETED
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P1303   YAW    TVCDAP COPYCYCLE SUBROUTINE (CALLED VIA YAW   TVCDAP OR TVC RESTART PACKAGE)

  1305  REF  15  LAST  969  20,3170  25'635 0  YCOPY    INCR   TVCPHASE        RESTART-PROTECT THE COPYCYCLE.       (3)
A1306                                                                               NOTE POSSIBLE RE-ENTRY FROM RESTART
A1307                                                                               PACKAGE, SHOULD A RESTART OCCUR
A1308                                                                               DURING YAW   COPYCYCLE.

  1309                      20,3171   0 0006 1           EXTEND
  1310  REF   5  LAST  971  20,3172   3 1671 0           DCA    TMP1
  1311  REF   3  LAST  971  20,3173  53'556 1            DXCH   YTMP1
  1312                      20,3174   0 0006 1           EXTEND
  1313  REF   5  LAST  971  20,3175   3 1673 1           DCA    TMP2
  1314  REF   3  LAST  971  20,3176  53'560 1            DXCH   YTMP2
  1315                      20,3177   0 0006 1           EXTEND
  1316  REF   5  LAST  971  20,3200   3 1675 1           DCA    TMP3
  1317  REF   3  LAST  971  20,3201  53'562 0            DXCH   YTMP3
  1318                      20,3202   0 0006 1           EXTEND
  1319  REF   5  LAST  971  20,3203   3 1677 0           DCA    TMP4
  1320  REF   3  LAST  971  20,3204  53'564 0            DXCH   YTMP4
  1321                      20,3205   0 0006 1           EXTEND
  1322  REF   5  LAST  971  20,3206   3 1701 0           DCA    TMP5
  1323  REF   3  LAST  971  20,3207  53'566 1            DXCH   YTMP5
  1324                      20,3210   0 0006 1           EXTEND
  1325  REF   5  LAST  971  20,3211   3 1703 1           DCA    TMP6
  1326  REF   3  LAST  971  20,3212  53'570 0            DXCH   YTMP6

  1327                      20,3213   0 0006 1  YMISC    EXTEND                 MISC....YAW-RATE-ERROR INTEGRATOR
  1328  REF  14  LAST  971  20,3214   3 1665 0           DCA    ERRBTMP
  1329  REF   7  LAST  551  20,3215  55'500 1            TS     AK2                    FOR YAW   NEEDLES, SC.AT B-1 REVS
  1330  REF   4  LAST  970  20,3216  53'600 1            DXCH   YERRB

  1331  REF   9  LAST  972  20,3217  31'666 0            CAE    CMDTMP
  1332  REF   7  LAST  971  20,3220  55'624 1            TS     YCMD

  1333                      20,3221   0 0006 1           EXTEND
  1334  REF   9  LAST  972  20,3222   3 1663 0           DCA    DELBRTMP
  1335  REF   8  LAST  971  20,3223  53'604 0            DXCH   DELYBAR

  1336  REF 155  LAST  966  20,3224   3 4772 1           CAF    ZERO             YAW   COPYCYCLE COMPLETED
  1337  REF  16  LAST  973  20,3225  55'635 1            TS     TVCPHASE               RESET TVCPHASE

  1338  REF 160  LAST  969  20,3226   0 0002 0           TC     Q
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P1339    SUBROUTINES COMMON TO BOTH PITCH AND YAW DAPS....

R1340    INITIALIZATION PACKAGE FOR CDURATES....

 1341    REF  14  LAST  970    20,3227  22 016 0  DAPINIT  LXCH    BANKRUPT          T5 RUPT ENTRY (CALLED BY TVCINT4)

 1342    REF  15  LAST  952    20,3230  3 7702 0           CAF     NEGONE                SET UP
 1343    REF   6  LAST  970    20,3231  6 1625 1           AD      T5TVCDT               T5 CALL FOR PITCHDAP IN TVCDT SECS
 1344    REF   3  LAST  437    20,3232  6 4752 0           AD      NEGMAX                (T5TVCDT = POSMAX - TVCDT/2 +1)
 1345    REF   7  LAST  974    20,3233  6 1625 1           AD      T5TVCDT
 1346    REF  14  LAST  970    20,3234  54 030 0           TS      TIME5
 1347    REF   2  LAST  970    20,3235  3 3616 0           CAF     PITCHT5               (BBCON ALREADY THERE)
 1348    REF  17  LAST  970    20,3236  54 112 1           TS      T5LOC

 1349    REF  11  LAST  970    20,3237  30 033 1           CAE     CDUY              READ AND STORE CDUS FOR DIFFERENTIATOR
 1350    REF   4  LAST  966    20,3240  55'636 1           TS      PCDUYPST              PAST-VALUES
 13501   REF   4  LAST  970    20,3241  55'640 0           TS      YCDUYPST
 1351    REF  15  LAST  970    20,3242  30 034 0           CAE     CDUZ
 1352    REF   4  LAST  966    20,3243  55'637 0           TS      PCDUZPST
 13521   REF   4  LAST  970    20,3244  55'641 1           TS      YCDUZPST

 1353    REF   3  LAST  962    20,3245  1 5325 1           TCF     NOQRSM

R1354    BODY-AXIS-ERROR  INPUT LIMITER PACKAGE....

 1355    REF  15  LAST  973    20,3246  31'664 1  ERRORLIM CAE     ERRBTMP           CHECK FOR INPUT-ERROR LIMIT
 1356                          20,3247  0 0006 1           EXTEND                        CHECKS UPPER WORD ONLY
 1357    REF   1               20,3250  7 4766 0           MP      1/ERRLIM
 1358                          20,3251  0 0006 1           EXTEND
 1359                          20,3252  1 3260 1           BZF     +6
 1360    REF  16  LAST  974    20,3253  11'664 0           CCS     ERRBTMP
 1361    REF   1               20,3254  3 4754 0           CAF     ERRLIM
 1362                          20,3255  1 3257 0           TCF     +2
 1363    REF   2  LAST  974    20,3256  4 4754 1           CS      ERRLIM
 1364    REF  17  LAST  974    20,3257  55'664 0           TS      ERRBTMP           LIMIT WRITES OVER UPPER WORD ONLY

 1365    REF 161  LAST  973    20,3260  0 0002 0           TC      Q

R1366    ACTUATOR-COMMAND LIMITER PACKAGE....

 1367    REF  10  LAST  973    20,3261  31'667 1  ACTLIM   CAE     CMDTMP +1         ROUND UP FOR OUTPUT
 1368                          20,3262  6 0000 1           DOUBLE
 1369    REF  87  LAST  946    20,3263  54 001 1           TS      L
 1370    REF 156  LAST  973    20,3264  3 4772 1           CAF     ZERO
 1371    REF  11  LAST  974    20,3265  6 1666 0           AD      CMDTMP

 1372                          20,3266  0 0006 1           EXTEND                    CHECK FOR ACTUATOR COMMAND LIMIT
 1373   REF   1                 20,3267  7 3615 1             MP      1/ACTSAT
 1374                           20,3270  0 0006 1             EXTEND
 1375                           20,3271  1 3277 1             BZF     +6
 1376   REF  12  LAST   974     20,3272  11'666 1             CCS     CMDTMP              APPLY LIMITS
 1377   REF   1                 20,3273  3 3614 1             CAF     ACTSAT
 1378                           20,3274  1 3276 0             TCF     +2
 1379   REF   2  LAST   975     20,3275  4 3614 0             CS      ACTSAT
 1380   REF  13  LAST   975     20,3276  55'666 1             TS      CMDTMP              LIMITS WRITE OVER CMDTMP

 1381   REF 162  LAST   974     20,3277  0 0002 0             TC      Q


R1382   FILTER COMPUTATIONS FOR PRESENT OUTPUT................

 1383   REF 157  LAST   974     20,3300  3 4772 1   FWDFLTR   CAF     ZERO
 1384   REF   2  LAST   109     20,3301  55'615 0             TS      DAP1
 1385   REF   2  LAST   109     20,3302  55'617 1             TS      DAP2
 1386   REF   2  LAST   109     20,3303  55'621 1             TS      DAP3
 1387   REF  14  LAST   975     20,3304  55'666 1             TS      CMDTMP

 1388   REF  10  LAST   973     20,3305  55'662 0             TS      DELBRTMP

 1389   REF  18  LAST   974     20,3306  31'665 0   1DAPCAS   CAE     ERRBTMP +1          FIRST DAP CASCADE
 1390                           20,3307  0 0006 1             EXTEND
 1391   REF  10  LAST   948     20,3310  7 1705 0             MP      N10                         N10
 1392   REF   3  LAST   975     20,3311  55'616 0             TS      DAP1 +1
 1393   REF  19  LAST   975     20,3312  3 1664 1             CA      ERRBTMP
 1394                           20,3313  0 0006 1             EXTEND
 1395   REF  11  LAST   975     20,3314  7 1705 0             MP      N10                         N10
 1396   REF   4  LAST   975     20,3315  21'616 0             DAS     DAP1
 1397   REF   6  LAST   973     20,3316  53'671 1             DXCH    TMP1
 1398   REF   5  LAST   975     20,3317  21'616 0             DAS     DAP1

 1399   REF   6  LAST   975     20,3320  31'616 1   2DAPCAS   CAE     DAP1 +1             SECOND DAP CASCADE
 1400                           20,3321  0 0006 1             EXTEND
 1401   REF  12  LAST   975     20,3322  7 1712 0             MP      N10 +5                      N20
 1402   REF   3  LAST   975     20,3323  55'620 0             TS      DAP2 +1
 1403   REF   7  LAST   975     20,3324  3 1615 1             CA      DAP1
 1404                           20,3325  0 0006 1             EXTEND
 1405   REF  13  LAST   975     20,3326  7 1712 0             MP      N10 +5                      N20
 1406   REF   4  LAST   975     20,3327  21'620 0             DAS     DAP2
 1407   REF   6  LAST   973     20,3330  53'675 0             DXCH    TMP3
 1408   REF   5  LAST   975     20,3331  21'620 0             DAS     DAP2

 1409   REF  62  LAST   957     20,3332  31'465 1             CAE     DAPDATR1            TEST FOR LEM ON OR OFF
 1410   REF  39  LAST   957     20,3333  7 4753 0             MASK    BIT14
 1411   REF 200  LAST   962     20,3334  10 000 0             CCS     A
 1412   REF   1                 20,3335  1 3344 0             TCF     3DAPCAS             LEM ON
 1413                           20,3336  0 0006 1             EXTEND                      LEM OFF
 1414   REF   6  LAST   975     20,3337  3 1620 1             DCA     DAP2
 14141                          20,3340  20 001 1             DDOUBL
 14142                          20,3341  20 001 1             DDOUBL
 1415   REF   3  LAST  975      20,3342  53'622 1             DXCH    DAP3
 1416   REF   1                 20,3343  1 3356 0             TCF     OPTVARK

 1417   REF   7  LAST  975      20,3344  31'620 1  3DAPCAS    CAE     DAP2 +1             THIRD DAP CASCADE
 1418                           20,3345  0 0006 1             EXTEND
 1419   REF  14  LAST  975      20,3346  7 1717 0             MP      N10 +10D                 N30
 1420   REF   4  LAST  976      20,3347  55'622 1             TS      DAP3 +1
 1421   REF   8  LAST  976      20,3350  3 1617 0             CA      DAP2
 1422                           20,3351  0 0006 1             EXTEND
 1423   REF  15  LAST  976      20,3352  7 1717 0             MP      N10 +10D                 N30
 1424   REF   5  LAST  976      20,3353  21'622 1             DAS     DAP3
 1425   REF   6  LAST  973      20,3354  53'701 1             DXCH    TMP5
 1426   REF   6  LAST  976      20,3355  21'622 1             DAS     DAP3

 1427   REF   7  LAST  976      20,3356  4 1622 1  OPTVARK    CS      DAP3 +1             VARIABLE GAIN PACKAGE
 1428                           20,3357  0 0006 1             EXTEND                      (ALSO, SIGN CHANGE IN FORWARD LOOP)
 1429   REF   3  LAST  948      20,3360  7 1632 0             MP      VARK                      SCALED (1/8 B+2)   CSM/LM
 1430   REF  15  LAST  975      20,3361  55'667 0             TS      CMDTMP +1                        (  "  B+4)   CSM
 1431   REF   8  LAST  976      20,3362  4 1621 1             CS      DAP3
 1432                           20,3363  0 0006 1             EXTEND
 1433   REF   4  LAST  976      20,3364  7 1632 0             MP      VARK
 1434   REF  16  LAST  976      20,3365  21'667 0             DAS     CMDTMP

 1435   REF  17  LAST  976      20,3366  53'667 0             DXCH    CMDTMP              FIX UP SCALING - SCALED B+1 ASCREV
 1437                           20,3367  20 001 1             DDOUBL
 1438   REF  18  LAST  976      20,3370  53'667 0             DXCH    CMDTMP                               - SCALED B+0 ASCREV
A14381                                                                                    NOTE - THERE IS AN INHERANT GAIN OF
A14382                                                                                    (B+1 ASCREV/REV) ON THE OUTPUT DACS

 1439   REF 163  LAST  975      20,3371  0 0002 0             TC      Q

R1440   FILTER PRECOMPUTATIONS FOR NEXT PASS....................

 1441   REF 158  LAST  975      20,3372  3 4772 1  PRECOMP    CAF     ZERO                ***** FIRST  CASCADE FILTER  **********
 1442   REF  16  LAST  966      20,3373  55'611 1             TS      TTMP1
 1443   REF   3  LAST  110      20,3374  55'613 0             TS      TTMP2

 1444   REF  20  LAST  975      20,3375  3 1665 0             CA      ERRBTMP +1          MULTIPLY INPUT BY
 1445                           20,3376  0 0006 1             EXTEND
 1446   REF  16  LAST  976      20,3377  7 1706 0             MP      N10 +1                   N11/2
 1447   REF  17  LAST  976      20,3400  55'612 1             TS      TTMP1 +1
 1448   REF  21  LAST  976      20,3401  3 1664 1             CA      ERRBTMP
 1449                           20,3402  0 0006 1             EXTEND
 1450   REF  17  LAST  976      20,3403  7 1706 0             MP      N10 +1                   N11/2
 1451   REF  18  LAST  976      20,3404  21'612 1             DAS     TTMP1

 1452   REF   8  LAST  975      20,3405  4 1616 0             CS      DAP1 +1             MULTIPLY OUTPUT BY
 1453                            20,3406  0 0006 1             EXTEND
 1454   REF  18  LAST  976       20,3407  7 1710 1             MP       N10 +3               D11/2
 1455   REF   4  LAST  976       20,3410  55'614 1             TS       TTMP2 +1
 1456   REF   9  LAST  976       20,3411  4 1615 0             CS       DAP1
 1457                            20,3412  0 0006 1             EXTEND
 1458   REF  19  LAST  977       20,3413  7 1710 1             MP       N10 +3               D11/2
 1459   REF   5  LAST  977       20,3414  21'614 1             DAS      TTMP2

 1460   REF   6  LAST  977       20,3415  53'614 1             DXCH     TTMP2
 1461   REF  19  LAST  976       20,3416  21'612 1             DAS      TTMP1
 1462   REF  20  LAST  977       20,3417  53'612 1             DXCH     TTMP1
 1463                            20,3420  20 001 1             DDOUBL
 1464   REF   6  LAST  973       20,3421  21'673 0             DAS      TMP2

 1465   REF   7  LAST  977       20,3422  53'673 0             DXCH     TMP2
 1466   REF   7  LAST  975       20,3423  53'671 1             DXCH     TMP1

 1467   REF 159  LAST  976       20,3424  3 4772 1             CAF      ZERO
 1468   REF  21  LAST  977       20,3425  55'611 1             TS       TTMP1
 1469   REF   8  LAST  977       20,3426  55'672 1             TS       TMP2

 1470   REF  22  LAST  976       20,3427  3 1665 0             CA       ERRBTMP +1          MULTIPLY INPUT  BY
 1471                            20,3430  0 0006 1             EXTEND                       SECOND-ORDER NUMERATOR COEFF
 1472   REF  20  LAST  977       20,3431  7 1707 1             MP       N10 +2                 N12
 1473   REF  22  LAST  977       20,3432  55'612 1             TS       TTMP1 +1
 1474   REF  23  LAST  977       20,3433  3 1664 1             CA       ERRBTMP
 1475                            20,3434  0 0006 1             EXTEND
 1476   REF  21  LAST  977       20,3435  7 1707 1             MP       N10 +2                 N12
 1477   REF  23  LAST  977       20,3436  21'612 1             DAS      TTMP1

 1478   REF  10  LAST  977       20,3437  4 1616 0             CS       DAP1 +1             MULTIPLY OUTPUT BY
 1479                            20,3440  0 0006 1             EXTEND
 1480   REF  22  LAST  977       20,3441  7 1711 0             MP       N10 +4                 D12
 1481   REF   9  LAST  977       20,3442  55'673 0             TS       TMP2 +1
 1482   REF  11  LAST  977       20,3443  4 1615 0             CS       DAP1
 1483                            20,3444  0 0006 1             EXTEND
 1484   REF  23  LAST  977       20,3445  7 1711 0             MP       N10 +4                 D12
 1485   REF  10  LAST  977       20,3446  21'673 0             DAS      TMP2

 1486   REF  24  LAST  977       20,3447  53'612 1             DXCH     TTMP1
 1487   REF  11  LAST  977       20,3450  21'673 0             DAS      TMP2


 1488   REF 160  LAST  977       20,3451  3 4772 1   2CASFLTR  CAF      ZERO            *****SECOND CASCADE FILTER*****
 1489   REF  25  LAST  977       20,3452  55'611 1             TS       TTMP1
 1490   REF   7  LAST  977       20,3453  55'613 0             TS       TTMP2

 1491   REF  12  LAST  977       20,3454  3 1616 1             CA       DAP1 +1         MULTIPLY INPUT BY
 1492                            20,3455  0 0006 1             EXTEND
 1493   REF  24  LAST  977       20,3456  7 1713 1             MP       N10 +6                 N21/2
 1494    REF  26  LAST  977   20,3457  55'612 1          TS      TTMP1 +1
 1495    REF  13  LAST  977   20,3460  3 1615 1          CA      DAP1
 1496                         20,3461  0 0006 1          EXTEND
 1497    REF  25  LAST  977   20,3462  7 1713 1          MP      N10 +6               N21/2
 1498    REF  27  LAST  978   20,3463  21'612 1          DAS     TTMP1

 1499    REF   9  LAST  976   20,3464  4 1620 0          CS      DAP2 +1         MULTIPLY OUTPUT BY
 1500                         20,3465  0 0006 1          EXTEND
 1501    REF  26  LAST  978   20,3466  7 1715 1          MP      N10 +8D              D21/2
 1502    REF   8  LAST  977   20,3467  55'614 1          TS      TTMP2 +1
 1503    REF  10  LAST  978   20,3470  4 1617 1          CS      DAP2
 1504                         20,3471  0 0006 1          EXTEND
 1505    REF  27  LAST  978   20,3472  7 1715 1          MP      N10 +8D              D21/2
 1506    REF   9  LAST  978   20,3473  21'614 1          DAS     TTMP2

 1507    REF  10  LAST  978   20,3474  53'614 1          DXCH    TTMP2
 1508    REF  28  LAST  978   20,3475  21'612 1          DAS     TTMP1
 1509    REF  29  LAST  978   20,3476  53'612 1          DXCH    TTMP1
 1510                         20,3477  20 001 1          DDOUBL
 1511    REF   6  LAST  978   20,3500  21'677 1          DAS     TMP4

 1512    REF   7  LAST  978   20,3501  53'677 1          DXCH    TMP4
 1513    REF   7  LAST  975   20,3502  53'675 0          DXCH    TMP3

 1514    REF 161  LAST  977   20,3503  3 4772 1          CAF     ZERO
 1515    REF  30  LAST  978   20,3504  55'611 1          TS      TTMP1
 1516    REF   8  LAST  978   20,3505  55'676 0          TS      TMP4

 1517    REF  14  LAST  978   20,3506  3 1616 1          CA      DAP1 +1          MULTIPLY INPUT  BY
 1518                         20,3507  0 0006 1          EXTEND
 1519    REF  28  LAST  978   20,3510  7 1714 0          MP      N10 +7               N22
 1520    REF  31  LAST  978   20,3511  55'612 1          TS      TTMP1 +1
 1521    REF  15  LAST  978   20,3512  3 1615 1          CA      DAP1
 1522                         20,3513  0 0006 1          EXTEND
 1523    REF  29  LAST  978   20,3514  7 1714 0          MP      N10 +7               N22
 1524    REF  32  LAST  978   20,3515  21'612 1          DAS     TTMP1

 1525    REF  11  LAST  978   20,3516  4 1620 0          CS      DAP2 +1          MULTIPLY OUTPUT BY
 1526                         20,3517  0 0006 1          EXTEND
 1527    REF  30  LAST  978   20,3520  7 1716 1          MP      N10 +9D              D22
 1528    REF   9  LAST  978   20,3521  55'677 1          TS      TMP4 +1
 1529    REF  12  LAST  978   20,3522  4 1617 1          CS      DAP2
 1530                         20,3523  0 0006 1          EXTEND
 1531    REF  31  LAST  978   20,3524  7 1716 1          MP      N10 +9D              D22
 1532    REF  10  LAST  978   20,3525  21'677 1          DAS     TMP4

 1533    REF  33  LAST  978   20,3526  53'612 1          DXCH    TTMP1
 1534    REF  11  LAST  978   20,3527  21'677 1          DAS     TMP4
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  1535   REF  63  LAST  975    20,3530  31'465 1           CAE     DAPDATR1       TEST FOR LEM ON OR OFF
  1536   REF  32  LAST  956    20,3531  7 4754 1           MASK    BIT13
  1537   REF 201  LAST  975    20,3532  10 000 0           CCS     A
  1538   REF 164  LAST  976    20,3533  0 0002 0           TC      Q              EXIT IF LEM OFF

  1539   REF 162  LAST  978    20,3534  3 4772 1  3CASFLTR CAF     ZERO           *****THIRD CASCADE FILTER*****
  1540   REF  34  LAST  978    20,3535  55'611 1           TS      TTMP1
  1541   REF  11  LAST  978    20,3536  55'613 0           TS      TTMP2

  1542   REF  13  LAST  978    20,3537  3 1620 1           CA      DAP2 +1          MULTIPLY INPUT  BY (1/2)
  1543                         20,3540  0 0006 1           EXTEND
  1544   REF  32  LAST  978    20,3541  7 1720 1           MP      N10 +11D             N31/2
  1545   REF  35  LAST  979    20,3542  55'612 1           TS      TTMP1 +1
  1546   REF  14  LAST  979    20,3543  3 1617 0           CA      DAP2
  1547                         20,3544  0 0006 1           EXTEND
  1548   REF  33  LAST  979    20,3545  7 1720 1           MP      N10 +11D             N31/2
  1549   REF  36  LAST  979    20,3546  21'612 1           DAS     TTMP1

  1550   REF   9  LAST  976    20,3547  4 1622 1           CS      DAP3 +1
  1551                         20,3550  0 0006 1           EXTEND
  1552   REF  34  LAST  979    20,3551  7 1722 0           MP      N10 +13D             D31/2
  1553   REF  12  LAST  979    20,3552  55'614 1           TS      TTMP2 +1
  1554   REF  10  LAST  979    20,3553  4 1621 1           CS      DAP3
  1555                         20,3554  0 0006 1           EXTEND
  1556   REF  35  LAST  979    20,3555  7 1722 0           MP      N10 +13D             D31/2
  1557   REF  13  LAST  979    20,3556  21'614 1           DAS     TTMP2

  1558   REF  14  LAST  979    20,3557  53'614 1           DXCH    TTMP2
  1559   REF  37  LAST  979    20,3560  21'612 1           DAS     TTMP1
  1560   REF  38  LAST  979    20,3561  53'612 1           DXCH    TTMP1
  1561                         20,3562  20 001 1           DDOUBL
  1562   REF   6  LAST  973    20,3563  21'703 0           DAS     TMP5

  1563   REF   7  LAST  979    20,3564  53'703 0           DXCH    TMP6
  1564   REF   7  LAST  976    20,3565  53'701 1           DXCH    TMP5

  1565   REF 163  LAST  979    20,3566  3 4772 1           CAF     ZERO
  1566   REF  39  LAST  979    20,3567  55'611 1           TS      TTMP1
  1567   REF   8  LAST  979    20,3570  55'702 1           TS      TMP6

  1568   REF  15  LAST  979    20,3571  3 1620 1           CA      DAP2 +1          MULTIPLY INPUT  BY
  1569                         20,3572  0 0006 1           EXTEND
  1570   REF  36  LAST  979    20,3573  7 1721 0           MP      N10 +12D             N32
  1571   REF  40  LAST  979    20,3574  55'612 1           TS      TTMP1 +1
  1572   REF  16  LAST  979    20,3575  3 1617 0           CA      DAP2
  1573                         20,3576  0 0006 1           EXTEND
  1574   REF  37  LAST  979    20,3577  7 1721 0           MP      N10 +12D             N32
  1575   REF  41  LAST  979    20,3600  21'612 1           DAS     TTMP1

  1576   REF  11  LAST  979    20,3601  4 1622 1           CS      DAP3 +1
```

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L        TVCDAPS                                                              USER'S PAGE NO.  17        E6 S3

  1577                           20,3602  0 0006 1          EXTEND
  1578   REF  38  LAST  979      20,3603  7 1723 1          MP       N10 +140               D32
  1579   REF   9  LAST  979      20,3604  55'703 0          TS       TMP6 +1
  1580   REF  12  LAST  979      20,3605  4 1621 1          CS       DAP3
  1581                           20,3606  0 0006 1          EXTEND
  1582   REF  39  LAST  980      20,3607  7 1723 1          MP       N10 +140               D32
  1583   REF  10  LAST  980      20,3610  21'703 0          DAS      TMP6

  1584   REF  42  LAST  979      20,3611  53'612 1          DXCH     TTMP1
  1585   REF  11  LAST  980      20,3612  21'703 0          DAS      TMP6

  1586   REF 165  LAST  979      20,3613  0 0002 0          TC       Q
```

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L        TVCDAPS                                                                                USER'S PAGE NO. 18       E6 S3

P1587    CONSTANTS FOR AUTOPILOTS

R1588    NCTE....1 ASCREV (ACTUATOR CMD SCALING) = 85.41 ARCSEC/BIT  OR  1.07975111 REVS (85.41X16384/3600/360)

R1590             1 SPASCREV (SPECIAL ACTUATOR CMD SCALING) = 1.04620942 REVS

  1592                               20,3614   00375 0  ACTSAT   DEC    253                ACTUATOR LIMIT (6 DEG),  SC.AT 1ASCREV
  1593                               20,3615   00101 1  1/ACTSAT DEC    .0039525692        RECIPROCAL (1/253)

  1594   REF  33  LAST  979            4754             ERRLIM   EQUALS BIT13              FILTER INPUT LIMIT....B-3 REVS (45DEG),
  1595   REF  36  LAST  946            4766             1/ERRLIM EQUALS BIT3                    SC.AT B-1 REV, AND ITS RECIPROCAL

  1596   REF   1                     20,3616   02644 0  PITCHT5  GENADR PITCHDAP           UPPER WORDS OF T5 2CADRS, LOWER WORDS
  1597   REF   2  LAST  949          20,3617   03227 0  DAPT5    GENADR DAPINIT                 (BBCON) ALREADY THERE.  ORDER IS
  1598   REF   1                     20,3620   03042 1  YAWT5    GENADR YAWDAP                  REQUIRED.

  1599                               20,3621   00115 1  1/RTLIM  DEC    0.004715           .004715(CDUDIF) = 0 IF CDUDIF < 2.33 DEG
  1600                               20,3622   00243 1  1-E(-AT) OCT    00243              AT = .01SEC....EITHER(1/A=4SEC, T=40MS),
  1601                               20,3623   37535 0  E(-AT)   OCT    37535                                  OR(1/A=8SEC, T=80MS)
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R1000   PROGRAM NAME...TVC ROLL AUTOPILOT
R1001   LOG SECTION...TVCROLLDAP                  SUBROUTINE...DAPCSM
R1002   MODIFIED BY SCHLUNDT                      21 OCTOBER 1968


R1005   FUNCTIONAL DESCRIPTION....

R1006        *AN ADAPTATION OF THE LEM P-AXIS CONTROLLER
R1007        *MAINTAIN OGA WITHIN 5 DEG DEADBND OF OGAD, WHERE OGAD = OGA AS SEEN
R1008         BY IGNITION (P40)
R1009        *MAINTAIN OGA RATE LESS THAN 0.1 DEG/SEC LIMIT CYCLE RATE
R1012        *SWITCHING LOGIC IN PHASE PLANE.... SEE GSOP CHAPTER 3
R1013        *USES T6 CLOCK TO TIME JET FIRINGS
R1014        *MAXIMUM JET FIRING TIME = 2.56 SECONDS, LIMITED TO 2.5 IF GREATER
R1015        *MINIMUM JET FIRING TIME = 15 MS
R1016        *JET PAIRS FIRE ALTERNATELY
R1017        *AT LEAST 1/2 SECOND DELAY BEFORE A NEW JET PAIR IS FIRED
R1018        *JET FIRINGS MAY NOT BE EXTENDED, ONLY SHORTENED, WHEN RE-EVALUATION
R1019         OF A JET FIRING TIME IS MADE ON A LATER PASS

R1020   CALLING SEQUENCE....

R1021        *ROLLDAP CALL VIA WAITLIST, IN PARTICULAR BY TVCEXEC (EVERY 1/2 SEC)
R1022         WITH A 3CS DELAY TO ALLOW FREE TIME FOR OTHER RUPTS (DWNRPT, ETC.)

R1023   NORMAL EXIT MODES.... ENDOFJOB

R1024   ALARM OR ABORT EXIT MODES.... NONE

R1025   SUBROUTINES CALLED.....NONE

R1026   OTHER INTERFACES....

R1027        *TVCEXEC SETS UP ROLLDAP TASK EVERY 1/2 SECOND AND UPDATES 1/CONACC
R1028         EVERY 10 SECONDS (VIA MASSPROP AND S40.15)
R1029        *RESTARTS SUSPEND ROLL DAP COMPUTATIONS UNTIL THE NEXT 1/2 SEC
R1030         SAMPLE PERIOD. (THE PART OF TVCEXECUTIVE THAT CALLS ROLL DAP IS
R1031         NOT RESTARTED.) THE OGAD FROM IGNITION IS MAINTAINED.

R1032   ERASABLE INITIALIZATION REQUIRED....

R1033        *1/CONACC    (S40.15)
R1034        *OGAD (CDUX AT IGNITION)
R1035        *OGANOW  (CDUX AT TVCINIT4 AND TVCEXECUTIVE)
R1036        *OGAPAST  (OGANOW AT TVCEXECUTIVE)
R10362       *ROLLFIRE = TEMREG = ROLLWORD = 0    (MRCLEAN LOOP IN TVCDAPON)
R1037   OUTPUT....

R1038        *ROLL JET PAIR FIRINGS
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L       TVCROLLDAP                                                      USER'S PAGE NO.   2      E0 S3

R1040   DEBRIS.... MISCELLANEOUS, SHAREABLE WITH RCS/ENTRY, IN EBANK6 ONLY
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P1041   SOME NOTES ON THE ROLL AUTOPILOT, AND IN PARTICULAR, ON ITS SWITCHING
R1042   LOGIC.  SEE SECTION THREE OF THE GSOP (SUNDISK/COLOSSUS) FOR DETAILS.

R1043   SWITCHING LOGIC IN THE PHASE PLANE....

R1044                                OGARATE
R1045                                   *
R1046                                   *
R1047    * * * * * * * * * * *          *
R1048                                   *     (REGION 1, SEE TEXT BELOW)
R1049                              *    *
R1050                                   *
R1051   * * * * * * *      (COAST)      *     ...PARABOLA (SWITCHING = CONTROL)
R1052                 *                 *    .
R1053                   *               *   *
R1054                     *             *                (FIRE NEG ROLL JETS)
R1055                       *           *      *
R1056       (-DB,+LMCRATE)....*         *
R1057                         *         *        *
R1058                         *         *                              OGAERROR
R1059   ************************************************************************
R1060                                   *         *                (-AK, OGAERR)
R1061                          *        *         *      (REGION 6-PRIME)
R1062                                   *         *      (SEE TEXT BELOW)
R1063                            *      *           *
R1064                                   *             *     ...STRAIGHT LINE
R1065       (FIRE POS ROLL JETS)    *   *               *  .
R1066                                   *    (COAST)      *
R1067                                   *                   * * * * * * * * * *
R1068                                   *                         -MINLIM
R1069                                   *    *
R1070                                   *
R1071                                   *          * * * * * * * * * * * * * * *
R1072                                   *                        -MAXLIM
R1073                                   *
R1074                                   *

R1075   SWITCHING PARABOLAS ARE CONTROL PARABOLAS, THUS REQUIRING KNOWLEDGE OF
R1076        CONTROL ACCELERATION CONACC, OR ITS RECIPROCAL, 1/CONACC, THE TVC
R1077        ROLL DAP GAIN  (SEE TVCEXECUTIVE VARIABLE GAIN PACKAGE).  JET
R1078        FIRING TIME IS SIMPLY THAT REQUIRED TO ACHIEVE THE DESIRED OGARATE,
R1079        SUBJECT TO THE LIMITATIONS DISCUSSED UNDER FUNCTIONAL DESCRIPTION,
R1080        ABOVE.

R1081   THE THREE CONTROL REGIONS  (+, -, AND ZERO TORQUE) ARE COMPRIZED OF
R1082        TWELVE SUBSET REGIONS  ( 1...6, AND THE CORRESPONDING 1-PRIME...
R1083        6-PRIME )  SEE SECTION 3 OF THE GSOP  (SUNDISK OR COLOSSUS)
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P1084   GIVEN THE OPERATING POINT NOT IN THE COAST REGION, THE DESIRED OGARATE
R1085        IS AT THE POINT OF PENETRATION OF THE COAST REGION BY THE CONTROL
R1086        PARABOLA WHICH PASSES THROUGH THE OPERATING POINT. FOR REGION 3
R1087        DESIRED OGARATE IS SIMPLY +-MAXLIM. FOR REGIONS 1 OR 6 THE SOLUTION
R1088        TO A QUADRATIC IS REQUIRED (THE PENETRATION IS ALONG THE STRAIGHT
R1089        LINE OR MINLIM BOUNDRY SWITCH LINES). AN APPROXIMATION IS MADE
R1090        INSTEAD. TAKE AN OPERATING POINT IN REGION 6' . PASS A TANGENT TO
R1091        THE CONTROL PARABOLA THROUGH THE OPERATING POINT, AND FIND ITS
R1092        INTERSECTION WITH THE STRAIGHT LINE SECTION OF THE SWITCH CURVE...
R1093        THE INTERSECTION DEFINES DESIRED OGARATE. IF THE OPERATING POINT IS
R1094        CLOSE TO THE SWITCH LINE, THE APPROXIMATION IS QUITE GOOD (INDEED
R1095        THE APPROXIMATE AND QUADRATIC SOLUTIONS CONVERGE IN THE LIMIT AS
R1096        THE SWITCH LINE IS APPROACHED). IF THE OPERATING POINT IS NOT CLOSE
R1097        TO THE SWITCH LINE, THE APPROXIMATE SOLUTION GIVES VALID TREND
R1098        INFORMATION (DIRECTION OF DESIRED OGARATE) AT LEAST. THE
R1099        RE-EVALUATION OF DESIRED OGARATE IN SUBSEQUENT ROLL DAP PASSES (1/2
R1100        SECOND INTERVALS) WILL BENEFIT FROM THE CONVERGENT NATURE OF THE
R1101        APPROXIMATION.

R11021  FOR LARGE OGAERROR THE TANGENT INTERSECTS +-MINLIM SWITCH BOUNDRY BEFORE
R11022       INTERSECTING THE STRAIGHT LINE SWITCH. HOWEVER THE MINLIM IS
R11023       IGNORED IN COMPUTING THE FIRING TIME, SO THAT THE EXTENSION (INTO
R11024       THE COAST REGION) OF THE STRAIGHT LINE SWITCH IS WHAT IS FIRED TO.
R11025       IF THE ROLL DAP FINDS ITSELF IN THE COAST REGION BEFORE REACHING
R11026       THE DESIRED INTERSECTION (IE, IN THE REGION BETWEEN THE MINLIM
R11027       AND THE STRAIGHT LINE SWITCH) IT WILL EXIBIT NORMAL COAST-REGION
R11028       BEHAVIOR AND TURN OFF THE JETS. THE PURPOSE OF THIS FIRING POLICY
R11029       IS TO MAINTAIN STATIC ROLL STABILITY IN THE EVENT OF A JET
R1103        FAILED-ON.

R1113   WHEN THE OPERATING POINT IS IN REGION 1 THE SAME APPROXIMATION IS
R1114        MADE, BUT AT AN ARTIFICIALLY-CREATED OR DUMMY OPERATING POINT,
R1115        DEFINED BY.. OGAERROR = INTERSECTION OF CONTROL PARABOLA  AND
R1116        OGAERROR AXIS, OGARATE = +-LMCRATE WHERE SIGN IS OPPOSITE THAT OF
R1117        REAL OPERATING POINT RATE.  WHEN THE OPERATING POINT HAS PASSED
R1118        FROM REGION 1 TO REGION 6', THE DUMMY POINT IS NO LONGER REQUIRED,
R1119        AND THE SOLUTION REVERTS TO THAT OF A REGULAR REGION 6' POINT.


R1120   EQUATION FOR SWITCHING PARABOLA (SEE FIGURE ABOVE)....
R1121                                   2
R1122       SOGAERROR = (DB - (SOGARATE) (1/CONACC)/2) SGN(SOGARATE)


R1123   EQUATION FOR SWITCHING STRAIGHT LINE SEGMENT....

R1124       SOGARATE = -(-SLOPE)(SOGAERROR) - SGN(SOGARATE) INTERCEP

R1125                 WHERE  INTERCEP = DB(-SLOPE) - LMCRATE
```

```
R1126   EQUATION FOR INTERSECTION, CONTROL PARABOLA AND STRAIGHT SWITCH LINE....

R1127        DOGADOT = NUM/DEN, WHERE
R1128                                   2
R1129            NUM = (-SLOPE)(OGARATE) (1/CONACC)
R1130                    +SGN(DELOGA)(-SLOPE)(OGAERROR - SGN(DELOGA)(DB))
R1131                    +LMCRATE

R1132            DEN = (-SLOPE)(LMCRATE)(1/CONACC) - SGN(DELOGA)

R1133                                              2
R1134            DELOGA = OGAERROR - (DB -  OGARATE (1/CONACC)/2) SGN(OGARATE)


R1135   FOR REGIONS 6 AND 6-PRIME  USE ACTUAL OPERATING POINT  (OGA, OGARATE)
R1136        FOR OGAERROR AND OGARATE IN THE INTERSECTION EQUATIONS ABOVE.
R1137        FOR REGIONS 1 AND 1-PRIME  USE DUMMY OPERATING POINT FOR OGAERROR
R1138        AND OGARATE,  WHERE THE DUMMY POINT IS GIVEN BY....
R1139        OGAERROR= DELOGA + DB SGN(OGARATE)
R1140        OGARATE= -LMCRATE SGN(OGARATE)

R1141   NOTE, OGAERROR = OGA - OGAD  USES DUMMY REGISTER  OGA IN ROLL DAP CODING
R1142         ALSO, AT POINT WHERE DOGARATE IS COMPUTED, REGISTER DELOGA IS USED
R1143         AS A DUMMY REGISTER FOR THE OGAERROR IN THE NUM EQUATION ABOVE
```

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L        TVCROLLDAP                                                                             USER'S PAGE NO.   6        E0 S3

P11432   ROLLDAP CODING....

 2000    REF   3  LAST  961   16,2000                            SETLOC DAPROLL
 2001                         16,3342                            BANK
 2002    REF   9  LAST  951   E6,1645                            EBANK= OGANOW
 2003    REF   1                                                 COUNT* $$/ROLL
 2006    REF  10  LAST  987   16,3342  31'645 1  ROLLDAP  CAE    OGANOW              OGA RATE ESTIMATOR...SIMPLE FIRST-ORDER
 2007                         16,3343  0 0006 1                  EXTEND                     DIFFERENCE (SAMPLE TIME = 1/2 SEC)
 2008    REF   3  LAST  951   16,3344  21'646 0                  MSU    OGAPAST
 2009                         16,3345  0 0006 1                  EXTEND
 2010    REF  26  LAST  941   16,3346  7 4764 1                  MP     BIT5
 2011    REF 202  LAST  979   16,3347  22 000 1                  LXCH   A
 2012    REF   3  LAST  182   16,3350  55'533 1                  TS     OGARATE              SC.AT B-4 REV/SEC

R2017    COMPUTATIONS WHICH FOLLOW USE OGA FOR OGAERR  (SAME REGISTER)
R2018    EXAMINE DURATION OF LAST JET FIRING IF JETS NOW ON.

 2019    REF   2  LAST  109   16,3351  3 1571 0  DURATION CA     ROLLFIRE            SAME SGN AS PRESENT TORQ,MAGN=POSMAX
 2020                         16,3352  0 0006 1           EXTEND
 2021                         16,3353  1 3355 0           BZF    +2                  ROLL JETS ARE NOW OFF.
 2022    REF   1              16,3354  1 3363 0           TCF    ROLLOGIC            ENTER LOGIC,JETS NOW ON.

 2023    REF   2  LAST  109   16,3355  31'573 1           CAE    TEMREG              EXAMINE LAST FIRING INTERVAL
 2024                         16,3356  0 0006 1           EXTEND                     IF POSITIVE, DONT FIRE
 2025    REF   2  LAST  987   16,3357  1 3363 0           BZF    ROLLOGIC            ENTER LOGIC, JETS NOW OFF.

 2026    REF 164  LAST  979   16,3360  3 4772 1           CAF    ZERO                JETS HAVE NOT BEEN OFF FOR 1/2 SEC. WAIT
 2027    REF   3  LAST  987   16,3361  55'573 0           TS     TEMREG              RESET TEMREG
 2028    REF  44  LAST  953   16,3362  1 5314 0  WAIT1/2  TCF    TASKOVER            EXIT ROLL DAP

R2029    COMPUTE DB-(1/2 CONACC) (OGARATE)SQ  (1/2 IN THE SCALING)

 2030    REF   4  LAST  987   16,3363  4 1533 1  ROLLOGIC CS     OGARATE             SCALED AT 2(-4) REV/SEC
 2031                         16,3364  0 0006 1           EXTEND
 2032    REF   3  LAST  948   16,3365  7 1631 0           MP     1/CONACC            SCALED AT 2(+9) SEC SQ /REV
 2033                         16,3366  0 0006 1           EXTEND
 2034    REF   5  LAST  987   16,3367  7 1533 1           MP     OGARATE
 2035    REF   1              16,3370  6 3756 0           AD     DB                  SCALED AT 2(+0) REV
 2036    REF   4  LAST  987   16,3371  55'573 0           TS     TEMREG              QUANTITY SCALED AT 2(+0) REV.

R2037    GET SIGN OF OGARATE

 2038    REF   6  LAST  987   16,3372  3 1533 0           CA     OGARATE
 2039                         16,3373  0 0006 1           EXTEND
 2040                         16,3374  6 3377 1           BZMF   +3                  LET SGN(0) BE NEGATIVE
 2041    REF  51  LAST  945   16,3375  3 4770 0           CA     BIT1
 2042                         16,3376  1 3400 1           TCF    +2
 2043    REF  52  LAST  987   16,3377  4 4770 1           CS     BIT1
 2044    REF   2  LAST  110   16,3400  55'651 0           TS     SGNRT               + OR -  2(-14)
```

```
R2045    CALCULATE DISTANCE FROM SWITCH PARABOLA (DELOGA)

 2046                          16,3401  0 0006 1             EXTEND
 2047    REF   5  LAST  987    16,3402  7 1573 0             MP      TEMREG           SGN(OGARATE) TEMREG NOW IN L
 2048    REF  88  LAST  974    16,3403  4 0001 1             CS      L
 2049    REF   3  LAST  110    16,3404  6 1647 0             AD      OGA              SCALED AT 2(+0) REV
 2050    REF   2  LAST  110    16,3405  55'652 0  DELOGAC    TS      DELOGA           SCALE B+0 REV, PLUS TO RIGHT OF C-PARAB

R2051    EXAMINE SGN(DELOGA) AND CREATE CA OR CS INSTR. DEPENDING UPON SIGN.

 2052                          16,3406  0 0006 1             EXTEND
 2053                          16,3407  6 3412 0             BZMF    +3
 2054    REF   8  LAST  720    16,3410  3 4346 1             CAF     PRIO30              =CA  (30000)
 2055                          16,3411  1 3413 0             TCF     +2
 2056    REF  34  LAST  422    16,3412  3 4752 0             CAF     BIT15               =CS  (40000)
 2057    REF   2  LAST  110    16,3413  55'653 1             TS      I

 2058    REF   3  LAST  988    16,3414  51'653 0             INDEX   I                TEST ON  I SGN(OGARATE)
 2059    REF   3  LAST  987    16,3415  0 1651 1             0       SGNRT            CA OR CS
 2060                          16,3416  4 0000 0             COM
 2061                          16,3417  0 0006 1             EXTEND
 2062    REF   1               16,3420  6 3471 0  REG1TST    BZMF    ROLLON           IF REGION 1 (DELOGA OGARATE SAME SIGN)

R2063    NO JET FIRE YET, TEST FOR MAX OGARATE

 2064    REF   4  LAST  988    16,3421  51'653 0             INDEX   I
 2065    REF   7  LAST  987    16,3422  0 1533 0             0       OGARATE          CA OR CS...BOTH MUST BE NEG. HERE
 2066    REF   2  LAST  110    16,3423  55'654 0             TS      IOGARATE         I.E. I OGARATE
 2067    REF   1               16,3424  6 3763 0             AD      MAXLIM           SCALED AT 2(-4) REV/SEC
 2068                          16,3425  0 0006 1             EXTEND
 2069    REF   1               16,3426  6 3550 1  REG3TST    BZMF    RATELIM          IF REGION 3 (RATES TOO HIGH, FIRE JETS)

R2070    COMPUTATION OF I((-SLOPE)OGA + OGARATE) - INTERCEPT..NOTE THAT STR. LINE
R2071    SWITCH SLOPE IS (SLOPE) DEG/SEC/DEG, A NEG QUANTITY

 2072    REF   8  LAST  988    16,3427  3 1533 0             CA      OGARATE
 2073                          16,3430  0 0006 1             EXTEND
 2074    REF  40  LAST  975    16,3431  7 4753 0             MP      BIT14
 2075    REF   6  LAST  988    16,3432  55'573 0             TS      TEMREG
 2076    REF   4  LAST  988    16,3433  3 1647 0             CA      OGA
 2077                          16,3434  0 0006 1             EXTEND
 2078    REF   1               16,3435  7 3757 0             MP      -SLOPE
 2079                          16,3436  20 001 1             DDOUBL
 2080                          16,3437  20 001 1             DDOUBL
 2081                          16,3440  20 001 1             DDOUBL                   (OGA ERROR MUST BE LESS THAN +-225 DEG)
 2082    REF   7  LAST  988    16,3441  6 1573 1             AD      TEMREG

 2083    REF   5  LAST  988    16,3442  51'653 0             INDEX   I
 2084    REF 203  LAST  987    16,3443  0 0000 1             0       A                I((-SLOPE)OGA+OGARATE) AT 2(-3)REV/SEC
 2085                          16,3444  4 0000 0             COM
```

```
  2086   REF   1               16,3445  6 3761 1             AD      INTERCEP         SCALED AT 2(-3) REV.
  2087                         16,3446  4 0000 0             COM
  2088                         16,3447  0 0006 1             EXTEND
  2089   REF   1               16,3450  6 3661 0  REG2TST    BZMF    NOROLL           IF REGION 2 (COAST SIDE OF STRT LINE)

 R2090   CHECK TO SEE IF OGARATE IS ABOVE MINLIM BOUNDARY

  2091   REF   3  LAST  988    16,3451  3 1654 1             CA      IOGARATE         ALWAYS NEGATIVE
  2092   REF   1               16,3452  6 3762 1             AD      MINLIM           SCALED AT 2(-4) REV/SEC
  2093                         16,3453  0 0006 1             EXTEND
  2094   REF   2  LAST  989    16,3454  6 3661 0  REG4TST    BZMF    NOROLL           IF REGION 4 (COAST SIDE OF MINLIM)

 R2095   ALL AREAS CHECKED EXCEPT LAST AREA...NO FIRE IN THIS SMALL SEGMENT

  2096   REF   6  LAST  988    16,3455  51'653 0             INDEX   I
  2097   REF   5  LAST  988    16,3456  0 1647 0             0       OGA
  2098                         16,3457  4 0000 0             COM
  2099   REF   2  LAST  987    16,3460  6 3756 0             AD      DB
  2100                         16,3461  4 0000 0             COM
  2101                         16,3462  0 0006 1             EXTEND
  2102   REF   3  LAST  989    16,3463  6 3661 0  REG5TST    BZMF    NOROLL           IF REGION 5 (COAST SIDE OF DB)


 R2103   JETS MUST FIRE NOW.OGARATE IS NEG.(OR VISA VERSA).USE DIRECT STR. LINE.
 R2104   DELOGA AND DELOGART ARE USED AS DUMMY VARIABLES IN THE SOLUTION OF A
 R2105   STRAIGHT LINE APPROXIMATION TO A QUADRATIC SOLUTION OF THE INTERSECTION
 R2106   OF THE CONTROL PARABOLA AND THE STRAIGHT-LINE SWITCH LINE. THE STRAIGHT
 R2107   LINE IS THE TANGENT TO THE CONTROL PARABOLA AT THE OPERATING POINT. (FOR
 R2108   OPERATING POINTS IN REGIONS 6 OR 6')

  2109   REF   6  LAST  989    16,3464  31'647 0  REGION6    CAE     OGA              USE ACTUAL OPERATING POINT FOR TANGENT
  2110   REF   3  LAST  988    16,3465  55'652 0             TS      DELOGA           ACTUAL STATE
  2111   REF   9  LAST  988    16,3466  3 1533 0             CA      OGARATE
  2112   REF   2  LAST  110    16,3467  55'650 1             TS      DELOGART         ACTUAL STATE,I.E. DEL OGARATE
  2113   REF   1               16,3470  1 3500 0             TCF     ONROLL

 R2114   JETS ALSO FIRE FROM HERE EXCEPT OGARATE IS POS(VISA VERSA),USE INDIRECT
 R2115   STRAIGHT LINE ESTABLISHED BY TANGENT TO A CONTROL PARABOLA AT   ((DELOGA
 R2116   + DB SGN(DELOGA) ), -LMCRATE SGN(DELOGA) )          (THIS IS THE DUMMY
 R2117   OPERATING POINT FOR OPERATING POINTS IN REGIONS I AND  I' )

  2118   REF   7  LAST  989    16,3471  51'653 0  ROLLON     INDEX   I
  2119   REF   3  LAST  989    16,3472  0 3756 0             0       DB
  2120   REF   4  LAST  989    16,3473  27'652 0             ADS     DELOGA           DELOGA WAS DIST. FROM SWITCH PARABOLA

  2121   REF   1               16,3474  4 3760 1             CS      LMCRATE          LIMIT CYCLE RATE AT 2(-4) REV/SEC
  2122   REF   8  LAST  989    16,3475  51'653 0             INDEX   I
  2123   REF 204  LAST  988    16,3476  0 0000 1             0       A
  2124   REF   3  LAST  989    16,3477  55'650 1             TS      DELOGART         EVALUATE STATE FOR INDIRECT LINE.
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R2125  SOLVE STRAIGHT LINES SIMULTANEOUSLY TO OBTAIN DESIRED OGARATE.

 2126                          16,3500  0 0006 1  ONROLL    EXTEND                          DELOGART IN ACC. ON ARRIVAL
 2127   REF   4  LAST  987     16,3501  7 1631 0            MP       1/CONACC
 2128                          16,3502  6 0000 1            DOUBLE
 2129                          16,3503  0 0006 1            EXTEND
 2130   REF   2  LAST  988     16,3504  7 3757 0            MP       -SLOPE
 2131   REF   8  LAST  988     16,3505  55'573 0            TS       TEMREG                 2(-SLOPE)RATE /CONACC
 2132                          16,3506  0 0006 1            EXTEND
 2133   REF   4  LAST  989     16,3507  7 1650 1            MP       DELOGART
 2134   REF   5  LAST  990     16,3510  55'650 1            TS       DELOGART               2(-SLOPE)(RATESQ)/CONACC
 2135   REF  22  LAST  967     16,3511  4 4756 0            CS       BIT11
 2136   REF   9  LAST  989     16,3512  51'653 0            INDEX    I
 2137   REF 205  LAST  989     16,3513  0 0000 1            0        A
 2138   REF   9  LAST  990     16,3514  27'573 0  RATEDEN   ADS      TEMREG                 DENOMINATOR COMPLETED

 2139   REF  10  LAST  990     16,3515  51'653 0            INDEX    I
 2140   REF   5  LAST  989     16,3516  0 1652 1            0        DELOGA
 2141                          16,3517  4 0000 0            COM
 2142   REF   4  LAST  989     16,3520  6 3756 0            AD       DB
 2143                          16,3521  4 0000 0            COM
 2144                          16,3522  0 0006 1            EXTEND
 2145   REF   3  LAST  990     16,3523  7 3757 0            MP       -SLOPE
 2146   REF   6  LAST  990     16,3524  27'650 1            ADS      DELOGART
 2147   REF   2  LAST  989     16,3525  3 3760 0            CA       LMCRATE
 2148                          16,3526  0 0006 1            EXTEND
 2149   REF  23  LAST  990     16,3527  7 4756 0            MP       BIT11
 2150   REF   7  LAST  990     16,3530  6 1650 0  RATENUM   AD       DELOGART               NUMERATOR COMPLETED

 2151   REF  89  LAST  988     16,3531  56 001 0            XCH      L                      PLACE NUMERATOR IN L FOR OVERFL. CHECK
 2152   REF 165  LAST  987     16,3532  3 4772 1            CA       ZERO
 2153                          16,3533  0 0006 1            EXTEND
 2154   REF  10  LAST  990     16,3534  11'573 0            DV       TEMREG                 OVERFLOW, IF ANYTHING, NOW APPEARS IN A
 2155                          16,3535  0 0006 1            EXTEND
 2156   REF   1                16,3536  1 3544 0            BZF      DVOK                   NO OVERFLOW.....(0,L)/TEMREG = 0,L

 2157   REF 206  LAST  990     16,3537  10 000 0  MINLIMAP  CCS      A
 2158   REF  18  LAST  944     16,3540  3 4750 1            CAF      POSMAX                      POSITIVE OVERFLOW
 2159   REF   1                16,3541  1 3553 0            TCF      ROLLSET
 2160   REF  19  LAST  990     16,3542  4 4750 0            CS       POSMAX                      NEGATIVE OVERFLOW
 2161   REF   2  LAST  990     16,3543  1 3553 0            TCF      ROLLSET

 2162   REF 207  LAST  990     16,3544  22 000 1  DVOK      LXCH     A                      PUT NUMERATOR BACK INTO A, 0 IN L
 2163                          16,3545  0 0006 1            EXTEND
 2164   REF  11  LAST  990     16,3546  11'573 0            DV       TEMREG                 RESULT OF DIVISION IS DESIRED OGARATE
 2165   REF   3  LAST  990     16,3547  1 3553 0            TCF      ROLLSET                    ( SCALED AT B-4 REV/SEC )


 2173   REF   2  LAST  988     16,3550  4 3763 1  RATELIM   CS       MAXLIM
 2174   REF  11  LAST  990     16,3551  51'653 0            INDEX    I
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L        TVCROLLDAP                                                                         USER'S PAGE NO. 10      E6 S3

 2175    REF 208  LAST  990   16,3552  0 0000 1              0      A                   IF I = CA, DESIRED RATE IS   -MAXLIM

R2176    COMPUTE JET FIRE TIME, BASED ON DESIRED RATE MINUS PRESENT RATE

 2177    REF  12  LAST  990   16,3553  55'573 0  ROLLSET  TS     TEMREG               STORE DESIRED OGARATE (SCALED B-4)
 21771                        16,3554  0 0006 1           EXTEND
 2178    REF  10  LAST  989   16,3555  61'533 0           SU     OGARATE              RATE DIFF. SCALED AT 2(-4) REV/SEC
 21781   REF  13  LAST  991   16,3556  55'573 0           TS     TEMREG                   OVERFLOW PROTECT
 21782                        16,3557  1 3562 1           TCF    +3                           "       "
 217821  REF 209  LAST  991   16,3560  50 000 1           INDEX  A                            "       "
 217822  REF   2  LAST  895   16,3561  4 4751 1           CS     LIMITS                       "       "
 2179                         16,3562  0 0006 1           EXTEND
 2180    REF   1              16,3563  7 7652 0           MP     T6SCALE              T6SCALE = 8/10.24
 2181                         16,3564  0 0006 1           EXTEND
 2182    REF   5  LAST  990   16,3565  7 1631 0           MP     1/CONACC             SCALED AT B+9 SECSQ/REV (MAX < .60)
 2183                         16,3566  20 001 1           DDOUBL
 21831                        16,3567  20 001 1           DDOUBL
 2184    REF  14  LAST  991   16,3570  55'573 0           TS     TEMREG                   OVERFLOW PROTECT
 21841                        16,3571  1 3574 0           TCF    +3                           "       "
 21842   REF 210  LAST  991   16,3572  50 000 1           INDEX  A                            "       "
 21843   REF   3  LAST  991   16,3573  4 4751 1           CS     LIMITS                       "       "
 2185    REF  15  LAST  991   16,3574  55'573 0           TS     TEMREG               JET FIRE TIME AT 625 MICROSEC/BIT
 2186                         16,3575  0 0006 1           EXTEND                      POS MEANS POSITIVE ROLL TORQUE.
 2187    REF   4  LAST  989   16,3576  1 3661 1           BZF    NOROLL

R2188    JET FIRE TIME IS NZ, TEST FOR JETS NOW ON.

 21881   REF  16  LAST  991   16,3577  31'573 1           CAE    TEMREG               DESIRED CHANGE IN OGARATE
 2189                         16,3600  0 0006 1           EXTEND
 2190    REF   3  LAST  987   16,3601  7 1571 1           MP     ROLLFIRE             (SGN OF TORQUE..ZERO IF JETS NOW OFF)
 2191    REF 211  LAST  991   16,3602  10 000 0           CCS    A
 2192    REF   1              16,3603  1 3607 1           TCF    MOREROLL             CONTINUE FIRING WITH PRESENT POLARITY
 2193    REF   1              16,3604  1 3612 0           TCF    NEWROLL              START NEW FIRING NOW, PLUS
 2194    REF   5  LAST  991   16,3605  1 3661 1           TCF    NOROLL               TERMINATE OLD FIRING, NEW SIGN REQUESTED
 2195    REF   2  LAST  991   16,3606  1 3612 0           TCF    NEWROLL              START NEW FIRING NOW, MINUS

R2196    CONTINUE PRESENT FIRING

 2197    REF 166  LAST  990   16,3607  3 4772 1  MOREROLL CAF    ZERO
 2198    REF  12  LAST  990   16,3610  55'653 1           TS     I                    USE TEMP. AS MOREROLL SWITCH
 2199    REF   1              16,3611  1 3623 1           TCF    MAXTFIRE

R2200    START NEW FIRING, BUT CHECK IF GREATER THAN MIN FIRE TIME.

 2201    REF  17  LAST  991   16,3612  11'573 0  NEWROLL  CCS    TEMREG               CALL THIS T6FIRE
 2202    REF  93  LAST  985   16,3613  6 4770 0           AD     ONE
 2203                         16,3614  1 3616 1           TCF    +2
 2204    REF  94  LAST  991   16,3615  6 4770 0           AD     ONE
 2205                         16,3616  4 0000 0           COM                         -MAG(T6FIRE)
 2206    REF   1              16,3617  6 5001 0           AD     TMINFIRE             TMINFIRE-MAG(T6FIRE)
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L       TVCROLLDAP                                                                            USER'S PAGE NO.  11       E6 53

 2207                           16,3620  4 0000 0             COM
 2208                           16,3621  0 0006 1             EXTEND
 2209   REF   6  LAST  991      16,3622  6 3661 0  MINTST     BZMF     NOROLL         IF NOT GREATER THAN TMINFIRE (NEW FIRE)

R2210   PROCEED WITH NEW FIRING, BUT NOT LONGER THAN TMAXFIRE.

 2211   REF  18  LAST  991      16,3623  3 1573 1  MAXTFIRE CA       TEMREG
 2212                           16,3624  0 0006 1             EXTEND
 2213   REF   1                 16,3625  7 4766 0             MP       1/TMXFIR       I.E. 1/TMAXFIRE
 2214                           16,3626  0 0006 1             EXTEND
 2215   REF   1                 16,3627  1 3635 0  MAXTST     BZF      NOMXFIRE       IF LESS THAN TMAXFIRE

 2216   REF 212  LAST  991      16,3630  10 000 0             CCS      A
 2217   REF   1                 16,3631  3 3764 1             CAF      TMAXFIRE       USE MAXIMUM
 2218                           16,3632  1 3634 1             TCF      +2
 2219   REF   2  LAST  992      16,3633  4 3764 0             CS       TMAXFIRE       USE MAXIMUM
 2220   REF  19  LAST  992      16,3634  55'573 0             TS       TEMREG

R2221   SET UP SIGN OF REQUIRED TORQUE.

 2222   REF  20  LAST  992      16,3635  11'573 0  NOMXFIRE CCS      TEMREG         FOR TORQUE SIGN
 2223   REF  20  LAST  990      16,3636  3 4750 1             CA       POSMAX         POSITIVE TORQUE REQUIRED
 2224                           16,3637  1 3641 0             TCF      +2
 2225   REF   4  LAST  974      16,3640  3 4752 0             CA       NEGMAX         NEGATIVE TORQUE REQUIRED
 2226   REF   4  LAST  991      16,3641  55'571 1             TS       ROLLFIRE       SET ROLLFIRE FOR + OR - TORQUE

 2227                           16,3642  4 0000 0             COM                     COMPLEMENT... POS. FOR NEG. TORQUE
 2228                           16,3643  0 0006 1             EXTEND
 2229                           16,3644  6 3647 1             BZMF     +3             POSITIVE TORQUE REQUIRED
 2230   REF  21  LAST  992      16,3645  4 1573 0             CS       TEMREG
 2231   REF  22  LAST  992      16,3646  55'573 0             TS       TEMREG

 2232   REF  13  LAST  991      16,3647  3 1653 0  FIRELOOK CA       1              IS IT MOREROLL
 2233                           16,3650  0 0006 1             EXTEND
 2234   REF   1                 16,3651  1 3653 0             BZF      FIREPLUG       YES
 2235   REF   1                 16,3652  1 3664 1             TCF      JETROLL        MAG(T6FIRE) NOW IN TEMREG

 2236   REF   1                 16,3653  30 031 0  FIREPLUG CAE      TIME6          CHECK FOR EXTENDED FIRING
 2237                           16,3654  0 0006 1             EXTEND
 2238   REF  23  LAST  992      16,3655  61'573 1             SU       TEMREG
 2241                           16,3656  0 0006 1             EXTEND
 2242   REF  45  LAST  987      16,3657  6 5314 1  EXTENTST   BZMF     TASKOVER       IF EXTENSION WANTED, DONT, EXIT ROLL DAP
 2243   REF   2  LAST  992      16,3660  1 3664 1             TCF      JETROLL

 2244   REF 167  LAST  991      16,3661  4 4772 0  NOROLL     CS       ZERO           COAST.....(NEG ZERO FOR TIME6)
 2245   REF   5  LAST  992      16,3662  55'571 1             TS       ROLLFIRE       NOTE, JETS CAN FIRE NEXT PASS
 2246   REF  24  LAST  992      16,3663  55'573 0             TS       TEMREG

 2247                           16,3664  0 0006 1  JETROLL    EXTEND
 2248   REF   1                 16,3665  3 3755 0             DCA      NOROLLT6
 2249   REF   2  LAST  139   16,3666  52 111 1             DXCH    T6LOC
 2250   REF  25  LAST  992   16,3667  3 1573 1             CA      TEMREG          ENTER JET FIRING TIME
 2251   REF   2  LAST  992   16,3670  54 031 1             TS      TIME6

 2252   REF  14  LAST  992   16,3671  3 1653 0             CA      I               I=0 IF MOREROLL,KEEP SAME JETS ON
 2253                        16,3672  0 0006 1             EXTEND
 2254   REF  46  LAST  992   16,3673  1 5314 0  SAMEJETS   BZF     TASKOVER        IF JETS ON KEEP SAME JETS. EXIT ROLL DAP

 2255   REF   6  LAST  992   16,3674  11'571 1             CCS     ROLLFIRE
 2256   REF   1              16,3675  1 3701 0             TCF     +TORQUE
 2257   REF   1              16,3676  1 3742 1             TCF     T6ENABL
 2258   REF   1              16,3677  1 3722 1             TCF     -TORQUE
 2259   REF   2  LAST  993   16,3700  1 3742 1             TCF     T6ENABL

R2260   PROCEED WITH PLUS TORQUE.

 2261   REF   2  LAST  109   16,3701  3 1572 0  +TORQUE    CA      ROLLWORD         WHAT WAS THE LAST +TORQUE COMBINATION
 2262   REF  53  LAST  987   16,3702  7 4770 1             MASK    BIT1            WAS IT NO.9-11
 2263                        16,3703  0 0006 1             EXTEND
 2264   REF   1              16,3704  1 3714 1             BZF     NO.9-11         NOT 9-11, SO USE IT THIS TIME

 2265   REF  54  LAST  993   16,3705  4 4770 1  NO.13-15   CS      BIT1
 2266   REF   3  LAST  993   16,3706  7 1572 1             MASK    ROLLWORD
 2267   REF   4  LAST  993   16,3707  55'572 1             TS      ROLLWORD        CHANGE BIT 1 TO ZERO
 2268   REF   1              16,3710  3 5014 1             CAF     +ROLL2
 2269                        16,3711  0 0006 1             EXTEND
 2270   REF   2  LAST  194   16,3712  01 006 0             WRITE   CHAN6
 2271   REF   3  LAST  993   16,3713  1 3742 1             TCF     T6ENABL

 2272   REF  55  LAST  993   16,3714  3 4770 0  NO.9-11    CAF     BIT1            1ST + JETS TO FIRE (MRCLEAN OS ROLLWORD)
 2273   REF   5  LAST  993   16,3715  27'572 1             ADS     ROLLWORD        CHANGE BIT 1 TO ONE
 2274   REF   1              16,3716  3 4773 0             CAF     +ROLL1
 2275                        16,3717  0 0006 1             EXTEND
 2276   REF   3  LAST  993   16,3720  01 006 0             WRITE   CHAN6
 2277   REF   4  LAST  993   16,3721  1 3742 1             TCF     T6ENABL

 2278   REF   6  LAST  993   16,3722  3 1572 0  -TORQUE    CA      ROLLWORD         WHAT WAS LAST -TORQUE COMBINATION
 2279   REF  33  LAST  961   16,3723  7 4767 1             MASK    BIT2            WAS IT NO.12-10
 2280                        16,3724  0 0006 1             EXTEND
 2281   REF   1              16,3725  1 3735 1             BZF     NO.12-10        NOT 12-10, SO USE IT THIS TIME

 2282   REF  34  LAST  993   16,3726  4 4767 1  NO.16-14   CS      BIT2
 2283   REF   7  LAST  993   16,3727  7 1572 1             MASK    ROLLWORD
 2284   REF   8  LAST  993   16,3730  55'572 1             TS      ROLLWORD        CHANGE BIT 2 TO ZERO
 2285   REF   1              16,3731  3 3765 0             CAF     -ROLL2
 2286                        16,3732  0 0006 1             EXTEND
 2287   REF   4  LAST  993   16,3733  01 006 0             WRITE   CHAN6
 2288   REF   5  LAST  993   16,3734  1 3742 1             TCF     T6ENABL

 2289   REF  35  LAST  993   16,3735  3 4767 0  NO.12-10   CAF     BIT2            1ST -JETS TO FIRE (MRCLEAN OS ROLLWORD)
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  2290   REF    9  LAST  993   16,3736  27'572 1             ADS     ROLLWORD        CHANGE BIT 2 TO ONE
  2291   REF    1              16,3737  3 4355 0             CAF     -ROLL1
  2292                         16,3740  0 0006 1             EXTEND
  2293   REF    5  LAST  993   16,3741  01 006 0             WRITE   CHAN6

  2294   REF   35  LAST  988   16,3742  3 4752 0  T6ENABL    CAF     BIT15
  2295                         16,3743  0 0006 1             EXTEND
  2296   REF    9  LAST  592   16,3744  05 013 0             WOR     CHAN13
  2297   REF   47  LAST  993   16,3745  1 5314 0  RDAPEND    TCF     TASKOVER        EXIT ROLL DAP
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L        TVCROLLDAP                                                           USER'S PAGE NO.  14      E6 S3

P2298    THIS T6 TASK SHUTS OFF ALL ROLL JETS


  2299   REF  15  LAST  974    16,3746  22 016 0  NOROLL1  LXCH    BANKRUPT        SHUT OFF ALL (ROLL) JETS, (A T6 TASK
  2300   REF 168  LAST  992    16,3747  3 4772 1           CAF     ZERO                 CALLED BY ..JETROLL..)
  2301   REF   7  LAST  993    16,3750  55'571 1           TS      ROLLFIRE        ZERO INDICATES JETS NOW OFF
  2302                         16,3751  0 0006 1           EXTEND
  2303   REF   6  LAST  994    16,3752  01 006 0  KILLJETS WRITE   CHAN6
  2304   REF   4  LAST  974    16,3753  1 5325 1           TCF     NOQRSM
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L        TVCROLLDAP                                                                USER'S PAGE NO.  15        E6 S3

P2305    CONSTANTS FOR ROLL AUTOPILOT....

 2306    REF  36  LAST  965    E6,1446                         EBANK= CNTR
 2307    REF   1               16,3754   03746 1  NOROLLT6 2CADR  NOROLL1
 2307    REF   1               16,3755   34066 0

 2309                          16,3756   00344 1  DB       DEC     .01388889          DEAD BAND (5 DEG), SC.AT B+0 REV

 2310                          16,3757   06315 0  -SLOPE   DEC     0.2                -SWITCHLINE SLOPE(0.2 PER SEC) SC.AT B+0
A2311                                                                                      PER SEC
 2312                          16,3760   00111 0  LMCRATE  DEC     .00027778 B+4      LIMIT CYCLE RATE (0.1 DEG/SEC) SC.AT
A2313                                                                                      B-4 REV/SEC
 2314                          16,3761   00510 0  INTERCEP DEC     .0025 B+3          DB(-SLOPE) - LMCRATE,  SC.AT  B-3 REV/SC

 2315                          16,3762   01330 0  MINLIM   DEC     .00277778 B+4      RATELIM,MIN (1DEG/SEC), SC.AT B-4 REV/SC

 2317                          16,3763   07071 0  MAXLIM   DEC     .01388889 B+4      RATELIM,MAX (5DEG/SEC), SC.AT B-4 REV/SC

A2318                                             TMINFIRE DEC     1.5 B+4            15 MS  (14 MIN), SC.AT 16 BITS/CS
 23185   REF   7  LAST  354       5001            TMINFIRE =       BITS4&5

 2319                          16,3764   07640 1  TMAXFIRE DEC     250 B+4            2.5 SEC, SC.AT 16 BITS/CS

 2320    REF  37  LAST  981       4766            1/TMXFIR =       BIT3               RECIPROCAL THEREOF, SHIFTED 14 RIGHT,
A23201                                                                                     ROUNDS TO OCT00004, SO ALLOWS 2.56
A23202                                                                                     SEC FIRINGS BEFORE APPLYING LIMIT
 23203   REF   4  LAST  838       7652            T6SCALE  =       PRIO31             (B+3) (16BITS/CS) (100CS/SEC)

 2321    REF  22  LAST  894       4773            +ROLL1   =       FIVE               ONBITS FOR JETS 9 AND 11
 2322    REF   1                  5014            +ROLL2   =       OCT120             ONBITS FOR JETS 13 AND 15
 2323    REF   5  LAST  714       4355            -ROLL1   =       TEN                ONBITS FOR JETS 12 NAD 10
 2324                          16,3765   00240 1  -ROLL2   OCT     240                ONBITS FOR JETS 16 AND 14
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L       MYSUBS                                                                    USER'S PAGE NO.   1     E0 S3

 0002   REF   1               21,2000                             SETLOC MYSUBS
 0003                         21,2060                             BANK

 0004   REF   2  LAST  112    E6,1510                             EBANK= KMPAC
 0005   REF   1                  5060                    SPCOS1   EQUALS SPCOS
 0006   REF   1                  5061                    SPSIN1   EQUALS SPSIN
 0007   REF   2  LAST  997       5060                    SPCOS2   EQUALS SPCOS
 0008   REF   2  LAST  997       5061                    SPSIN2   EQUALS SPSIN

 0009  *REF   1                                                   COUNT* $$/DAPMS
R0010   ONE AND ONE HALF PRECISION MULTIPLICATION ROUTINE

 0011   REF   2  LAST  112    21,2060  55'512 1  SMALLMP  TS      KMPTEMP          A(X+Y)
 0012                         21,2061  0 0006 1           EXTEND
 0013   REF   3  LAST  997    21,2062  7 1511 1           MP      KMPAC +1
 0014   REF   4  LAST  997    21,2063  55'511 1           TS      KMPAC +1         AY
 0015   REF 169  LAST  995    21,2064  3 4772 1           CAF     ZERO
 0016   REF   5  LAST  997    21,2065  57'510 1           XCH     KMPAC
 0017                         21,2066  0 0006 1           EXTEND
 0018   REF   3  LAST  997    21,2067  7 1512 1           MP      KMPTEMP          AX
 0019   REF   6  LAST  997    21,2070  21'511 1           DAS     KMPAC            AX+AY
 0020   REF 166  LAST  980    21,2071  0 0002 0           TC      Q


R0021   SUBROUTINE FOR DOUBLE PRECISION ADDITIONS OF ANGLES
R0022   A AND L CONTAIN A DP(1S) ANGLE SCALED BY 180 DEGS TO BE ADDED TO KMPAC.
R0023   RESULT IS PLACED IN KMPAC.  TIMING = 6 MCT (22 MCT ON OVERFLOW)

 0024   REF   7  LAST  997    21,2072  21'511 1  DPADD    DAS     KMPAC
 0025                         21,2073  0 0006 1           EXTEND
 0026   REF   1               21,2074  1 2111 0           BZF     TSK +1           NO OVERFLOW
 0027   REF   8  LAST  997    21,2075  11'510 0           CCS     KMPAC
 0028   REF   1               21,2076  1 2112 0           TCF     DPADD+           + OVERFLOW
 0029                         21,2077  1 2101 1           TCF     +2
 0030   REF   1               21,2100  1 2114 0           TCF     DPADD-           - OVERFLOW
 0031   REF   9  LAST  997    21,2101  11'511 1           CCS     KMPAC +1
 0032   REF   1               21,2102  1 2117 0           TCF     DPADD2+          UPPER = 0, LOWER +
 0033                         21,2103  1 2105 0           TCF     +2
 0034                         21,2104  4 0000 0           COM                      UPPER = 0, LOWER -
 0035   REF  21  LAST  992    21,2105  6 4750 1           AD      POSMAX           LOWER = 0, A=0
 0036   REF  10  LAST  997    21,2106  55'511 1           TS      KMPAC +1         CAN NOT OVERFLOW
 0037   REF  22  LAST  997    21,2107  3 4750 1           CA      POSMAX           UPPER WAS = 0
 0038   REF  11  LAST  997    21,2110  55'510 0  TSK      TS      KMPAC
 0039  *REF 167  LAST  997    21,2111  0 0002 0    +1     TC      Q
 0040   REF   5  LAST  992    21,2112  6 4752 0  DPADD+   AD      NEGMAX           KMPAC GREATER THAN 0
 0041   REF   2  LAST  997    21,2113  1 2110 1           TCF     TSK

 0042                         21,2114  4 0000 0  DPADD-   COM
 0043   REF  23  LAST  997    21,2115  6 4750 1           AD      POSMAX           KMPAC LESS THAN 0
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0044   REF   3  LAST  997   21,2116  1 2110 1            TCF      TSK

0045   REF   6  LAST  997   21,2117  6 4752 0  DPADD2+   AD       NEGMAX           CAN NOT OVERFLOW
0046   REF  12  LAST  997   21,2120  55'511 1            TS       KMPAC +1
0047   REF   7  LAST  998   21,2121  3 4752 0            CA       NEGMAX           UPPER WAS = 0
0048   REF   4  LAST  998   21,2122  1 2110 1            TCF      TSK
```

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L        RCS-CSM DIGITAL AUTOPILOT                                                              USER'S PAGE NO.  1      E0 S3

P0001    T5 INTERRUPT PROGRAM FOR THE RCS-CSM AUTOPILOT
R0002         START OF T5 INTERRUPT PROGRAM

  0004   REF   2  LAST  734   21,2000                          SETLOC DAPS3
  0005                        21,2123                          BANK

  0006  *REF   1                                               COUNT* $$/DAPRC
  0007   REF  13  LAST  998   E6,1510                          EBANK= KMPAC
  0008   REF  16  LAST  995   21,2123  22 016 0  REDORCS  LXCH   BANKRUPT        RESTART OF AUTOPILOT COMES HERE
  0009   REF   2  LAST  735   21,2124  3 1464 0           CA     T5PHASE         ON A T5 RUPT.
  0010                        21,2125  0 0006 1           EXTEND
  00101                       21,2126  6 2130 1           BZMF   +2              IF T5PHASE +0, -0, OR -, RESET TO -
  00102                       21,2127  1 2132 1           TCF    +3              IF T5PHASE +, LEAVE IT +.  DO A FRESHDAP
  00103  REF  95  LAST  991   21,2130  4 4770 1           CS     ONE
  00104  REF   3  LAST 1000   21,2131  55'464 1           TS     T5PHASE
  0011                        21,2132  0 0006 1           EXTEND
  0012   REF   1              21,2133  3 2137 0           DCA    RCSLOC
  0013   REF  18  LAST  974   21,2134  52 113 0           DXCH   T5LOC           HOOK UP T5RUPT TO AUTOPILOT
  0014   REF   2  LAST  734   21,2135  1 2141 0           TCF    RCSATT +1
  0015   REF  14  LAST 1000   E6,1510                     EBANK= KMPAC
  0016   REF   3  LAST 1000   21,2136   02140 0  RCSLOC   2CADR  RCSATT
  0016                        21,2137   42066 1


  0017   REF  17  LAST 1000   21,2140  22 016 0  RCSATT   LXCH   BANKRUPT        SAVE BB
  0018  *                     21,2141  0 0006 1    +1     EXTEND                 SAVE Q
  0019   REF  13  LAST  970   21,2142  22 012 1           QXCH   QRUPT
  0020   REF  36  LAST  994   21,2143  3 4752 0           CAF    BIT15           BIT15 CHAN31 = 0 IF IMU POWER IS ON AND
  0021   REF   3  LAST  597   21,2144  0 5654 0           TC     C31BTCHK        S/C CONT SW IS IN CMC (I.E. IF G/C DAP
  0022   REF   1              21,2145  1 2170 1           TCF    SETT5           IS FULLY ENABLED).      IF SO6
 A0025                                                                           GO TO SETT5

  0026   REF  17  LAST  946   21,2146  4 1501 0           CS     RCSFLAGS        IF G/C AUTOPILOT IS NOT FULLY ENABLED,
  0027   REF  41  LAST  988   21,2147  7 4753 0           MASK   BIT14
  0028   REF  18  LAST 1000   21,2150  27'501 0           ADS    RCSFLAGS        SET NORATE FLAG,
  0029   REF  24  LAST  997   21,2151  3 4750 1           CAF    POSMAX
  0030   REF   9  LAST  600   21,2152  55'340 0           TS     HOLDFLAG        SET HOLDFLAG +,
  00301  REF 170  LAST  997   21,2153  3 4772 1           CAF    ZERO            ZERO ERRORX, ERRORY, AND ERRORZ,
  00302  REF   7  LAST  187   21,2154  55'567 0           TS     ERRORX
  00303  REF   8  LAST  703   21,2155  55'570 0           TS     ERRORY
  00304  REF   5  LAST  188   21,2156  55'571 1           TS     ERRORZ
  0031   REF  42  LAST 1000   21,2157  3 4753 1           CAF    BIT14
  0032   REF   4  LAST 1000   21,2160  0 5654 0           TC     C31BTCHK        AND CHECK FREE FUNCTION (BIT14 CHAN31)
  0033   REF   2  LAST 1000   21,2161  1 2170 1           TCF    SETT5
  00332  REF   4  LAST 1000   21,2162  55'464 1           TS     T5PHASE         IF NOT IN FREE MODE,
  00333  REF   2  LAST  551   21,2163  3 7661 1           CAF    OCT37766        SCHEDULE REINITIALIZATION (FRESHDAP)
  00334  REF  15  LAST  974   21,2164  54 030 0           TS     TIME5           IN 100 MS VIA T5RUPT

  00335  REF   3  LAST  262   21,2165  0 2642 0           TCR    ZEROJET         ZERO JET CHANNELS IN 14 MS VIA ZEROJET
 0034   REF   1               21,2166  1 2355 1             TCF     KMATRIX
 0035                         21,2167   37770 0  DELTATT    OCT     37770              80MS (TIME5)
 0036   REF   4  LAST  961       7663            DELTATT2 =         OCT37776           20 MS (TIME5)
R0044              CHECK PHASE OF T5 PROGRAM

R0045        BECAUSE OF THE LENGTH OF THE T5 PROGRAM, IT HAS BEEN DIVIDED INTO
R0046   THREE PARTS, T5PHASE1, T5PHASE2, AND THE JET SELECTION LOGIC,
R0047   TO ALLOW FOR THE EXECUTION OF OTHER
R0048   INTERRUPTS.  T5PHASE IS ALSO USED IN THE INITIALIZATION OF THE AUTOPILOT
R0049   VARIABLES AT TURN ON.
R0050   THE CODING OF T5PHASE IS...

R0051                 + = INITIALIZE T5 RCS-CSM AUTOPILOT
R0052   T5PHASE = +0  = PHASE2 OF THE T5 PROGRAM
R0053                 -  = RESTART DAP
R0054                -0  = PHASE1 OF THE T5 PROGRAM

 0055   REF   5  LAST 1000    21,2170  11'464 1  SETT5      CCS     T5PHASE
 0056   REF   1               21,2171  1 2551 0             TCF     FRESHDAP           TURN ON AUTOPILOT
 0057   REF   1               21,2172  1 2674 1             TCF     T5PHASE2           BRANCH TO PHASE2 OF PROGRAM
 0058   REF   1               21,2173  1 2553 1             TCF     REDAP              RESTART AUTOPILOT


 0059   REF   6  LAST 1001    21,2174  55'464 1             TS      T5PHASE            PHASE 1  RESET  FOR PHASE 2
 0060   REF  16  LAST 1000    21,2175  3 0030 1             CA      TIME5
 0061   REF   2  LAST  113    21,2176  55'634 0             TS      T5TIME             USED IN COMPENSATING FOR DELAYS IN T5
 0062   REF   1               21,2177  3 7663 0             CAF     DELTATT2           RESET FOR T5RUPT IN 20MS FOR PHASE2
 0063   REF  17  LAST 1001    21,2200  54 030 0             TS      TIME5              OF PROGRAM
```

```
P0064   IMU STATUS CHECK

  0065  REF  30  LAST  392  21,2201  4 1334 0             CS      IMODES33        CHECK IMU STATUS
  0066  REF   5  LAST  199  21,2202  7 4763 0             MASK    NOIMODAP        BIT 6 = 0 IMU OK
  0067  REF 213  LAST  992  21,2203  10 000 0             CCS     A               BIT6 = 1 NO IMU
  0068  REF   1             21,2204  1 2215 1             TCF     RATEFILT
  0069  REF  19  LAST 1000  21,2205  4 1501 0   FREECHK   CS      RCSFLAGS        BIT14 INDICATES THAT RATES HAVE NOT BEEN
  0070  REF  43  LAST 1000  21,2206  7 4753 0             MASK    BIT14           INITIALIZED
  0071  REF  20  LAST 1002  21,2207  27'501 0             ADS     RCSFLAGS
  0072  REF  44  LAST 1002  21,2210  3 4753 1             CAF     BIT14           NO ATTITUDE REFERENCE
  0073  REF  10  LAST 1000  21,2211  55'340 0             TS      HOLDFLAG        STOP ANY AUTOMATIC STEERING AND PREPARE
 A0074                                                                            TO PICK UP CDU ANGLES UPON RESUMPTION OF
 A0075                                                                            ATTITUDE HOLD
  0076  REF   5  LAST 1000  21,2212  0 5654 0             TC      C31BTCHK        CHECK FOR FREE MODE
  0077  REF   1             21,2213  1 2424 0             TCF     KRESUME1        IN FREE, PROVIDE FREE CONTROL ONLY
  0080  REF   1             21,2214  1 2541 1             TCF     REINIT          .....TILT..............................
  0081  REF   6  LAST  996     5001             BITS4,5   =       BITS465


  0082  REF  21  LAST 1002  21,2215  3 1501 1   RATEFILT  CA      RCSFLAGS        SEE IF RATEFILTER HAS BEEN INITIALIZED
  0083  REF  45  LAST 1002  21,2216  7 4753 0             MASK    BIT14
  0084                      21,2217  0 0006 1             EXTEND                  IF SO, PROCEED WITH RATE DERIVATION
  0085                      21,2220  1 2222 0             BZF     +2
  0086  REF   2  LAST 1001  21,2221  1 2355 1             TCF     KMATRIX         IF NOT, SKIP RATE DERIVATION

 R0087             RATE FILTER     TIMING = 7.72MS

 R0088  RATE FILTER EQUATIONS
 R0089  DRHO = DELRHO - (.1)ADOT + (1 - GAIN1)DRHO
 R0090                                            -1
 R0091  ADOT = ADOT   + GAIN2 DRHO + KMJ DFT
 R0092              -1
 R0093      -          *       -     -
 R0094  WHERE DELRHO = AMGB (CDU - CDU   )
 R0095                                 -1

  0096 *REF  34  LAST  952  21,2222  3 4767 0     +2      CAF     TWO
  0097  REF   3  LAST  116  21,2223  55'506 1   DRHOLOOP  TS      SPNDX
  0098                      21,2224  6 0000 1             DOUBLE
  0099  REF   2  LAST  112  21,2225  55'507 0             TS      DPNDX
  0100  REF   3  LAST 1002  21,2226  51'507 1             INDEX   DPNDX
  0101  REF   2  LAST  112  21,2227  4 1552 0             CS      DRHO            DRHO SCALED 180 DEGS
  0102                      21,2230  0 0006 1             EXTEND
  0103  REF   2  LAST  113  21,2231  5 1617 0             INDEX   ATTKALMN        PICK UP DESIRED FILTER GAIN
  0104  REF   1             21,2232  7 3121 1             MP      GAIN1
  0105  REF   4  LAST 1002  21,2233  51'507 1             INDEX   DPNDX
  0106  REF   3  LAST 1002  21,2234  21'553 1             DAS     DRHO            (1 -.064)DRHO
  0107                      21,2235  0 0006 1             EXTEND
  0108  REF   5  LAST 1002  21,2236  5 1507 1             INDEX   DPNDX
  0109  REF   8  LAST  181  21,2237  4 1534 0             DCS     ADOT
 0110   REF 15  LAST 1000   21,2240  53'511 1          DXCH    KMPAC          -(.1)ADOT
 0111   REF  2  LAST  297   21,2241  3 4754 0          CA      QUARTER
 0112   REF  1              21,2242  0 2060 0          TC      SMALLMP
 0113   REF 16  LAST 1003   21,2243  53'511 1          DXCH    KMPAC
 0114   REF  6  LAST 1002   21,2244  51'507 1          INDEX   DPNDX
 0115   REF  4  LAST 1002   21,2245  21'553 1          DAS     DRHO
 0116   REF  4  LAST 1002   21,2246  11'506 1          CCS     SPNDX
 0117   REF  1              21,2247  1 2223 1          TCF     DRHOLOOP

 0118   REF 20  LAST  951   21,2250  3 0032 0          CA      CDUX           MEASURED BODY RATES--
 0119   REF  2  LAST  113   21,2251  57'635 0          XCH     RHO
 0120                       21,2252  0 0006 1          EXTEND
 0121   REF  3  LAST 1003   21,2253  21'635 1          MSU     RHO            -         *    -     -
 0122                       21,2254  4 0000 0          COM                    DELRHO = AMGB (CDU - CDU  )
A0123                                                                                              -1
 0124                       21,2255  22 007 0          ZL
 01241  REF  2  LAST  112   21,2256  53'516 0          DXCH    DELTEMPX
 0125   REF 12  LAST  974   21,2257  3 0033 1          CA      CDUY
 0126   REF  2  LAST  113   21,2260  57'636 0          XCH     RHO1
 0127                       21,2261  0 0006 1          EXTEND
 0128   REF  3  LAST 1003   21,2262  21'636 1          MSU     RHO1
 0129                       21,2263  4 0000 0          COM
 0130   REF  1              21,2264  55'502 0          TS      T5TEMP         (CDUY - RHO1)    SCALED 90 DEGS
 0131                       21,2265  0 0006 1          EXTEND
 0132   REF  2  LAST  113   21,2266  7 1640 0          MP      AMGB1
 0133   REF  3  LAST 1003   21,2267  21'516 0          DAS     DELTEMPX       DELTEMPX = (CDUX-RHO) + AMGBI(CDUY-RHO1)
A0134                                                                         MUST BE DOUBLE PRECISION OR WILL LOSE
A0135                                                                         PULSES
 0136   REF  2  LAST  114   21,2270  3 1641 0          CA      AMGB4
 0137                       21,2271  0 0006 1          EXTEND
 0138   REF  2  LAST 1003   21,2272  7 1502 0          MP      T5TEMP
 0139   REF  2  LAST  112   21,2273  53'520 0          DXCH    DELTEMPY
 0140   REF  2  LAST  114   21,2274  3 1643 1          CA      AMGB7
 0141                       21,2275  0 0006 1          EXTEND
 0142   REF  3  LAST 1003   21,2276  7 1502 0          MP      T5TEMP
 0143   REF  1              21,2277  53'522 1          DXCH    DELTEMPZ
 0144   REF 16  LAST  974   21,2300  3 0034 0          CA      CDUZ
 0145   REF  2  LAST  113   21,2301  57'637 1          XCH     RHO2
 0146                       21,2302  0 0006 1          EXTEND
 0147   REF  3  LAST 1003   21,2303  21'637 0          MSU     RHO2
 0148                       21,2304  4 0000 0          COM
 0149   REF  4  LAST 1003   21,2305  55'502 0          TS      T5TEMP         (CDUZ - RHO2)    SCALED 90 DEGS
 0150                       21,2306  0 0006 1          EXTEND
 0151   REF  2  LAST  114   21,2307  7 1642 1          MP      AMGB5
 0152   REF  3  LAST 1003   21,2310  21'520 0          DAS     DELTEMPY       DELTEMPY =AMGB4(CDUY-RHO1)
A01521                                                                                  + AMGB5(CDUZ-RHO2)
 0153   REF  2  LAST  114   21,2311  3 1644 0          CA      AMGB8
 0154                       21,2312  0 0006 1          EXTEND
 0155   REF  5  LAST 1003   21,2313  7 1502 0          MP      T5TEMP
 0156   REF  2  LAST 1003   21,2314  21'522 1          DAS     DELTEMPZ       DELTEMPZ =AMGB7(CDUY-RHO1)
```

```
A01561                                                                            + AMGB8(CDUZ-RHO2)
 0157    REF  35  LAST 1002   21,2315  3 4767 0                CAF      TWO
 0158    REF   5  LAST 1003   21,2316  55'506 1  ADOTLOOP TS       SPNDX
 0159                         21,2317  6 0000 1                DOUBLE
 0160    REF   7  LAST 1003   21,2320  55'507 0                TS       DPNDX
 01601                        21,2321  0 0006 1                EXTEND
 01602   REF   8  LAST 1004   21,2322  5 1507 1                INDEX    DPNDX
 01603   REF   4  LAST 1003   21,2323  3 1516 1                DCA      DELTEMPX
 01604   REF   9  LAST 1004   21,2324  51'507 1                INDEX    DPNDX
 01605   REF   5  LAST 1003   21,2325  21'553 1                DAS      DRHO
 01606                        21,2326  0 0006 1                EXTEND
 01607   REF  10  LAST 1004   21,2327  5 1507 1                INDEX    DPNDX
 01608   REF   5  LAST 1004   21,2330  3 1516 1                DCA      DELTEMPX
 01609   REF  11  LAST 1004   21,2331  51'507 1                INDEX    DPNDX
 016091  REF   2  LAST  112   21,2332  21'542 1                DAS      MERRORX
 0161    REF  12  LAST 1004   21,2333  51'507 1                INDEX    DPNDX
 0162    REF   6  LAST 1004   21,2334  3 1552 1                CA       DRHO
 0163                         21,2335  6 0000 1                DOUBLE                       N.B.
 0164                         21,2336  6 0000 1                DOUBLE                       N.B.
 0165                         21,2337  0 0006 1                EXTEND
 0166    REF   3  LAST 1002   21,2340  5 1617 0                INDEX    ATTKALMN            PICK UP DESIRED FILTER GAINS
 0167    REF   1              21,2341  7 3137 0                MP       GAIN2
 0168    REF  13  LAST 1004   21,2342  51'507 1                INDEX    DPNDX               ADOT  + (.16)(.1)DRHO
 0169    REF   9  LAST 1002   21,2343  21'534 0                DAS      ADOT                    -1
 0170    REF   6  LAST 1004   21,2344  51'506 0                INDEX    SPNDX               S/C TORQUE TO INERTIA RATIO
 0171    REF   3  LAST  734   21,2345  3 1620 1                CA       KMJ                 SCALED (450)(1600)/(57.3)(16384)=1/1.3
 0172                         21,2346  0 0006 1                EXTEND
 0173    REF   7  LAST 1004   21,2347  5 1506 0                INDEX    SPNDX
 0174    REF   2  LAST  112   21,2350  7 1547 1                MP       DFT
 0175    REF  14  LAST 1004   21,2351  51'507 1                INDEX    DPNDX
 0176    REF  10  LAST 1004   21,2352  21'534 0                DAS      ADOT                KMJ(DFT)
 0177    REF   8  LAST 1004   21,2353  11'506 1                CCS      SPNDX
 0178    REF   1              21,2354  1 2316 0                TCF      ADOTLOOP            END CALCULATION OF VEHICLE RATES
 0179    REF   2  LAST  113   21,2355  3 1560 0  KMATRIX  CA       ATTSEC
 0180    REF   4  LAST  887   21,2356  7 4777 0                MASK     LOW4
 0181    REF 214  LAST 1002   21,2357  10 000 0                CCS      A
 0182    REF   1              21,2360  1 2366 1                TCF      TENTHSEK
 0183    REF   1              21,2361  3 7656 0                CAF      PRIO34              CALL FOR 1 SEC UPDATE OF TRANSFORMATION
 0184    REF  19  LAST  883   21,2362  0 5121 0                TC       NOVAC               MATRIX FROM GIMBAL AXES TO BODY AXES
 0185    REF  17  LAST 1003   E6,1510                          EBANK=   KMPAC
 0186    REF   1              21,2363   03560 1                2CADR    AMBGUPDT
 0186    REF   1              21,2364   44066 1
 0187    REF   4  LAST  961   21,2365  3 4322 0                CAF      NINE

 0188    REF   3  LAST 1004   21,2366  55'560 1  TENTHSEK TS       ATTSEC
```

```
R0189    WHEN AUTOMATIC MANEUVERS ARE BEING PERFORMED, THE FOLLOWING ANGLE ADDITION MUST BE MADE TO PROVIDE A SMOOTH
R0191    SEQUENCE OF ANGULAR COMMANDS TO THE AUTOPILOT--

R0192              CDUXD = CDUXD + DELCDUX     (DOUBLE PRECISION)
R0193              CDUYD = CDUYD + DELCDUY     (DOUBLE PRECISION)
R0194              CDUZD = CDUZD + DELCDUZ     (DOUBLE PRECISION)

R0195    THE STEERING PROGRAMS-
R0196              1) ATTITUDE MANEUVER ROUTINE
R0198              2) LEM TRACKING

R0199    SHOULD GENERATE THE DESIRED ANGLES (CDUXD, CDUYD, CDUZD) AS WELL AS THE INCREMENTAL ANGLES (DELCDUX, DELCDUY,
R0201    DELCDUZ) SO THAT THE GIMBAL ANGLE COMMANDS CAN BE INTERPOLATED BETWEEN UPDATES.

R0203    HOLDFLAG CODING-

R0204          +  = GRAB PRESENT CDU ANGLES AND STORE IN THETADX, THETADY, THETADZ
R0205              AND PERFORM ATTITUDE HOLD ABOUT THESE ANGLES
R0206              ALSO IGNORE AUTOMATIC STEERING
R0207              SET = + BY
R0208                        1) INITIALIZATION PHASE OF AUTOPILOT
R0209                        2) OCCURANCE OF RHC COMMANDS
R0210                        3) FREE MODE
R0211                        4) SWITCH OVER TO ATTITUDE HOLD FROM AUTO
R0212                             WHILE DOING AUTOMATIC STEERING (IN THIS CASE
R021203                           HOLDFLAG IS NOT ACTUALLY SET TO +, BUT THE LOGIC
R021205                           FUNCTIONS AS IF IT WERE.)
R02121                       5) S/C CONTROL SWITCH IN SCS
R02122                       6) IMU POWER OFF
R0213         +0 = IN ATTITUDE HOLD ABOUT A PREVIOUSLY ESTABLISHED REFERENCE
R0214         -  = PERFORMING AUTOMATIC MANEUVER
R0215         -0 = NOT USED AT PRESENT

R0216             NOTE THAT THIS FLAG MUST BE  SET = -  BY THE STEERING PROGRAM IF IT IS TO COMMAND THE AUTOPILOT.
R0218    SINCE ASTRONAUT ACTION MAY CHANGE THE HOLDFLAG SETTING, IT SHOULD BE MONITORED BY THE STEERING PROGRAM TO
R0220    DETERMINE IF THE AUTOMATIC SEQUENCE HAS BEEN INTERRUPTED AND IF SO, TAKE APPROPRIATE ACTION.

 0222    REF  11  LAST 1002   21,2367  4 1340 0               CS      HOLDFLAG
 0223                         21,2370  0 0006 1               EXTEND
 0224    REF   1              21,2371  6 2416 0               BZMF    CACNDLS            IF HOLDFLAG +0,-0,+, BYPASS AUTOMATIC
A0225                                                                                    COMMANDS
 0226    REF  36  LAST 1004   21,2372  3 4767 0   DCDUINCR CAF     TWO
 0227    REF   9  LAST 1004   21,2373  55'506 1   DELOOP   TS      SPNDX
 0228                         21,2374  6 0000 1               DOUBLE
 0229    REF  15  LAST 1004   21,2375  55'507 0               TS      DPNDX
 0230                         21,2376  0 0006 1               EXTEND
 0231    REF 215  LAST 1004   21,2377  5 0000 1               INDEX   A
 0232    REF   8  LAST  599   21,2400  3 1647 0               DCA     CDUXD
 0233   REF  18  LAST 1004   21,2401  53'511 1             DXCH    KMPAC
 0234                        21,2402  0 0006 1             EXTEND
 0235   REF  16  LAST 1005   21,2403  5 1507 1             INDEX   DPNDX
 0236   REF   6  LAST  600   21,2404  3 1576 1             DCA     DELCDUX
 0237   REF   1              21,2405  0 2072 0             TC      DPADD
 0238                        21,2406  0 0006 1             EXTEND
 0239   REF  19  LAST 1006   21,2407  3 1511 0             DCA     KMPAC
 0240   REF  10  LAST 1005   21,2410  51'506 0             INDEX   SPNDX
 0241   REF  12  LAST  708   21,2411  55'572 1             TS      THETADX
 0242   REF  17  LAST 1006   21,2412  51'507 1             INDEX   DPNDX
 0243   REF   9  LAST 1005   21,2413  53'647 1             DXCH    CDUXD
 0244   REF  11  LAST 1006   21,2414  11'506 1             CCS     SPNDX
 0245   REF   1              21,2415  1 2373 0             TCF     DELOOP
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L        RCS-CSM DIGITAL AUTOPILOT                                           USER'S PAGE NO.  8      E6 53

P0246    RCS-CSM AUTOPILOT ATTITUDE ERROR DISPLAY

R0247    THREE TYPES OF ATTITUDE ERRORS MAY BE DISPLAYED ON THE FDAI-

R0248                MODE 1) AUTOPILOT FOLLOWING ERRORS                 SELECTED BY V61E
R0250                        GENERATED INTERNALLY BY THE AUTOPILOT

R0251                MODE 2) TOTAL ATTITUDE ERRORS                      SELECTED BY V62E
R0253                        WITH RESPECT TO THE CONTENTS OF N22

R02531               MODE 3) TOTAL ASTRONAUT ATTITUDE ERRORS            SELECTED BY V63E
R02533                       WITH RESPECT TO THE CONTENTS OF N17

R0254    MODE 1 IS PROVIDED AS A MONITOR OF THE RCS DAP AND ITS ABILITY TO TRACK AUTOMATIC STEERING COMMANDS.  IN THIS
R0256    MODE THE ATTITUDE ERRORS WILL BE ZEROED WHEN THE CMC MODE SWITCH IS IN FREE

R0259    MODE 2 IS PROVIDED TO ASSIST THE CREW IN MANUALLY MANEUVERING THE S/C TO THE ATTITUDE (GIMBAL ANGLES) SPECIFIED
R0261    IN N22.  THE ATTITUDE ERRORS WRT THESE ANGLES AND THE CURRENT CDU ANGLES ARE RESOLVED INTO S/C CONTROL AXES
R0263    AS A FLY-TO INDICATOR.

R02631   MODE 3 IS PROVIDED TO ASSIST THE CREW IN MANUALLY MANEUVERING THE S/C TO THE ATTITUDE (GIMBAL ANGLES) SPECIFIED
R02633   IN N17.  THE ATTITUDE ERRORS WRT THESE ANGLES AND THE CURRENT CDU ANGLES ARE RESOLVED INTO S/C CONTROL AXES
R02635   AS A FLY-TO INDICATOR.

R0264       V60 IS PROVIDED TO LOAD N17 WITH A SNAPSHOT OF THE CURRENT CDU ANGLES, THUS SYNCHRONIZING THE MODE 3 DISPLAY
R0266    WITH THE CURRENT S/C ATTITUDE.  THIS VERB MAY BE USED AT ANY TIME.

R0269       THESE DISPLAYS WILL BE AVAILIABLE IN ANY MODE (AUTO, HOLD, FREE, G+N, OR SCS) ONCE THE RCS DAP HAS BEEN
R0271    INITIATED VIA V46E.  MODE 1, HOWEVER, WILL BE MEANINGFUL ONLY IN G+N AUTO OR HOLD.  THE CREW MAY PRESET (VIA
R0273    V25N17) AN ATTITUDE REFERENCE (DESIRED GIMBAL ANGLES) INTO N17 AT ANY TIME.

 0278    REF  22  LAST 1002    21,2416   4 1501 0   CACNDLS  CS      RCSFLAGS          ALTERNATE  BETWEEN FDAIDSP1 AND FDAIDSP2
 0279    REF  29  LAST  722    21,2417   7 4765 0            MASK    BIT4
 0280                          21,2420   0 0006 1            EXTEND
 0281    REF   1               21,2421   1 3202 0            BZF     FDAIDSP2

 0282    REF  23  LAST 1007    21,2422  27'501 0   FDAIDSP1 ADS     RCSFLAGS
 0283    REF   8  LAST  951    21,2423   0 2425 0            TC      NEEDLER
 0284    REF  31  LAST  972    21,2424   1 5323 1   KRESUME1 TCF     RESUME            END PHASE 1
```

```
P0285   FDAI ATTITUDE ERROR DISPLAY SUBROUTINE

R0286   PROGRAM DESCRIPTION:    D. KEENE   5/24/67

R0287       THIS SUBROUTINE IS USED TO DISPLAY ATTITUDE ERRORS ON THE FDAI VIA THE DIGITAL TO ANALOG CONVERTERS (DACS)
R0289   IN THE CDUS.  CARE IS TAKEN TO METER OUT THE APPROPRIATE NUMBER OF PULSES TO THE IMU ERROR COUNTERS AND PREVENT
R0291   OVERFLOW, TO CONTROL THE RELAY SEQUENCING, AND TO AVOID INTERFERENCE WITH THE COARSE ALIGN LOOP WHICH ALSO USES
R0293   THE DACS.

R0294   CALLING SEQUENCE:

R0295       DURING THE INITIALIZATION SECTION OF THE USER'S PROGRAM, BIT3 OF RCSFLAGS SHOULD BE SET TO INITIATE THE
R0297   TURN-ON SEQUENCE WITHIN THE NEEDLES PROGRAM:

R0298               CS      RCSFLAGS        IN EBANK6
R0299               MASK    BIT3
R0300               ADS     RCSFLAGS

R0301   THEREAFTER, THE ATTITUDE ERRORS GENERATED BY THE USER SHOULD BE TRANSFERED TO THE FOLLOWING LOCATIONS IN EBANK6:

R0303               AK      SCALED 180 DEGREES  NOTE: THESE LOCATIONS ARE SUBJECT
R0304               AK1     SCALED 180 DEGREES        TO CHANGE
R0305               AK2     SCALED 180 DEGREES

R0306   FULL SCALED DEFLECTION CORRESPONDS TO 16 7/8 DEGREES OF ATTITUDE ERROR
R0307               (= 384 BITS IN IMU ERROR COUNTER)

R0308   A CALL TO NEEDLER WILL THEN UPDATE THE DISPLAY:

R0309               INHINT
R0310               TC      IBNKCALL        NOTE: EBANK SHOULD BE SET TO E6
R0311               CADR    NEEDLER
R0312               RELINT

R0313       THIS PROCESS SHOULD BE REPEATED EACH TIME THE ERRORS ARE UPDATED.  AT LEAST 3 PASSES THRU THE PROGRAM ARE
R0315   REQUIRED BEFORE ANYTHING IS ACTUALLY DISPLAYED ON THE ERROR METERS.
R0316   NOTE: EACH CALL TO NEEDLER MUST BE SEPARATED BY AT LEAST 50MS TO ASSURE PROPER RELAY SEQUENCING.

R0318   ERASABLE USED:
R0319                           AK          CDUXCMD
R0320                           AK1         CDUYCMD
R0321                           AK2         CDUZCMD
R0322                           EDRIVEX     A,L,Q
R0323                           EDRIVEY     T5TEMP
R0324                           EDRIVEZ     SPNDX

R0325   SWITCHES:               RCSFLAGS    BITS 3,2

R0326   I/O CHANNELS:           CHAN12      BIT 4 (COARSE ALIGN - READ ONLY)
```

```
L        RCS-CSM DIGITAL AUTOPILOT                                                         USER'S PAGE NO.  10        E6 S3

R0327                                   CHAN12     BIT 6 (IMU ERROR COUNTER ENABLE)
R0328                                   CHAN14     BIT 13,14,15 (DAC ACTIVITY)

R0329    SIGN CONVENTION<    AK = THETAC - THETA
R0330             WHERE      THETAC = COMMAND ANGLE
R0331                        THETA  = PRESENT ANGLE

 0332    REF  30  LAST 1007  21,2425  3 4765 1  NEEDLER   CAF     BIT4              CHECK FOR COARSE ALIGN ENABLE
 0333                        21,2426  0 0006 1            EXTEND                    IF IN COARSE ALIGN DO NOT USE IMU
 0334    REF  41  LAST  961  21,2427  02 012 0            RAND    CHAN12            ERROR COUNTERS. DONT USE NEEDLES
 0335                        21,2430  0 0006 1            EXTEND
 0336    REF   1             21,2431  1 2436 0            BZF     NEEDLER1
 0337    REF  24  LAST 1007  21,2432  4 1501 0  RCSINT    CS      RCSFLAGS          SET BIT 3 FOR INITIALIZATION PASS
 0338    REF  38  LAST  996  21,2433  7 4766 0            MASK    BIT3
 0339    REF  25  LAST 1009  21,2434  27'501 0            ADS     RCSFLAGS
 0340    REF 168  LAST  997  21,2435  0 0002 0            TC      Q

 0341    REF  26  LAST 1009  21,2436  3 1501 1  NEEDLER1  CA      RCSFLAGS
 0342    REF  22  LAST  781  21,2437  7 6211 1            MASK    SIX
 0343                        21,2440  0 0006 1            EXTEND
 0344    REF   1             21,2441  1 2476 1            BZF     NEEDLES3
 0345    REF  39  LAST 1009  21,2442  7 4766 0            MASK    BIT3
 0346                        21,2443  0 0006 1            EXTEND
 0347    REF   2  LAST  260  21,2444  1 2467 1            BZF     NEEDLER2          BIT3 = 0, BIT2 = 1

 0348    REF  29  LAST  781  21,2445  4 4763 0            CS      BIT6              FIRST PASS BIT3 = 1
 0349                        21,2446  0 0006 1            EXTEND                    DISABLE IMU ERROR COUNTER TO ZERO DACS
 0350    REF  42  LAST 1009  21,2447  03 012 1            WAND    CHAN12            MUST WAIT AT LEAST 60 MS BEFORE
 0351    REF 171  LAST 1000  21,2450  4 4772 0  NEEDLE11  CS      ZERO              ENABLING COUNTERS.
 0352    REF  17  LAST  951  21,2451  55'476 1            TS      AK                ZERO THE INPUTS ON FIRST PASS
 0353    REF   8  LAST  969  21,2452  55'477 0            TS      AK1
 0354    REF   8  LAST  973  21,2453  55'500 1            TS      AK2
 0355    REF   1             21,2454  55'503 1            TS      EDRIVEX           ZERO THE DISPLAY REGISTERS
 0356    REF   1             21,2455  55'504 0            TS      EDRIVEY
 0357    REF   1             21,2456  55'505 1            TS      EDRIVEZ
 0358    REF   2  LAST  160  21,2457  54 050 0            TS      CDUXCMD           ZERO THE OUT COUNTERS
 0359    REF   2  LAST  160  21,2460  54 051 1            TS      CDUYCMD
 0360    REF   2  LAST  160  21,2461  54 052 1            TS      CDUZCMD
 0361    REF  23  LAST 1009  21,2462  4 6211 1            CS      SIX               RESET RCSFLAGS FOR PASS2
 0362    REF  27  LAST 1009  21,2463  7 1501 0            MASK    RCSFLAGS
 0363    REF  36  LAST  993  21,2464  6 4767 0            AD      BIT2
 0364    REF  28  LAST 1009  21,2465  55'501 0            TS      RCSFLAGS
 0365    REF 169  LAST 1009  21,2466  0 0002 0            TC      Q                 END PASS1

 0366    REF  30  LAST 1009  21,2467  3 4763 1  NEEDLER2  CAF     BIT6              ENABLE IMU ERROR COUNTERS
 0367                        21,2470  0 0006 1            EXTEND
 0368    REF  43  LAST 1009  21,2471  05 012 1            WOR     CHAN12
 0369    REF  24  LAST 1009  21,2472  4 6211 1            CS      SIX               RESET RCSFLAGS TO DISPLAY ATTITUDE
```

```
0370  REF  29  LAST 1009  21,2473  7 1501 0           MASK    RCSFLAGS        ERRORS    WAIT ATLEAST 4 MS FOR
0371  REF  30  LAST 1010  21,2474  55'501 0           TS      RCSFLAGS        RELAY CLOSURE
0372  REF 170  LAST 1009  21,2475  0 0002 0           TC      Q


0373  REF  31  LAST 1009  21,2476  3 4763 1 NEEDLES3  CAF     BIT6            CHECK TO SEE IF IMU ERROR COUNTER
0374                      21,2477  0 0006 1           EXTEND                  IS ENABLED
0375  REF  44  LAST 1009  21,2500  02 012 0           RAND    CHAN12
0376                      21,2501  0 0006 1           EXTEND                  IF NOT RECYCLE NEEDLES
0377  REF   1             21,2502  1 2432 1           BZF     RCSINT
0378  REF  37  LAST 1005  21,2503  3 4767 0 NEEDLES   CAF     TWO
0379  REF  12  LAST 1006  21,2504  55'506 1 DACLOOP   TS      SPNDX
0380  REF   3  LAST 1003  21,2505  4 4754 1           CS      QUARTER
0381                      21,2506  0 0006 1           EXTEND
0382  REF  13  LAST 1010  21,2507  5 1506 0           INDEX   SPNDX
0383  REF  18  LAST 1009  21,2510  7 1476 1           MP      AK
0384  REF  90  LAST  990  21,2511  54 001 1           TS      L
0385  REF 216  LAST 1005  21,2512  10 000 0           CCS     A
0386  REF   1             21,2513  3 2547 0           CA      DACLIMIT
0387                      21,2514  1 2516 0           TCF     +2
0388  REF   2  LAST 1010  21,2515  4 2547 1           CS      DACLIMIT
0389  REF  91  LAST 1010  21,2516  6 0001 0           AD      L
0390  REF   6  LAST 1003  21,2517  55'502 0           TS      T5TEMP          OVFLO CHK
0391  REF   1             21,2520  1 2524 1           TCF     CVSPOT
0392  REF 217  LAST 1010  21,2521  50 000 1           INDEX   A               ON OVERFLOW LIMIT OUTPUT TO +-384
0393  REF   3  LAST 1010  21,2522  3 2547 0           CAF     DACLIMIT
0394  REF  92  LAST 1010  21,2523  54 001 1           TS      L
0395  REF  14  LAST 1010  21,2524  51'506 0 CVSPOT    INDEX   SPNDX
0396  REF   2  LAST 1009  21,2525  4 1503 1           CS      EDRIVEX         CURRENT VALUE OF DAC
0397  REF  93  LAST 1010  21,2526  6 0001 0           AD      L
0398  REF  15  LAST 1010  21,2527  51'506 0           INDEX   SPNDX
0399  REF   3  LAST 1009  21,2530  26 050 0           ADS     CDUXCMD
0400  REF  16  LAST 1010  21,2531  51'506 0           INDEX   SPNDX
0401  REF   3  LAST 1010  21,2532  23'503 0           LXCH    EDRIVEX
0402  REF  17  LAST 1010  21,2533  11'506 1           CCS     SPNDX
0403  REF   1             21,2534  1 2504 0           TCF     DACLOOP
0404  REF   4  LAST  608  21,2535  3 7673 1           CAF     13,14,15
0405                      21,2536  0 0006 1           EXTEND
0406  REF  10  LAST  971  21,2537  05 014 1 DRIVEDAC  WOR     CHAN14          SET DAC ACTIVITY BITS
0407  REF 171  LAST 1010  21,2540  0 0002 0           TC      Q

0408  REF   1             21,2541  3 2545 1 REINIT    CAF     DELAY200        ........TILT LOGIC
0409  REF  18  LAST 1001  21,2542  54 030 0           TS      TIME5           REINITIALIZE DAP IN 200MS
0410  REF   7  LAST 1001  21,2543  55'464 1           TS      T5PHASE
0411  REF  32  LAST 1007  21,2544  1 5323 1           TCF     RESUME
0412                      21,2545   37754 0 DELAY200  DEC     16364           200MS


0413                      21,2546   77177 0           DEC     -384
0414                      21,2547   37200 1 DACLIMIT  DEC     16000
```

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 0415                        21,2550  00600 1          DEC     384
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P0416    INITIALIZATION PROGRAM FOR RCS-CSM AUTOPILOT

R0417    THE FOLLOWING QUANTITIES WILL BE ZEROED AND SHOULD APPEAR IN CONSECUTIVE LOCATIONS IN MEMORY AFTER WBODY

R0419    WBODY    (+1)    DFT                TAU2
R0420    WBODY1   (+1)    DFT1               BIAS
R0421    WBODY2   (+1)    DFT2               BIAS1
R0422    ADOT     (+1)    DRHO     (+1)      BIAS2
R0423    ADOT1    (+1)    DRHO1    (+1)      ERRORX
R0424    ADOT2    (+1)    DRHO2    (+1)      ERRORY
R0425    MERRORX  (+1)    ATTSEC             ERRORZ
R0426    MERRORY  (+1)    TAU
R0427    MERRORZ  (+1)    TAU1
 0428    REF  96  LAST 1000   21,2551  3 4770 0  FRESHDAP CAF    ONE              RESET HOLDFLAG TO STOP AUTOMATIC
 0429    REF  12  LAST 1005   21,2552  55'340 0           TS     HOLDFLAG         STEERING AND PREPARE TO PICK UP AN
A0430                                                                          ATTITUDE HOLD REFERENCE

 0431    REF  34  LAST  962   21,2553  0 4714 1  REDAP    TC     IBNKCALL         DECODE DAPDATR1, DAPDATR2 FOR DEADBANDS
 0432    REF   2  LAST  265   21,2554   40463 1           CADR   S41.2            RATES, QUADFAILS, QUAD MANAGEMENT

 0433    REF  35  LAST 1012   21,2555  0 4714 1           TC     IBNKCALL         DECODE IXX, IAVG AND CONVERT
 0434    REF   2  LAST  266   21,2556   40614 0           CADR   S40.14           TO AUTOPILOT GAINS

 0436    REF   1              21,2557  3 2633 0           CAF    NO.T5VAR         NO. LOCATIONS TO BE ZEROED MINUS 2
A04365                                                                         NO.T5VAR MUST BE ODD ************
 0437    REF 218  LAST 1010   21,2560  10 000 0  ZEROT5   CCS    A
 0438    REF  18  LAST 1010   21,2561  55'506 1           TS     SPNDX
 0439    REF 172  LAST 1009   21,2562  3 4772 1           CAF    ZERO
 0440    REF  94  LAST 1010   21,2563  54 001 1           TS     L
 0441    REF  19  LAST 1012   21,2564  51'506 0           INDEX  SPNDX
 0442    REF  12  LAST  599   21,2565  53'527 1           DXCH   WBODY +1
 04422   REF  20  LAST 1012   21,2566  11'506 1           CCS    SPNDX
 04424   REF   1              21,2567  1 2560 1           TCF    ZEROT5
 04426   REF  13  LAST 1012   21,2570  55'525 0           TS     WBODY            ZERO LAST (FIRST) ONE

 0443    REF   4  LAST 1000   21,2571  0 2642 0           TC     ZEROJET
 0444    REF 173  LAST 1012   21,2572  4 4772 0           CS     ZERO
 0445    REF   2  LAST  113   21,2573  55'633 1           TS     CHANTEMP         INITIALIZE MINIMUM IMPULSE CONTROL

 04451   REF   2  LAST  113   21,2574  55'632 0           TS     CH31TEMP         INITIALIZE RHC POSITION MEMORY FOR
A04452                                                                         MANUAL RATE MODES
 0446    REF   1              21,2575  3 2634 1           CAF    =.24
 0447    REF   2  LAST  114   21,2576  55'654 0           TS     SLOPE            INITIALIZE SWITCHING LOGIC SLOPE

 0448    REF  12  LAST  951   21,2577  3 4766 1           CAF    FOUR
 0449    REF   3  LAST 1001   21,2600  55'634 0           TS     T5TIME           PHASE 0 RESETS FOR PHASE 2 INTERRUPT IN
A0450                                                                          60MS. PHASE 2 RESETS FOR PHASE 1 RUPT
A04501                                                                         IN (80MS - T5TIME(40MS)). THEREFORE
A04502                                                                         PHASE 1 (RATEFILTER) BEGINS CYCLING 100
A04503                                                                         MS FROM NOW AND EVERY 100MS THEREAFTER
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GAP: ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011      11:40 FEB. 26,1971  ULYSSES .029  PAGE 1013

L       RCS-CSM DIGITAL AUTOPILOT                                                     USER'S PAGE NO. 14       E6 53

 0451   REF   6  LAST  835    21,2601  3 4775 0            CAF      ELEVEN
 0452   REF   4  LAST 1004    21,2602  55'617 1            TS       ATTKALMN        RESET TO PICK UP KALMAN FILTER GAINS
A0453                                                                               TO INITIALIZE THE S/C ANGULAR RATES

 0473   REF  21  LAST 1003    21,2603  3 0032 0            CA       CDUX
 0474   REF   4  LAST 1003    21,2604  55'635 1            TS       RHO
 0475   REF  13  LAST 1003    21,2605  3 0033 1            CA       CDUY
 0476   REF   4  LAST 1003    21,2606  55'636 1            TS       RHO1
 0477   REF  17  LAST 1003    21,2607  3 0034 0            CA       CDUZ
 0478   REF   4  LAST 1003    21,2610  55'637 0            TS       RHO2
 0479   REF 174  LAST 1012    21,2611  3 4772 1            CAF      ZERO            RESET AUTOPILOT TO BEGIN EXECUTING
 0480   REF   8  LAST 1010    21,2612  55'464 1            TS       T5PHASE         PHASE2 OF PROGRAM

 0481   REF  31  LAST 1002    21,2613  4 1334 0            CS       IMODES33        CHECK IMU STATUS
 0482   REF   6  LAST 1002    21,2614  7 4763 0            MASK     NOIMUDAP        IF BIT6 =0 IMU IN FINE ALIGN
 0483   REF 219  LAST 1012    21,2615  10 000 0            CCS      A               IF BIT6 = 1 IMU NOT READY
 0484   REF   1               21,2616  1 2622 1            TCF      IMUAOK
 0485   REF   5  LAST 1013    21,2617  55'617 1            TS       ATTKALMN        CANNOT USE IMU
 0486   REF   1               21,2620  3 2635 0            CAF      RCSINITB        PROVIDE FREE CONTROL ONLY
 0487   REF   1               21,2621  1 2627 1            TCF      RCSSWIT         DONT START UP RATE FILTER
A0488                                                                               SIGNAL NO RATE FILTER

 0489   REF   2  LAST 1004    21,2622  3 7656 0  IMUAOK    CAF      PRIO34          START MATRIX INITIALIZATION
 0490   REF  20  LAST 1004    21,2623  0 5121 0            TC       NOVAC           BYPASS IF IMU NOT IN FINE ALIGN
 0491   REF  20  LAST 1006    E6,1510                      EBANK=   KMPAC
 0492   REF   2  LAST 1004    21,2624   03560 1            2CADR    AMBGUPDT
 0492                         21,2625   44066 1
 0493   REF   1               21,2626  3 4766 1            CAF      RCSINIT         CLEAR BIT14 -ASSUME WE HAVE A GOOD IMU
 0494   REF  31  LAST 1010    21,2627  55'501 0  RCSSWIT   TS       RCSFLAGS        CLEAR BIT1  -INITIALIZE T6 PROGRAM
A0495                                                                                 SET BIT3  -INITIALIZE NEEDLES
A0496                                                                               CLEAR BIT4  -RESET FOR FDAIDSP1
 0497   REF   1               21,2630  3 2636 0            CAF      T5WAIT60        NEXT T5RUPT 60 MS FROM NOW TO ALLOW IMU
A0498                                                                               ERROR COUNTER TO ZERO.
A0499                                                                               (MINIMUM DELAY = 15 MS)
 0500   REF  19  LAST 1010    21,2631  54 030 0            TS       TIME5           SINCE ATTKALMN IS +11, PROGRAM WILL THEN
 0501   REF  33  LAST 1010    21,2632  0 5323 0            TC       RESUME          PICK UP THE KALMAN FILTER GAINS. RATE
A0502                                                                               FILTER WILL BEGIN OPERATING 200MS FROM
A0503                                                                               NOW

R0504   CONSTANTS USED IN INITIALIZATION PROGRAM

 0505                         21,2633   00043 0  NO.T5VAR  DEC      35              NO. OF LOCATIONS TO BE ZEROED
A05051                                                                              MINUS 2...MUST BE ODD
R05052  FOR AN EVEN NUMBER OF VARIABLES TO BE ZEROED....
R05053    * SET NO.T5VAR EQUAL TO NUMBER OF VARIABLES MINUS 1
R05054    * DO DXCH WBODY INSTEAD OF WBODY + 1
R05055    * DELETE TS WBODY
 0506                         21,2634   07534 1  =.24      DEC      .24             = SLOPE OF 0.6/SEC
 0507   REF  40  LAST 1009       4766            RCSINIT   =        BIT3
 0508                         21,2635   20004 1  RCSINITB  OCT      20004
 0509                             21,2636   37772 1  T5WAIT60 DEC      16378             = 6 CS
 0510    REF  21  LAST 1013       E6,1510                       EBANK=  KMPAC
 0511    REF   1                  21,2637   03606 1  T6ADDR   2CADR   T6START
 0511    REF   1                  21,2640   36066 1


 0512                             21,2641   62524 0  -75DEGS  DEC     -.41666            -75 DEGS IN REVS * 2
 053001 REF    7  LAST 1013       21,2642  3 4775 0  ZEROJET  CAF     ELEVEN             ZERO  BLAST2, BLAST1, BLAST, YWORD2,
 053002*REF   21  LAST 1012       21,2643  55'506 1    +1     TS      SPNDX              YWORD1,PWORD2,PWORD1,RWORD2,
 053003 REF  175  LAST 1013       21,2644  3 4772 1           CAF     ZERO               AND RWORD1.
 053004 REF   22  LAST 1014       21,2645  51'506 0           INDEX   SPNDX
 053005 REF    2  LAST  107       21,2646  55'450 0           TS      RWORD1
 053006 REF   23  LAST 1014       21,2647  11'506 1           CCS     SPNDX
 053007 REF    5  LAST 1012       21,2650  1 2643 0           TCF     ZEROJET +1

 053008 REF   13  LAST 1012       21,2651  3 4766 1           CAF     FOUR
 053009 REF    2  LAST  107       21,2652  55'461 1           TS      BLAST1 +1
 05301   REF   8  LAST 1014       21,2653  3 4775 0           CAF     ELEVEN
 0531    REF   2  LAST  107       21,2654  55'463 0           TS      BLAST2 +1

 0532    REF  56  LAST  993       21,2655  4 4770 1           CS      BIT1
 0533    REF  32  LAST 1013       21,2656  7 1501 0           MASK    RCSFLAGS
 0534    REF  33  LAST 1014       21,2657  55'501 0           TS      RCSFLAGS           RESET BIT1 OF RCSFLAGS TO 0

 0535                             21,2660  0 0006 1           EXTEND
 0536    REF   1                  21,2661  3 2640 1           DCA     T6ADDR
 0537    REF   3  LAST  993       21,2662  52 111 1           DXCH    T6LOC
 0538    REF   1                  21,2663  3 3075 0           CAF     =+14MS             ENABLE T6RUPT TO SHUT OFF JETS IN 14 MS.
 05381   REF   3  LAST  993       21,2664  54 031 1           TS      TIME6
 05385                            21,2665  0 0006 1           EXTEND
 05386   REF  26  LAST  832       21,2666  22 070 0           QXCH    RUPTREG1
 05387   REF   2  LAST  392       21,2667  0 4542 0           TC      C13STALL
 0540    REF  37  LAST 1000       21,2670  3 4752 0           CAF     BIT15
 0541                             21,2671  0 0006 1           EXTEND
 0542    REF  10  LAST  994       21,2672  05 013 0           WOR     CHAN13

 0543    REF  27  LAST 1014       21,2673  0 0070 0           TC      RUPTREG1

 0544    REF   6  LAST 1013       21,2674  11'617 1  T5PHASE2 CCS     ATTKALMN           IF (+) INITIALIZE RATE ESTIMATE
 0545    REF   1                  21,2675  1 3170 0           TCF     KALUPDT


 0546                             21,2676  1 2700 0           TCF     +2                 ONLY IF ATTKALMN POSITIVE
 0547                             21,2677  1 2700 0           TCF     +1
 0548    REF   2  LAST 1001       21,2700  3 7663 0           CA      DELTATT2           RESET FOR PHASE3 IN 20 MS
 0549    REF  20  LAST 1013       21,2701  56 030 1           XCH     TIME5              (JET SELECTION LOGIC )
 0550    REF   4  LAST 1012       21,2702  27'634 0           ADS     T5TIME             TO COMPENSATE FOR DELAYS IN T5RUPT


 055001 REF   18  LAST 1013       21,2703  10 034 1           CCS     CDUZ
```

```
055002 REF   1                21,2704  1 2710 1             TCF     GIMBY            +0
055003 REF   1                21,2705  1 2717 0             TCF     CKGIMB           +0
055004 REF   2  LAST 1015     21,2706  1 2710 1             TCF     GIMBY            -N
055005 REF   2  LAST 1015     21,2707  1 2717 0             TCF     CKGIMB           -0
055006 REF   1                21,2710  6 2641 0  GIMBY      AD      -75DEGS
055007                        21,2711  0 0006 1             EXTEND
055008 REF   3  LAST 1015     21,2712  6 2717 1             BZMF    CKGIMB

055009 REF  66  LAST  833     21,2713  0 5547 1             TC      UPFLAG           ATTITUDE HOLD WHEN MIDDLE GIMBAL ANGLE
05501  REF   4  LAST  557     21,2714    00020 0            ADRES   STIKFLAG           GREATER THAN 75 DEGREES
055011 REF 176  LAST 1014     21,2715  3 4772 1             CAF     ZERO
055012 REF  13  LAST 1012     21,2716  55'340 0             TS      HOLDFLAG

055013 REF  34  LAST 1014     21,2717  3 1501 1  CKGIMB     CA      RCSFLAGS         IF A HIGH RATE AUTO MANEUVER IS IN
05502  REF  38  LAST 1014     21,2720  7 4752 1             MASK    BIT15            PROGRESS (BIT 15 OF RCSFLAGS SET), SET
05503                         21,2721  0 0006 1             EXTEND                   ATTKALMN TO -1
05504  REF   1                21,2722  1 2724 0             BZF     NOHIAUTO         OTHERWISE SET ATTKALMN TO 0.
05505  REF  97  LAST 1012     21,2723  4 4770 1             CS      ONE
05506  REF   7  LAST 1014     21,2724  55'617 1  NOHIAUTO   TS      ATTKALMN
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P0551                      MANUAL ROTATION COMMANDS
 0552    REF   1                 21,2725  4 3057 1               CS       OCT01760         RESET FORCED FIRING BITS (BITS 10 TO 5
 0553    REF  35  LAST 1015      21,2726  7 1501 0               MASK     RCSFLAGS         OF RCSFLAGS) TO ZERO
 0554    REF  36  LAST 1016      21,2727  55'501 0               TS       RCSFLAGS

 0555                            21,2730  0 0006 1               EXTEND
 0556    REF   4  LAST  737      21,2731  00 031 0               READ     CHAN31
 0557    REF  95  LAST 1012      21,2732  54 001 1               TS       L
 0558    REF   3  LAST 1012      21,2733  3 1632 1               CA       CH31TEMP
 0559                            21,2734  0 0006 1               EXTEND
 0560    REF  11  LAST  278      21,2735  06 001 0               RXOR     LCHAN
 0561    REF   1                 21,2736  7 3063 0               MASK     MANROT           = OCT00077
 0562                            21,2737  0 0006 1               EXTEND
 0563    REF   1                 21,2740  6 2753 1               BZMF     NOCHANGE

 0564    REF 220  LAST 1013      21,2741  22 000 1               LXCH     A
 0565    REF   4  LAST 1016      21,2742  55'632 0               TS       CH31TEMP         SAVE CONTENTS OF CHANNEL 31 IN CH31TEMP

 0566    REF  96  LAST 1016      21,2743  3 0001 0               CA       L
 0567                            21,2744  0 0006 1               EXTEND
 0568    REF  27  LAST  987      21,2745  7 4764 1               MP       BIT5             PUT BITS 6-1 OF A IN BITS 10-5 OF L
 0569    REF  97  LAST 1016      21,2746  3 0001 0               CA       L
 0570    REF  37  LAST 1016      21,2747  27'501 0               ADS      RCSFLAGS         SET FORCED FIRING BITS FOR AXES WITH
A0571                                                                                      WITH CHANGES IN COMMAND. BITS 10,9 FOR
A0572                                                                                      ROLL, BITS 8,7 FOR YAW, BITS 6,5 FOR
A0573                                                                                      PITCH

 0574    REF  38  LAST 1016      21,2750  4 1501 0               CS       RCSFLAGS         SET RATE DAMPING FLAGS (BITS 13,12,AND
 0575    REF   1                 21,2751  7 3064 1               MASK     OCT16000         11 OF RCSFLAGS)
 0576    REF  39  LAST 1016      21,2752  27'501 0               ADS      RCSFLAGS

 0577    REF   5  LAST 1016      21,2753  4 1632 0      NOCHANGE CS       CH31TEMP
 0578    REF   2  LAST 1016      21,2754  7 3063 0               MASK     MANROT
 0579                            21,2755  0 0006 1               EXTEND
 0580    REF   1                 21,2756  6 3272 0               BZMF     AHFNOROT         IF NO MANUAL COMMANDS, GO TO AHFNOROT

 0581    REF  14  LAST 1015      21,2757  55'340 0               TS       HOLDFLAG         SET HOLDFLAG +

 0582    REF   2  LAST  550      21,2760  0 3152 1               TC       STICKCHK         WHEN THE RHC IS OUT OF DETENT, PMANNDX,
A0583                                                                                      YMANNDX, AND RMANNDX ARE ALL SET, BY
A0584                                                                                      MEANS OF STICKCHK, TO 0, 1, OR 2 FOR NO,
A0585                                                                                      +, OR - ROTATION RESPECTIVELY AS
A0586                                                                                      COMMANDED BY THE RHC.

A0587                                                                                      HOWEVER, IT IS WELL TO NOTE THAT AFTER
A0588                                                                                      THE RHC IS RETURNED TO DETENT, THE
A0589                                                                                      PROGRAM BRANCHES TO AHFNOROT AND AVOIDS
A0590                                                                                      STICKCHK SO PMANNDX, YMANNDX, AND
A0591                                                                                      RMANNDX ARE NOT RESET TO ZERO BUT RATHER
A0592                                                                                      LEFT SET TO THEIR LAST OUT OF DETENT
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A0593                                                                            VALUES.

 0594   REF  38  LAST  829   21,2761  4 0075 1             CS       FLAGWRD1     SET STIKFLAG TO INFORM STEERING
 0595   REF   2  LAST  597   21,2762  7 4753 0             MASK     STIKBIT      PROGRAMS (P20) THAT ASTRONAUT HAS
 0596   REF  39  LAST 1017   21,2763  26 075 1             ADS      FLAGWRD1     ASSUMED ROTATIONAL CONTROL OF SPACECRAFT

 0597   REF  46  LAST 1002   21,2764  3 4753 1             CAF      BIT14
 0598   REF   6  LAST 1002   21,2765  0 5654 0             TC       C31BTCHK
 0599   REF   1              21,2766  1 3076 1             TCF      FREEFUNC
 0602   REF  40  LAST 1016   21,2767  3 1501 1             CA       RCSFLAGS     EXAMINE RCSFLAGS TO SEE IF RATE FILTER
 0603   REF  47  LAST 1017   21,2770  7 4753 0             MASK     BIT14        HAS BEEN INITIALIZED
 0604   REF 221  LAST 1016   21,2771  10 000 0             CCS      A            IF SO, PROCEED WITH MANUAL RATE COMMANDS
 0605   REF   2  LAST 1002   21,2772  1 2541 1             TCF      REINIT       .....TILT, RECYCLE TO INITIALIZE FILTER

 0606   REF  23  LAST  996   21,2773  4 4773 1             CS       FIVE         IF MANUAL MANEUVER IS AT HIGH RATE, SET
 0607   REF   4  LAST  720   21,2774  6 0774 0             AD       RATEINDX     ATTKALMN TO -1.
 0608                         21,2775  0 0006 1             EXTEND                OTHERWISE, LEAVE ATTKALMN ALONE.
 0609                         21,2776  6 3001 0             BZMF     +3
 0610   REF  98  LAST 1015   21,2777  4 4770 1             CS       ONE
 0611   REF   8  LAST 1015   21,3000  55'617 1             TS       ATTKALMN

 0614   REF  38  LAST 1010   21,3001  3 4767 0             CAF      TWO          AUTO-HOLD MANUAL ROTATION
 0615   REF  24  LAST 1014   21,3002  55'506 1  SETWBODY  TS       SPNDX
 0616                         21,3003  6 0000 1             DOUBLE
 0617   REF  18  LAST 1006   21,3004  55'507 0             TS       DPNDX
 0618   REF  25  LAST 1017   21,3005  51'506 0             INDEX    SPNDX        RMANNDX = 0  NO ROTATION
 0619   REF   3  LAST  550   21,3006  3 1656 0             CA       RMANNDX              = 1  + ROTATION
 0620                         21,3007  0 0006 1             EXTEND                        = 2  - ROTATION
 0621   REF   1              21,3010  1 3032 1             BZF      NORATE       IF NO ROTATION COMMAND ON THIS AXIS,
A0622                                                                            GO TO NORATE.

 0623   REF   5  LAST 1017   21,3011  6 0774 0             AD       RATEINDX     RATEINDX = 0  0.05 DEG/SEC
 0624   REF 172  LAST 1010   21,3012  54 002 1             TS       Q                     = 2  0.2 DEG/SEC
 0625   REF 173  LAST 1017   21,3013  50 002 0             INDEX    Q                     = 4  0.5 DEG/SEC
 0626   REF   1              21,3014  3 3064 0             CA       MANTABLE -1           = 6  2.0 DEG/SEC
 0627                         21,3015  0 0006 1             EXTEND
 0628   REF  23  LAST  634   21,3016  7 4760 0             MP       BIT9         MULTIPLY MANTABLE BY 2 TO THE -6
 0629   REF  19  LAST 1017   21,3017  51'507 1             INDEX    DPNDX        TO GET COMMANDED RATE.
 0630   REF  14  LAST 1012   21,3020  53'526 0             DXCH     WBODY        SET WBODY TO COMMANDED RATE.

 0631   REF  41  LAST 1017   21,3021  3 1501 1             CA       RCSFLAGS
 0632   REF   2  LAST 1016   21,3022  7 3064 1             MASK     OCT16000     IS RATE DAMPING COMPLETED (BITS 13,12AND
 0633                         21,3023  0 0006 1             EXTEND                11 OF RCSFLAGS ALL ZERO.) IF SO, GO TO
 0634   REF   1              21,3024  1 3042 0             BZF      MERUPDAT     MERUPDAT TO UPDATE CUMULATIVE ATTITUDE
A0635                                                                            ERROR.

 0636   REF 177  LAST 1015   21,3025  3 4772 1  ZERОER    CA       ZERO         ZEROER ZEROS MERRORS
 0637                         21,3026  22 007 0             ZL
 0638   REF  20  LAST 1017   21,3027  51'507 1             INDEX    DPNDX
 0639   REF   3  LAST 1004   21,3030  53'542 1            DXCH    MERRORX
 0640   REF   1              21,3031  1 3050 0            TCF     SPNDXCHK

 0641                        21,3032  22 007 0  NORATE    ZL
 0642   REF  21  LAST 1017   21,3033  51'507 1            INDEX   DPNDX
 0643   REF  15  LAST 1017   21,3034  53'526 0            DXCH    WBODY            ZERO WBODY FOR THIS AXIS
 0644   REF  42  LAST 1017   21,3035  3 1501 1            CA      RCSFLAGS
 0645   REF   3  LAST 1017   21,3036  7 3064 1            MASK    OCT16000
 0646                        21,3037  0 0006 1            EXTEND                   IS RATE DAMPING COMPLETED
 0647   REF   2  LAST 1018   21,3040  1 3050 0            BZF     SPNDXCHK         YES, KEEP CURRENT MERRORX GO TO SPNDXCHK
 0648   REF   1              21,3041  1 3025 1            TCF     ZEROER           NO,GO TO ZEROER

 0649   REF 174  LAST 1017   21,3042  50 002 0  MERUPDAT  INDEX   Q                MERRORX=MERRORX+MEASURED CHANGE IN ANGLE
 0650   REF   2  LAST 1017   21,3043  4 3064 1            CS      MANTABLE -1      -COMMANDED CHANGE IN ANGLE
 0651                        21,3044  0 0006 1            EXTEND                   THE ADDITION OF MEASURED CHANGE IN ANGLE
 0652   REF  27  LAST  732   21,3045  7 4762 1            MP      BIT7             HAS ALREADY BEEN DONE IN THE RATE FILTER
 0653   REF  22  LAST 1018   21,3046  51'507 1            INDEX   DPNDX            COMMANDED CHANGE IN ANGLE = WBODY TIMES
 0654   REF   4  LAST 1018   21,3047  21'542 1            DAS     MERRORX          .1SEC = MANTABLE ENTRY TIMES 2 TO THE -8

 0655   REF  23  LAST 1018   21,3050  51'507 1  SPNDXCHK  INDEX   DPNDX
 0656   REF   5  LAST 1018   21,3051  3 1541 0            CA      MERRORX
 0657   REF  26  LAST 1017   21,3052  51'506 0            INDEX   SPNDX
 0658   REF   8  LAST 1000   21,3053  55'567 0            TS      ERRORX           ERRORX = HIGH ORDER WORD OF MERRORX
 0659   REF  27  LAST 1018   21,3054  11'506 1            CCS     SPNDX
 0660   REF   1              21,3055  1 3002 1            TCF     SETWBODY
 0661   REF   1              21,3056  1 3452 0            TCF     JETS


 0662                        21,3057   01760 1  OCT01760  OCT     01760            FORCED FIRING BITS MASK

 0663                        21,3060   01400 1  OCT01400  OCT     01400            ROLL FORCED FIRING MASK        ORDER OF
 0664                        21,3061   00060 1  OCT00060  OCT     00060            PITCH FORCED FIRING MASK       DEFINITION
 0665                        21,3062   00300 1  OCT00300  OCT     00300            YAW FORCED FIRING MASK         MUST BE
A0666                                                                                                             PRESERVED
A0667                                                                                                           FOR INDEXING
 0668                        21,3063   00077 1  MANROT    OCT     77
 0669                        21,3064   16000 0  OCT16000  OCT     16000            RATE DAMPING FLAGS MASK
 0670                        21,3065   00165 0  MANTABLE  DEC     .0071111
 0671                        21,3066   77612 1            DEC     -.0071111
 0672                        21,3067   00722 0            DEC     .028444
 0673                        21,3070   77055 1            DEC     -.028444
 0674                        21,3071   02215 0            DEC     .071111
 0675                        21,3072   75562 1            DEC     -.071111
 0676                        21,3073   11064 0            DEC     .284444
 0677                        21,3074   66713 1            DEC     -.284444
 0678                        21,3075   00027 1  =+14MS    DEC     23
 0679   REF  43  LAST 1018   21,3076  3 1501 1  FREEFUNC  CA      RCSFLAGS
 0680                        21,3077  0 0006 1            EXTEND
 0681   REF  24  LAST  990   21,3100  7 4756 0            MP      BIT11            SHIFT RIGHT 4 BITS
 0682   REF   7  LAST 1010   21,3101  55'502 0            TS      T5TEMP
 0683    REF    6  LAST 1016   21,3102  4 1632 0             CS      CH31TEMP
 0684    REF    8  LAST 1018   21,3103  7 1502 0             MASK    T5TEMP            A= COMPLEMENT OF NEW CH 31 COMMANDS
 0685    REF    1              21,3104  1 3320 1             TCF     RHCMINP
 0693    REF  178  LAST 1017   21,3105  3 4772 1   T6PROGM   CAF     ZERO              FOR MANUAL ROTATIONS
 0694    REF    9  LAST 1018   21,3106  55'567 0             TS      ERRORX
 0695    REF    9  LAST 1000   21,3107  55'570 0             TS      ERRORY
 0696    REF    6  LAST 1000   21,3110  55'571 1             TS      ERRORZ
 0697    REF    1              21,3111  1 3763 1             TCF     T6PROG
```

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06971                          21,3112   00000 1  FREETAU  DEC     0
06972                          21,3113   00740 1           DEC     480
06973                          21,3114   77037 0           DEC     -480
06974                          21,3115   00000 1           DEC     0


06975                          21,3116   06604 0           DEC     .2112        FILTER GAIN FOR TRANSLATION, LEM ON
06980                          21,3117   32703 1           DEC     .8400        FILTER GAIN FOR TRANSLATION 2(ZETA)WN DT
06990                          21,3120   06604 0           DEC     .2112        FILTER GAIN FOR 2 DEGREES/SEC MANEUVERS
07000                          21,3121   02031 1  GAIN1    DEC     .0640        KALMAN FILTER GAINS FOR INITIALIZATION
07010                          21,3122   12132 1           DEC     .3180        OF ATTITUDE RATES
07020                          21,3123   13030 0           DEC     .3452
07030                          21,3124   14047 1           DEC     .3774
07040                          21,3125   15241 1           DEC     .4161
07050                          21,3126   16650 0           DEC     .4634
07060                          21,3127   20555 0           DEC     .5223
07070                          21,3130   23065 0           DEC     .5970
07080                          21,3131   26137 0           DEC     .6933
07090                          21,3132   32053 0           DEC     .8151
07100                          21,3133   35712 0           DEC     .9342

07105                          21,3134   00435 0           DEC     .0174        FILTER GAIN FOR TRANSLATION, LEM ON
07110                          21,3135   13412 1           DEC     .3600        FILTER GAIN FOR TRANSLATION (WN)(WN)DT
07120                          21,3136   00435 0           DEC     .0174        FILTER GAIN FOR 2 DEGREES/SEC MANEUVERS
07130                          21,3137   00032 0  GAIN2    DEC     .0016        SCALED 10
07140                          21,3140   01350 0           DEC     .0454
07150                          21,3141   01575 1           DEC     .0545
07160                          21,3142   02103 1           DEC     .0666
07170                          21,3143   02523 1           DEC     .0832
07180                          21,3144   03327 1           DEC     .1069
07190                          21,3145   04432 0           DEC     .1422
07200                          21,3146   06264 1           DEC     .1985
07210                          21,3147   11351 0           DEC     .2955
07220                          21,3150   17324 1           DEC     .4817
07230                          21,3151   33622 1           DEC     .8683
07240    REF   9  LAST 1019    21,3152   55'502 0 STICKCHK TS      TSTEMP
07250    REF  31  LAST  951    21,3153   7 6214 1          MASK    THREE        INDECES FOR MANUAL ROTATION
07260    REF   3  LAST  551    21,3154   55'657 0          TS      PMANNDX
07270    REF  10  LAST 1020    21,3155   3 1502 1          CA      TSTEMP
07280                          21,3156   0 0006 1          EXTEND               MAN RATE 0    0 RATE (DP)
07290    REF   4  LAST 1010    21,3157   7 4754 1          MP      QUARTER                 +1   +RATE (DP)
07300    REF  11  LAST 1020    21,3160   55'502 0          TS      TSTEMP                  +2   -RATE (DP)
07310    REF  32  LAST 1020    21,3161   7 6214 1          MASK    THREE                  (+3)  0 RATE (DP)
07320    REF   3  LAST  551    21,3162   55'660 1          TS      YMANNDX
07330    REF  12  LAST 1020    21,3163   3 1502 1          CA      TSTEMP
07340                          21,3164   0 0006 1          EXTEND
07350    REF   5  LAST 1020    21,3165   7 4754 1          MP      QUARTER
07360    REF   4  LAST 1017    21,3166   55'656 1          TS      RMANNDX
07370    REF 175  LAST 1018    21,3167   0 0002 0          TC      Q
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 0738    REF   9  LAST 1017   21,3170  55'617 1  KALUPDT  TS      ATTKALMN          INITIALIZATION OF ATTITUDE RATES USING
A0739                                                                               KALMAN FILTER TAKES 1.1 SEC

 0740    REF   1              21,3171  3 2167 0           CA      DELTATT           =1SEC - 80MS
 0741    REF   5  LAST 1014   21,3172  6 1634 1           AD      T5TIME            + DELAYS
 0742    REF  21  LAST 1014   21,3173  54 030 0           TS      TIME5
 0743                         21,3174  1 3177 1           TCF     +3
 0744    REF   3  LAST 1014   21,3175  3 7663 0           CAF     DELTATT2          SAFETY PLAY TO ASSURE
 0745    REF  22  LAST 1021   21,3176  54 030 0           TS      TIME5             A T5RUPT


 0752    REF 179  LAST 1019   21,3177  4 4772 0  KRESUME2 CS      ZERO              RESET FOR PHASE1
 0753    REF   9  LAST 1013   21,3200  55'464 1           TS      T5PHASE           RESUME INTERRUPTED PROGRAM
 0754    REF  34  LAST 1013   21,3201  1 5323 1           TCF     RESUME


 0755    REF  31  LAST 1009   21,3202  4 4765 0  FDAIDSP2 CS      BIT4              RESET FOR FDAIDSP1
 0756    REF  44  LAST 1018   21,3203  7 1501 0           MASK    RCSFLAGS
 0757    REF  45  LAST 1021   21,3204  55'501 0           TS      RCSFLAGS

 0758    REF  20  LAST  834   21,3205  4 0074 0           CS      FLAGWRD0          ON - DISPLAY ONE OF THE TOTAL ATTITUDE
 0759    REF   1              21,3206  7 4760 0           MASK    NEEDLBIT          ERRORS
 0760                         21,3207  0 0006 1           EXTEND
 0761    REF   1              21,3210  1 3217 1           BZF     FDAITOTL
 0762                         21,3211  0 0006 1           EXTEND
 0763    REF  10  LAST 1019   21,3212  4 1570 0           DCS     ERRORX            OFF -DISPLAY AUTOPILOT FOLLOWING ERROR
 0764    REF  19  LAST 1010   21,3213  53'477 0           DXCH    AK
 0765    REF   7  LAST 1019   21,3214  4 1571 1           CS      ERRORZ
 0766    REF   9  LAST 1009   21,3215  55'500 1           TS      AK2
 0767    REF  35  LAST 1021   21,3216  1 5323 1           TCF     RESUME            END PHASE 1


 0768    REF  12  LAST  947   21,3217  3 0105 0  FDAITOTL CA      FLAGWRD9
 07681   REF   1              21,3220  7 4763 0           MASK    N2217BIT
 07682                        21,3221  0 0006 1           EXTEND
 07683   REF   1              21,3222  1 3265 1           BZF     WRTN17            IS N22ORN17 (BIT6 OF FLAGWRD9) = 0
A07684                                                                              IF SO, GO TO WRTN17
 07685                        21,3223  0 0006 1  WRTN22   EXTEND                    OTHERWISE, CONTINUE ON TO WRTN22 AND
 0769    REF   2  LAST  423   21,3224  3 1311 0           DCA     CTHETA            GET SET TC COMPUTE TOTAL ATTITUDE
 0770    REF   2  LAST  112   21,3225  53'514 1           DXCH    WTEMP             ERROR WRT N22 BY PICKING UP THE THREE
 0771    REF   7  LAST  423   21,3226  3 1307 1           CA      CPHI              COMPONENTS OF N22

 0772                         21,3227  0 0006 1  GETAKS   EXTEND                    COMPUTE TOTAL ATTITUDE ERROR FOR
 0773    REF  22  LAST 1013   21,3230  20 032 1           MSU     CDUX              DISPLAY ON FDAI ERROR NEEDLES
 0774    REF  20  LAST 1021   21,3231  55'476 1           TS      AK
 0775    REF   3  LAST 1021   21,3232  3 1513 1           CA      WTEMP
 0776                         21,3233  0 0006 1           EXTEND
 0777    REF  14  LAST 1013   21,3234  20 033 0           MSU     CDUY
 0778    REF  13  LAST 1020   21,3235  55'502 0           TS      T5TEMP
 0779                         21,3236  0 0006 1           EXTEND
 0780   REF   3  LAST 1003    21,3237  7 1640 0              MP      AMGB1
 0781   REF  21  LAST 1021    21,3240  27'476 1              ADS     AK
 0782   REF  14  LAST 1021    21,3241  3 1502 1              CA      T5TEMP
 0783                         21,3242  0 0006 1              EXTEND
 0784   REF   3  LAST 1003    21,3243  7 1641 1              MP      AMGB4
 0785   REF   9  LAST 1009    21,3244  55'477 0              TS      AK1
 0786   REF  15  LAST 1022    21,3245  3 1502 1              CA      T5TEMP
 0787                         21,3246  0 0006 1              EXTEND
 0788   REF   3  LAST 1003    21,3247  7 1643 0              MP      AMGB7
 0789   REF  10  LAST 1021    21,3250  55'500 1              TS      AK2
 0790   REF   4  LAST 1021    21,3251  3 1514 0              CA      WTEMP +1
 0791                         21,3252  0 0006 1              EXTEND
 0792   REF  19  LAST 1014    21,3253  20 034 1              MSU     CDUZ
 0793   REF  16  LAST 1022    21,3254  55'502 0              TS      T5TEMP
 0794                         21,3255  0 0006 1              EXTEND
 0795   REF   3  LAST 1003    21,3256  7 1642 1              MP      AMGB5
 0796   REF  10  LAST 1022    21,3257  27'477 0              ADS     AK1
 0797   REF  17  LAST 1022    21,3260  3 1502 1              CA      T5TEMP
 0798                         21,3261  0 0006 1              EXTEND
 0799   REF   3  LAST 1003    21,3262  7 1644 1              MP      AMGB8
 0800   REF  11  LAST 1022    21,3263  27'500 1              ADS     AK2
 0801   REF  36  LAST 1021    21,3264  1 5323 1              TCF     RESUME          END PHASE1 OF RCS DAP

 0802                         21,3265  0 0006 1   WRTN17     EXTEND                  GET SET TO COMPUTE TOTAL ASTRONAUT
 0803   REF   4  LAST  283    21,3266  3 1015 1              DCA     CPHIX +1        ATTITUDE ERROR WRT N17 BY PICKING UP
 0804   REF   5  LAST 1022    21,3267  53'514 1              DXCH    WTEMP           THE THREE COMPONENTS OF N17
 0805   REF   5  LAST 1022    21,3270  3 1013 1              CA      CPHIX
 0806   REF   1               21,3271  1 3227 1              TCF     GETAKS
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L        AUTOMATIC MANEUVERS                                                                USER'S PAGE NO.   1      EC S3

  0002   REF   3  LAST 1000   21,2000                            SETLOC DAPS3
  0003                        21,3272                            BANK

  0004  *REF   1                                                 COUNT* $$/DAPAM
  0005   REF  22  LAST 1014   E6,1510                            EBANK= KMPAC
  0006   REF  48  LAST 1017   21,3272  3 4753 1  AHFNOROT CAF    BIT14
  0007   REF   7  LAST 1017   21,3273  0 5654 0           TC     C31BTCHK
  0008   REF   1              21,3274  1 3310 1           TCF    FREECONT
  0011   REF  46  LAST 1021   21,3275  3 1501 1           CA     RCSFLAGS        SEE IF RATE FILTER HAS BEEN INITIALIZED
  0012   REF  49  LAST 1024   21,3276  7 4753 0           MASK   BIT14
  0013   REF 222  LAST 1017   21,3277  10 000 0           CCS    A               IF SO, PROCEED WITH ATTITUDE CONTROL
  0014   REF   3  LAST 1017   21,3300  1 2541 1           TCF    REINIT          IF NOT, RECYCLE TO INITIALIZE FILTER
 A0015                                                                           AUTOMATIC CONTROL YET
  0016   REF  34  LAST  981   21,3301  3 4754 0           CAF    BIT13
  0017   REF   8  LAST 1024   21,3302  0 5654 0           TC     C31BTCHK
  0018   REF   1              21,3303  1 3404 0           TCF    HOLDFUNC
  0021   REF  15  LAST 1016   21,3304  3 1340 1  AUTOCONT CA     HOLDFLAG        IF HOLDFLAG IS +, GO TO GRABANG.
  0022                        21,3305  0 0006 1           EXTEND                 OTHERWISE, GO TO ATTHOLD.
  0023   REF   1              21,3306  6 3334 0           BZMF   ATTHOLD
  0024   REF   1              21,3307  1 3410 0           TCF    GRABANG

 R0026             MINIMUM IMPULSE CONTROL

  0027   REF  99  LAST 1017   21,3310  3 4770 0  FREECONT CAF    ONE
  0028   REF  16  LAST 1024   21,3311  55'340 0           TS     HOLDFLAG        RESET HOLDFLAG
 A0029                                                                           INHIBIT AUTOMATIC STEERING
  0030                        21,3312  0 0006 1           EXTEND
  0031   REF   2  LAST  144   21,3313  00 032 0           READ   CHAN32
  0032   REF  98  LAST 1016   21,3314  54 001 1           TS     L
  0033                        21,3315  4 0000 0           COM
  0035   REF   3  LAST 1012   21,3316  7 1633 1           MASK   CHANTEMP
  0036   REF   4  LAST 1024   21,3317  23'633 0           LXCH   CHANTEMP
  00365  REF   3  LAST 1016   21,3320  7 3063 0  RHCMINP  MASK   MANROT
  0037   REF   3  LAST 1016   21,3321  0 3152 1           TC     STICKCHK
  0038   REF   5  LAST 1020   21,3322  51'656 0           INDEX  RMANNDX
  0039   REF   1              21,3323  3 4614 0           CA     MINTAU          MINTAU  +0
  0040   REF   2  LAST  113   21,3324  55'561 0           TS     TAU                     +1   +14MS MINIMUM IMPULSE
  0041   REF   4  LAST 1020   21,3325  51'657 1           INDEX  PMANNDX                 +2   -14MS TIME
  0042   REF   2  LAST 1024   21,3326  3 4614 0           CA     MINTAU                  +3   +0
  0043   REF   2  LAST  113   21,3327  55'562 0           TS     TAU1
  0044   REF   4  LAST 1020   21,3330  51'660 0           INDEX  YMANNDX
  0045   REF   3  LAST 1024   21,3331  3 4614 0           CA     MINTAU
  0046   REF   2  LAST  113   21,3332  55'563 1           TS     TAU2
  0047   REF   1              21,3333  1 3105 1           TCF    T6PROGM

  00475  REF   5  LAST  713      4000                     SETLOC FFTAG12
  00476                          4614                     BANK

  00478 *REF   1                                          COUNT* $$/DAPAM
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L        AUTOMATIC MANEUVERS                                                   USER'S PAGE NO.   2      E6 53

 0048                             4614   00000 1  MINTAU    DEC     0
 0049                             4615   00027 1  DEC23     DEC     23                  = 14 MS
 0050                             4616   77750 0  DECNEG23  DEC     -23                 = -14 MS
 0051                             4617   00000 1            DEC     0


 00515  REF    4  LAST 1024   21,2000                       SETLOC  DAPS3
 00516                        21,3334                       BANK

 00518 *REF    2 LAST 1024 TO 1024:     34     34*          COUNT*  $$/DAPAM
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L         AUTOMATIC MANEUVERS                                                                  USER'S PAGE NO.  3      E6 S3

P0052            CALCULATION OF ATTITUDE ERRORS-

R0053                -    *     -       -             -
R0054                AK = AMGB (CDUX - THETADX) + BIAS

R0055     IE         *AK *    * 1   SIN(PSI)             0      ** CDUX - THETADX *     *BIAS *
R0057                *  *   *                                   **                *     *     *
R0059                *AK1* = * 0   COS(PSI)COS(PHI)  SIN(PHI)** CDUY - THETADY *   + *BIAS1*
R0061                *  *   *                                   **                *     *     *
R0063                *AK2*    * 0  -COS(PSI)SIN(PHI)  COS(PHI)** CDUZ - THETADZ *     *BIAS2*

R0065            THE BIASES ARE ADDED ONLY WHILE PERFORMING AUTOMATIC MANEUVERS (ESP KALCMANU) TO PROVIDE ADDITIONAL LEAD
R0067     AND PREVENT OVERSHOOT WHEN STARTING AN AUTOMATIC MANEUVER. NORMALLY THE REQUIRED LEAD IS ONLY 1-2 DEGREES.
R0069     BUT DURING HIGH RATE MANEUVERS IT CAN BE AS MUCH AS 7 DEGREES.  THE BIASES ARE COMPUTED BY KALCMANU AND REMAIN
R0071     FIXED UNTIL THE MANEUVER IS COMPLETED AT WHICH TIME THEY ARE RESET TO ZERO.


 0075     REF  23  LAST 1021   21,3334  3 0032 0  ATTHOLD  CA      CDUX
 0076                          21,3335  0 0006 1           EXTEND
 0077     REF  13  LAST 1006   21,3336  21'572 1           MSU     THETADX
 0078     REF  11  LAST 1021   21,3337  55'567 0           TS      ERRORX
 0079     REF  15  LAST 1021   21,3340  3 0033 1           CA      CDUY
 0080                          21,3341  0 0006 1           EXTEND
 0081     REF  10  LAST  708   21,3342  21'573 0           MSU     THETADY
 0082     REF  18  LAST 1022   21,3343  55'502 0           TS      T5TEMP
 0083                          21,3344  0 0006 1           EXTEND
 0084     REF   4  LAST 1022   21,3345  7 1640 0           MP      AMGB1
 0085     REF  12  LAST 1026   21,3346  27'567 0           ADS     ERRORX
 0086     REF  19  LAST 1026   21,3347  3 1502 1           CA      T5TEMP
 0087                          21,3350  0 0006 1           EXTEND
 0088     REF   4  LAST 1022   21,3351  7 1641 1           MP      AMGB4
 0089     REF  10  LAST 1019   21,3352  55'570 0           TS      ERRORY
 0090     REF  20  LAST 1026   21,3353  3 1502 1           CA      T5TEMP
 0091                          21,3354  0 0006 1           EXTEND
 0092     REF   4  LAST 1022   21,3355  7 1643 0           MP      AMGB7
 0093     REF   8  LAST 1021   21,3356  55'571 1           TS      ERRORZ
 0094     REF  20  LAST 1022   21,3357  3 0034 0           CA      CDUZ
 0095                          21,3360  0 0006 1           EXTEND
 0096     REF   9  LAST  599   21,3361  21'574 1           MSU     THETADZ
 0097     REF  21  LAST 1026   21,3362  55'502 0           TS      T5TEMP
 0098                          21,3363  0 0006 1           EXTEND
 0099     REF   4  LAST 1022   21,3364  7 1642 1           MP      AMGB5
 0100     REF  11  LAST 1026   21,3365  27'570 0           ADS     ERRORY
 0101     REF  22  LAST 1026   21,3366  3 1502 1           CA      T5TEMP
 0102                          21,3367  0 0006 1           EXTEND
 0103     REF   4  LAST 1022   21,3370  7 1644 1           MP      AMGB8
 0104     REF   9  LAST 1026   21,3371  27'571 1           ADS     ERRORZ
 0105     REF  17  LAST 1024   21,3372  4 1340 0           CS      HOLDFLAG
 0106                          21,3373  0 0006 1           EXTEND
 0107    REF   2  LAST 1018    21,3374  6 3452 1             BZMF    JETS
 0108    REF   4  LAST  422    21,3375  3 1564 1             CA      BIAS             AD BIASES ONLY IF PERFORMING AUTOMATIC
 0109    REF  13  LAST 1026    21,3376  27'567 0             ADS     ERRORX
 0110    REF   4  LAST  422    21,3377  3 1565 0             CA      BIAS1
 0111    REF  12  LAST 1026    21,3400  27'570 0             ADS     ERRORY
 0112    REF   4  LAST  422    21,3401  3 1566 0             CA      BIAS2
 0113    REF  10  LAST 1026    21,3402  27'571 1             ADS     ERRORZ
 0114    REF   3  LAST 1027    21,3403  1 3452 0             TCF     JETS


 0115    REF  18  LAST 1026    21,3404  11'340 0  HOLDFUNC CCS     HOLDFLAG
 0116                          21,3405  1 3410 0             TCF     +3
 0117    REF   2  LAST 1024    21,3406  1 3334 1             TCF     ATTHOLD
 0118                          21,3407  1 3410 0             TCF     +1
 0119    REF 180  LAST 1021    21,3410  3 4772 1  GRABANG  CAF     ZERO             ZERO WBODYS AND BIASES
 01191   REF  16  LAST 1018    21,3411  55'525 0             TS      WBODY
 01192   REF  17  LAST 1027    21,3412  55'526 0             TS      WBODY +1
 01193   REF   6  LAST  599    21,3413  55'527 1             TS      WBODY1
 01194   REF   7  LAST 1027    21,3414  55'530 1             TS      WBODY1 +1
 01195   REF   6  LAST  599    21,3415  55'531 0             TS      WBODY2
 01196   REF   7  LAST 1027    21,3416  55'532 0             TS      WBODY2 +1
 01197   REF   5  LAST 1027    21,3417  55'564 0             TS      BIAS
 01198   REF   5  LAST 1027    21,3420  55'565 1             TS      BIAS1
 01199   REF   5  LAST 1027    21,3421  55'566 1             TS      BIAS2

 0120    REF  47  LAST 1024    21,3422  3 1501 1             CA      RCSFLAGS
 01201   REF   4  LAST 1018    21,3423  7 3064 1             MASK    OCT16000
 012011                        21,3424  0 0006 1             EXTEND                   IS RATE DAMPING COMPLETED
 01202   REF   1               21,3425  1 3433 1             BZF     ENDDAMP          IF SO, GO TO ENDDAMP
 01203   REF 181  LAST 1027    21,3426  3 4772 1             CAF     ZERO             OTHERWISE, ZERO ERRORS
 01204   REF  14  LAST 1027    21,3427  55'567 0             TS      ERRORX
 01205   REF  13  LAST 1027    21,3430  55'570 0             TS      ERRORY
 01206   REF  11  LAST 1027    21,3431  55'571 1             TS      ERRORZ
 01207   REF   4  LAST 1027    21,3432  1 3452 0             TCF     JETS

 01208   REF  19  LAST 1027    21,3433  55'340 0  ENDDAMP  TS      HOLDFLAG         SET HOLDFLAG +0
 01209                         21,3434  0 0006 1             EXTEND
 0121    REF  24  LAST 1026    21,3435  3 0033 1             DCA     CDUX             PICK UP CDU ANGLES FOR ATTITUDE HOLD
 01211   REF  14  LAST 1026    21,3436  53'573 0             DXCH    THETADX          REFERENCES
 01212   REF  21  LAST 1026    21,3437  3 0034 0             CA      CDUZ
 01213   REF  10  LAST 1026    21,3440  55'574 1             TS      THETADZ
 01214   REF   3  LAST 1027    21,3441  1 3334 1             TCF     ATTHOLD
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L       AUTOMATIC MANEUVERS                                                          USER'S PAGE NO.   5      E6 S3

P0130   JET SWITCHING LOGIC AND CALCULATION OF REQUIRED ROTATION COMMANDS

R0131   DETERMINE THE LOCATION OF THE RATE ERROR AND THE ATTITUDE ERROR RELATIVE TO THE SWITCHING LOGIC IN THE PHASE
R0133   PLANE.
R0134   COMPUTE THE CHANGE IN RATE CORRESPONDING TO THE ATTITUDE ERROR NECESSARY TO DRIVE THE THE S/C INTO THE
R0136   APPROPRIATE DEADZONE.


R0137                                       .
R0138     R22                          RATE . ERROR
R0139          WL+H                         .
R0140   *********************************   .                                   ***** SWITCH LINES ENCLOSING DEADZONES
R0142     R23 WL                         *  .
R0143   --------------------------------- * .                                   ----- DESIRED RATE LINES
R0145     R23 WL-H         -               *.
R0146   ****************** -                .                                   R20, R21, R22, ETC  REGIONS IN PHASE
R0148                     * -               .* R18       R20      R21           PLANE FOR COMPUTING DESIRED RESPONSE
R0150                       *               . *
R0151                       *-              .  *
R0152     R22             R24*-     R23     .   *
R0153                         *-            .    *
R0154                          *            .     *
R0155                           + -ADB      .      * AF              ATTITUDE
R0156   .........................+--+---------------+--+........................
R0157                             AF *      .     +ADB  +             ERROR
R0158                                 *     .            *
R0159                                  *    .            -*
R0160                                   *   .             -*
R0161                                    *  .              -*
R0162                                     * .                *
R0163                                      *.               - *
R0164                                       .                - *****************
R0165                                       .*                -
R0166                                       . * --------------------------------
R0167                                       .  *
R0168                                       .   ********************************
R0169                                       .

R0170                       FIG. 1   PHASE PLANE SWITCHING LOGIC


R0171            CONSTANTS FOR JET SWITCHING LOGIC

 0172                         21,3442  00114 0  WLH/SLOP DEC  .00463            = WL+H/SLOPE = .83333 DEG      $180
 0173   REF    1                 5006           WL-H/SLP =    DEC45             = WL-H/SLOPE = .5 DEC           $180
 0174                         21,3443  00022 1  WLH      2DEC .0011111111       = WL+H = 0.5 DEG/SEC           $450
 0174                         21,3444  06426 1
 0175                         21,3445  00012 1  WLMH     2DEC .0006666666       = WL-H = 0.3 DEG/SEC           $450
 0175                         21,3446  35415 1
 0176                         21,3447  00016 0  WL       2DEC .0008888888       = WL    = 0.4 DEG/SEC          $450
 0176                         21,3450  22021 1
 0177                          21,3451   12173 1  SLOPE2   DEC     .32             = 0.8 DEG/SEC/DEG               $450/180
 0178   REF  10  LAST  721     21,3452  3 1655 0  JETS     CA      ADB
 0179   REF  14  LAST 1014     21,3453  6 4766 1           AD      FOUR            AF = FLAT REGION = .044 DEG
 0180   REF  23  LAST 1026     21,3454  55'502 0           TS      T5TEMP          ADB+AF
 0181   REF  39  LAST 1017     21,3455  3 4767 0           CAF     TWO
 0182   REF  28  LAST 1018     21,3456  55'506 1  JLOOP    TS      SPNDX
 0183                          21,3457  6 0000 1           DOUBLE
 0184   REF  24  LAST 1018     21,3460  55'507 0           TS      DPNDX
 0185                          21,3461  0 0006 1           EXTEND
 0186   REF 223  LAST 1024     21,3462  5 0000 1           INDEX   A
 0187   REF  11  LAST 1004     21,3463  3 1534 1           DCA     ADOT
 0188   REF   2  LAST  112     21,3464  53'516 0           DXCH    EDOT
 0189   REF  20  LAST 1027     21,3465  3 1340 1           CA      HOLDFLAG        HOLDFLAG = +0 MEANS THAT DAP IS IN
 0190                          21,3466  0 0006 1           EXTEND                  ATTITUDE HOLD AND RATE DAMPING IS OVER.
 0191   REF   1                21,3467  1 3474 1           BZF     INHOLD          IF THIS IS THE CASE, BYPASS ADDITION
A01911                                                                             OF WBODY AND GO TO INHOLD
 0192                          21,3470  0 0006 1           EXTEND
 0193   REF  25  LAST 1029     21,3471  5 1507 1           INDEX   DPNDX
 0194   REF  18  LAST 1027     21,3472  4 1526 0           DCS     WBODY
 0195   REF   3  LAST 1029     21,3473  21'516 0           DAS     EDOT            = ADOT-WBODY
 0196   REF  29  LAST 1029     21,3474  51'506 0  INHOLD   INDEX   SPNDX
 0197   REF  15  LAST 1027     21,3475  3 1567 1           CA      ERRORX
 0198   REF   2  LAST  112     21,3476  55'517 1           TS      AERR            AERR = BIAS + AK

 0199   REF   4  LAST 1029     21,3477  11'515 0           CCS     EDOT
 0200   REF   1                21,3500  1 3510 1           TCF     POSVEL
 0201   REF   1                21,3501  1 3503 0           TCF     SIGNCK1
 0202   REF   1                21,3502  1 3520 1           TCF     NEGVEL
 0203   REF   5  LAST 1029     21,3503  11'516 0  SIGNCK1  CCS     EDOT +1
 0204   REF   2  LAST 1029     21,3504  1 3510 1           TCF     POSVEL
 0205   REF   3  LAST 1029     21,3505  1 3510 1           TCF     POSVEL
 0206   REF   2  LAST 1029     21,3506  1 3520 1           TCF     NEGVEL
 0207   REF   3  LAST 1029     21,3507  1 3520 1           TCF     NEGVEL
 0208                          21,3510  0 0006 1  POSVEL   EXTEND
 0209   REF   6  LAST 1029     21,3511  3 1516 1           DCA     EDOT
 0210   REF   2  LAST  112     21,3512  53'521 1           DXCH    EDOTVEL
 0211   REF  24  LAST 1029     21,3513  3 1502 1           CA      T5TEMP
 0212   REF   1                21,3514  55'523 0           TS      ADBVEL          +(ADB+AF)
 0213   REF   3  LAST 1029     21,3515  3 1517 0           CA      AERR
 0214   REF   2  LAST  112     21,3516  55'522 1           TS      AERRVEL
 0215   REF   1                21,3517  0 3527 1           TC      J6.
 0216                          21,3520  0 0006 1  NEGVEL   EXTEND
 0217   REF   7  LAST 1029     21,3521  4 1516 0           DCS     EDOT
 0218   REF   3  LAST 1029     21,3522  53'521 1           DXCH    EDOTVEL
 0219   REF  25  LAST 1029     21,3523  4 1502 0           CS      T5TEMP
 0220   REF   2  LAST 1029     21,3524  55'523 0           TS      ADBVEL          -(ADB+AF)
 0221   REF   4  LAST 1029     21,3525  4 1517 1           CS      AERR
 0222   REF   3  LAST 1029     21,3526  55'522 1           TS      AERRVEL

 0223                          21,3527  0 0006 1  J6.      EXTEND
 0224    REF  11  LAST 1029    21,3530  61'655 0              SU       ADB
 0225    REF   1               21,3531  6 3442 0              AD       WLH/SLOP
 0226                          21,3532  0 0006 1              EXTEND
 0227    REF   1               21,3533  6 3562 0              BZMF     J8

 0228    REF  26  LAST 1029    21,3534  4 1502 0              CS       T5TEMP          (ADB+AF)
 0229    REF   4  LAST 1029    21,3535  6 1522 0              AD       AERRVEL
 0230                          21,3536  0 0006 1              EXTEND
 0231                          21,3537  6 3541 1              BZMF     +2
 0232    REF   1               21,3540  1 3553 0              TCF      J7
 0233                          21,3541  0 0006 1              EXTEND
 0234    REF   4  LAST 1029    21,3542  4 1521 1              DCS      EDOTVEL
 0235                          21,3543  0 0006 1              EXTEND
 0236    REF   3  LAST 1012    21,3544  11'654 0              DV       SLOPE
 0237                          21,3545  0 0006 1              EXTEND
 0238    REF   5  LAST 1030    21,3546  61'522 0              SU       AERRVEL
 0239    REF  12  LAST 1030    21,3547  6 1655 0              AD       ADB
 0240                          21,3550  0 0006 1              EXTEND
 0241    REF   1               21,3551  6 3641 1              BZMF     J18
 0242    REF   1               21,3552  1 3715 0              TCF      J23

 0243    REF   1               21,3553  4 5006 0   J7         CS       WL-H/SLP
 0244                          21,3554  0 0006 1              EXTEND
 0245    REF  27  LAST 1030    21,3555  61'502 1              SU       T5TEMP          (ADB+AF)
 0246    REF   6  LAST 1030    21,3556  6 1522 0              AD       AERRVEL
 0247                          21,3557  0 0006 1              EXTEND
 0248    REF   1               21,3560  6 3645 0              BZMF     J20
 0249    REF   1               21,3561  1 3656 0              TCF      J21

 0250                          21,3562  0 0006 1   J8         EXTEND
 0251    REF   1               21,3563  4 3444 1              DCS      WLH
 0252    REF   6  LAST 1022    21,3564  53'514 1              DXCH     WTEMP
 0253                          21,3565  0 0006 1              EXTEND
 0254    REF   5  LAST 1030    21,3566  3 1521 0              DCA      EDOTVEL
 0255    REF   7  LAST 1030    21,3567  21'514 1              DAS      WTEMP
 0256    REF   8  LAST 1030    21,3570  11'513 0              CCS      WTEMP
 0257    REF   1               21,3571  1 3704 0              TCF      J22
 0258    REF   1               21,3572  1 3574 0              TCF      SIGNCK2
 0259    REF   1               21,3573  1 3600 0              TCF      NJ22
 0260    REF   9  LAST 1030    21,3574  11'514 1   SIGNCK2    CCS      WTEMP +1
 0261    REF   2  LAST 1030    21,3575  1 3704 0              TCF      J22
 0262    REF   3  LAST 1030    21,3576  1 3704 0              TCF      J22
 0263    REF   2  LAST 1030    21,3577  1 3600 0              TCF      NJ22

 0264                          21,3600  0 0006 1   NJ22       EXTEND
 0265    REF   6  LAST 1030    21,3601  3 1521 0              DCA      EDOTVEL
 0266                          21,3602  0 0006 1              EXTEND
 0267    REF   4  LAST 1030    21,3603  11'654 0              DV       SLOPE
 0268    REF  28  LAST 1030    21,3604  6 1502 1              AD       T5TEMP          (ADB+AF)
 0269    REF   7  LAST 1030    21,3605  6 1522 0              AD       AERRVEL
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0270   REF 224  LAST 1029   21,3606  10 000 0            CCS      A
0271   REF   2  LAST 1030   21,3607  1 3715 0            TCF      J23
0272   REF   3  LAST 1031   21,3610  1 3715 0            TCF      J23
0273                        21,3611  1 3613 1            TCF      +2
0274   REF   4  LAST 1031   21,3612  1 3715 0            TCF      J23

0275                        21,3613  0 0006 1            EXTEND
0276   REF   1              21,3614  4 3446 0            DCS      WLMH              WL - H
0277   REF  10  LAST 1030   21,3615  53'514 1            DXCH     WTEMP
0278                        21,3616  0 0006 1            EXTEND
0279   REF   7  LAST 1030   21,3617  3 1521 0            DCA      EDOTVEL
0280   REF  11  LAST 1031   21,3620  21'514 1            DAS      WTEMP
0281   REF  12  LAST 1031   21,3621  11'513 0            CCS      WTEMP
0282   REF   5  LAST 1031   21,3622  1 3715 0            TCF      J23
0283   REF   1              21,3623  1 3625 1            TCF      SIGNCK3
0284   REF   1              21,3624  1 3631 1            TCF      NJ23
0285   REF  13  LAST 1031   21,3625  11'514 1  SIGNCK3   CCS      WTEMP +1
0286   REF   6  LAST 1031   21,3626  1 3715 0            TCF      J23
0287   REF   7  LAST 1031   21,3627  1 3715 0            TCF      J23
0288   REF   2  LAST 1031   21,3630  1 3631 1            TCF      NJ23

0289   REF   8  LAST 1030   21,3631  3 1522 0  NJ23      CA       AERRVEL
0290   REF  29  LAST 1030   21,3632  6 1502 1            AD       TSTEMP            (ADB+AF)
0291   REF   2  LAST 1030   21,3633  6 5006 1            AD       WL-H/SLP
0292   REF 225  LAST 1031   21,3634  10 000 0            CCS      A
0293   REF   1              21,3635  1 3727 1            TCF      J24
0294   REF   2  LAST 1031   21,3636  1 3727 1            TCF      J24
0295   REF   4  LAST 1030   21,3637  1 3704 0            TCF      J22
0296   REF   5  LAST 1031   21,3640  1 3704 0            TCF      J22

0297                        21,3641  0 0006 1  J18       EXTEND
0298   REF   8  LAST 1029   21,3642  4 1516 0            DCS      EDOT
0299   REF  23  LAST 1024   21,3643  53'511 1            DXCH     KMPAC
0300   REF   1              21,3644  1 3740 0            TCF      JTIME

0301   REF   5  LAST 1029   21,3645  4 1517 1  J20       CS       AERR
0302   REF   3  LAST 1029   21,3646  6 1523 1            AD       ADBVEL
0303                        21,3647  0 0006 1            EXTEND
0304   REF   1              21,3650  7 3451 0            MP       SLOPE2            (HYSTERESIS SLOPE)
0305   REF  24  LAST 1031   21,3651  53'511 1            DXCH     KMPAC
0306                        21,3652  0 0006 1            EXTEND
0307   REF   9  LAST 1031   21,3653  4 1516 0            DCS      EDOT
0308   REF  25  LAST 1031   21,3654  21'511 1            DAS      KMPAC
0309   REF   2  LAST 1031   21,3655  1 3740 0            TCF      JTIME

0310   REF  10  LAST 1031   21,3656  11'515 0  J21       CCS      EDOT
0311   REF   1              21,3657  1 3675 1            TCF      JP
0312   REF   1              21,3660  1 3662 1            TCF      SIGNCK4
0313   REF   1              21,3661  1 3666 0            TCF      JN
0314   REF  11  LAST 1031   21,3662  11'516 0  SIGNCK4   CCS      EDOT +1
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 0315    REF   2  LAST 1031   21,3663  1 3675 1              TCF     JP
 0316    REF   3  LAST 1032   21,3664  1 3675 1              TCF     JP
 0317    REF   2  LAST 1031   21,3665  1 3666 0              TCF     JN
 0318                         21,3666  0 0006 1   JN         EXTEND
 0319    REF  12  LAST 1031   21,3667  4 1516 0              DCS     EDOT
 0320    REF  26  LAST 1031   21,3670  53'511 1              DXCH    KMPAC
 0321                         21,3671  0 0006 1              EXTEND
 0322    REF   1              21,3672  3 3450 0              DCA     WL
 0323    REF  27  LAST 1032   21,3673  21'511 1              DAS     KMPAC
 0324    REF   3  LAST 1031   21,3674  1 3740 0              TCF     JTIME

 0325                         21,3675  0 0006 1   JP         EXTEND
 0326    REF  13  LAST 1032   21,3676  4 1516 0              DCS     EDOT
 0327    REF  28  LAST 1032   21,3677  53'511 1              DXCH    KMPAC
 0328                         21,3700  0 0006 1              EXTEND
 0329    REF   2  LAST 1032   21,3701  4 3450 1              DCS     WL
 0330    REF  29  LAST 1032   21,3702  21'511 1              DAS     KMPAC
 0331    REF   4  LAST 1032   21,3703  1 3740 0              TCF     JTIME

 0332    REF  14  LAST 1032   21,3704  11'515 0   J22        CCS     EDOT
 0333    REF   3  LAST 1032   21,3705  1 3666 0              TCF     JN
 0334    REF   1              21,3706  1 3710 0              TCF     SIGNCK5
 0335    REF   4  LAST 1032   21,3707  1 3675 1              TCF     JP
 0336    REF  15  LAST 1032   21,3710  11'516 0   SIGNCK5    CCS     EDOT +1
 0337    REF   4  LAST 1032   21,3711  1 3666 0              TCF     JN
 0338    REF   5  LAST 1032   21,3712  1 3666 0              TCF     JN
 0339    REF   5  LAST 1032   21,3713  1 3675 1              TCF     JP
 0340    REF   6  LAST 1032   21,3714  1 3675 1              TCF     JP

 0341    REF  30  LAST 1029   21,3715  51'506 0   J23        INDEX   SPNDX
 034151  REF  35  LAST 1024   21,3716  4 4754 1              CS      BIT13          RESET RATE DAMPING FLAG
 034152  REF  48  LAST 1027   21,3717  7 1501 0              MASK    RCSFLAGS       BIT13 FOR ROLL  (SPNDX = 0)
 034153  REF  49  LAST 1032   21,3720  55'501 0              TS      RCSFLAGS       BIT12 FOR PITCH (SPNDX = 1)
A034154                                                                             BIT11 FOR YAW   (SPNDX = 2)

 034155  REF  31  LAST 1032   21,3721  51'506 0              INDEX   SPNDX
 034156  REF   1              21,3722  3 3060 1              CAF     OCT01400       IS THERE TO BE A FORCED FIRING ON THIS
 034157  REF  50  LAST 1032   21,3723  7 1501 0              MASK    RCSFLAGS       AXIS
 034158                       21,3724  0 0006 1              EXTEND
 034159  REF   1              21,3725  1 3761 0              BZF     DOJET +2       NO, GO TO DOJET +2 AND DO NOTHING

 03416   REF   2  LAST 1030   21,3726  1 3641 0              TCF     J18            YES, GO TO J18 AND FORCE A FIRING

 0342    REF   6  LAST 1031   21,3727  4 1517 1   J24        CS      AERR
 0343                         21,3730  0 0006 1              EXTEND
 0344    REF   4  LAST 1031   21,3731  61'523 1              SU      ADBVEL
 0345                         21,3732  0 0006 1              EXTEND
 0346    REF   2  LAST 1031   21,3733  7 3451 0              MP      SLOPE2          (HYSTERESIS SLOPE)
 0347    REF  30  LAST 1032   21,3734  53'511 1              DXCH    KMPAC
 0348                         21,3735  0 0006 1              EXTEND
 0349    REF  16  LAST 1032   21,3736  4 1516 0            DCS    EDOT
 0350    REF  31  LAST 1032   21,3737  21'511 1            DAS    KMPAC
```

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L        AUTOMATIC MANEUVERS                                                                      USER'S PAGE NO. 11       E6 S3

P0351         COMPUTE THE JET ON TIME NECESSARY TO ACCOMPLISH THE DESIRED CHANGE IN RATE, IE

R0353              T  = J/M(DELTA W)
R0354               J

R0355        DELTA W = DESIRED CHANGE IN S/C ANGULAR RATE AS DETERMINED BY THE
R0356                  SWITCHING LOGIC,  AT THIS POINT STORED IN KMPAC.

R0357           J/M  = S/C INERTIA TO TORQUE 9ATIO  SCALED BY
R0358                    (57.3/450)(B24/1600)(1/.8)
R0359                  FOR 1 JET OPERATION  (M = 700 FT-LB).
R0360                  IE  J/M = J(SLUG-FTFT) X 0.0000085601606

R0361                  THE CORRESPONDING COMPUTER VARIABLES ESTABLISHED BY
R0362                  KEYBOARD ENTRY ARE
R0363                     J/M (ROLL)
R0364                     J/M1 (PITCH)
R0365                     J/M2 (YAW)

R0366            T   = JET ON-TIME      SCALED 16384/1600 SEC
R0367             J

R0368                  THE COMPUTER VARIABLES ARE
R0369                     TAU  (ROLL)
R0370                     TAU1 (PITCH)
R0371                     TAU2 (YAW)

  0372   REF  32  LAST 1032    21,3740  51'506 0  JTIME      INDEX   SPNDX                PICK UP S/C INERTIA/TORQUE RATIO
  0373   REF   3  LAST  734    21,3741  3 1623 1             CA      J/M                  SCALED (57.3/450)(B24/1600)
  0374   REF   2  LAST 1003    21,3742  0 2060 0             TC      SMALLMP              FOR 1-JET OPERATION
  0375   REF  25  LAST 1018    21,3743  3 4756 1             CA      BIT11
  0376   REF   3  LAST 1034    21,3744  0 2060 0             TC      SMALLMP
  0377   REF  32  LAST 1033    21,3745  11'510 0             CCS     KMPAC
  0378                         21,3746  1 3752 0             TCF     +4
  0379   REF   1               21,3747  1 3756 1             TCF     TAUNORM
  0380                         21,3750  1 3754 0             TCF     +4
  0381   REF   2  LAST 1034    21,3751  1 3756 1             TCF     TAUNORM
  0382   REF  25  LAST 1000    21,3752  3 4750 1             CA      POSMAX
  0383   REF   2  LAST 1032    21,3753  1 3757 0             TCF     DOJET
  0384   REF   8  LAST  998    21,3754  3 4752 0             CA      NEGMAX
  0385   REF   3  LAST 1034    21,3755  1 3757 0             TCF     DOJET

  0386   REF  33  LAST 1034    21,3756  3 1511 0  TAUNORM    CA      KMPAC +1
  0387   REF  33  LAST 1034    21,3757  51'506 0  DOJET      INDEX   SPNDX
  0388   REF   3  LAST 1024    21,3760  55'561 0             TS      TAU
  0389  *REF  34  LAST 1034    21,3761  11'506 1    +2       CCS     SPNDX
  0390   REF   1               21,3762  1 3456 1             TCF     JLOOP
  0396                         21,3763  0 0006 1  T6PROG     EXTEND                       WHEN THE ROTATION COMMANDS (TAUS)
  0397   REF   1               21,3764  3 3770 1             DCA     JETADDR              HAVE BEEN DETERMINED
```

```
 0398    REF  19  LAST 1000    21,3765  52 113 0              DXCH    T5LOC             RESET T5LOC FOR PHASE3
 0399    REF  37  LAST 1022    21,3766  1 5323 1              TCF     RESUME

 0400    REF  34  LAST 1034    E6,1510                        EBANK=  KMPAC
 0401    REF   1               21,3767   02541 0   JETADDR    2CADR   JETSLECT
 0401    REF   1               21,3770   36066 1
```

```
L       RCS-CSM DAP EXECUTIVE PROGRAMS                                                       USER'S PAGE NO.   1       E0 S3

R0001   CALCULATION OF  AMGB, AMBG     ONCE EVERY SECOND

R0002     AMGB =  1    SIN(PSI)              0
R0003             0    COS(PSI)COS(PHI)      SIN(PHI)
R0004             0    -COS(PSI)SIN(PHI)     COS(PHI)
R0005
R0006     AMBG =  1    -TAN(PSI)COS(PHI)     TAN(PSI)SIN(PHI)
R0007             0    COS(PHI)/COS(PSI)     -SIN(PHI)/COS(PSI)
R0008             0    SIN(PHI)              COS(PHI)
R0009
R0010     WHERE PHI AND PSI ARE CDU ANGLES
R0011
R0012
  0014  REF   1                 22,2000                         SETLOC DAPS8
  0015                          22,3560                         BANK

  0016  REF   1                                                 COUNT* $$/DAPEX
  0017  REF  35  LAST 1035      E6,1510                         EBANK= KMPAC
  0018  REF  26  LAST  951      22,3560  3 0102 1  AMBGUPDT CA      FLAGWRD6        CHECK FOR RCS AUTOPILOT
  00185 REF  16  LAST  951      22,3561  7 4076 0           MASK    UPCONFIG
  0019                          22,3562  0 0006 1           EXTEND
  0020  REF  86  LAST  941      22,3563  6 5205 0           BZMF    ENDOFJOB        BIT15 = 0, BIT14 = 1
  0021  REF   2  LAST  735      22,3564  7 4753 0           MASK    DAP2BIT         IF NOT RCS, EXIT
  0022                          22,3565  0 0006 1           EXTEND
  0023  REF  87  LAST 1036      22,3566  1 5205 1           BZF     ENDOFJOB        TO PROTECT TVC DAP ON SWITCHOVER

  0024  REF  22  LAST 1027      22,3567  3 0034 0           CA      CDUZ
  0025  REF   1                 22,3570  0 5061 0           TC      SPSIN2
  0026  REF   5  LAST 1026      22,3571  55'640 0           TS      AMGB1           CALCULATE AMGB
  0027  REF  23  LAST 1036      22,3572  3 0034 0           CA      CDUZ
  0028  REF   1                 22,3573  0 5060 1           TC      SPCOS2
  0029  REF   2  LAST  114      22,3574  55'645 0           TS      CAPSI           MUST CHECK FOR GIMBAL LOCK
  0030  REF   1                 22,3575  3 4620 1           CAF     QUADANGL        = 7.25  DEGREES JET QUAD ANGULAR OFFSET
  0031                          22,3576  0 0006 1           EXTEND
  0032  REF  25  LAST 1027      22,3577  20 032 1           MSU     CDUX
  0033                          22,3600  4 0000 0           COM                     CDUX - 7.25 DEG
  0034  REF   1                 22,3601  0 5060 1           TC      SPCOS1
  0035  REF   5  LAST 1026      22,3602  55'644 1           TS      AMGB8
  0036                          22,3603  0 0006 1           EXTEND
  0037  REF   3  LAST 1036      22,3604  7 1645 0           MP      CAPSI
  0038  REF   5  LAST 1026      22,3605  55'641 1           TS      AMGB4
  0039  REF   2  LAST 1036      22,3606  3 4620 1           CAF     QUADANGL
  0040                          22,3607  0 0006 1           EXTEND
  0041  REF  26  LAST 1036      22,3610  20 032 1           MSU     CDUX
  0042                          22,3611  4 0000 0           COM                     CDUX - 7.25 DEG
  0043  REF   1                 22,3612  0 5061 0           TC      SPSIN1
  0044  REF   5  LAST 1026      22,3613  55'642 1           TS      AMGB5
  0045                          22,3614  0 0006 1           EXTEND
  0046  REF   4  LAST 1036      22,3615  7 1645 0           MP      CAPSI
  0047                          22,3616  4 0000 0           COM
```

```
0048    REF   5  LAST 1026   22,3617  55'643 0               TS      AMGB7
0049    REF  88  LAST 1036   22,3620  1 5205 1               TCF     ENDOFJOB
00491   REF   6  LAST 1024      4000                         SETLOC  FFTAG12
00492                           4620                         BANK

00493 *REF    1                                              COUNT*  $$/DAPEX
0050                            4620   01224 1  QUADANGL     DEC     660              = 7.25 DEGREES
```

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L         JET SELECTION LOGIC                                                            USER'S PAGE NO.   1      EQ 53

  0002   REF   1                17,2000                        SETLOC  DAP34
  0003                          17,2541                        BANK

  0004  *REF   1                                               COUNT*  $$/DAPJS
  0005   REF  36  LAST 1036    E6,1510                        EBANK=  KMPAC
R0006    EXAMINE CHANNEL 31 FOR TRANSLATION COMMANDS

  0007   REF  18  LAST 1000    17,2541  22 016 0  JETSLECT LXCH    BANKRUPT
  0008   REF   1                17,2542  3 2624 0           CAF     DELTATT3        = 60 MS   RESET TO EXECUTE PHASE1
  0009   REF   6  LAST 1021    17,2543  6 1634 1           AD      T5TIME
  0010   REF  23  LAST 1021    17,2544  54 030 0           TS      TIME5
  0011                          17,2545  1 2550 1           TCF     +3
  0012   REF   1                17,2546  3 7663 0           CAF     DELATT20        = 20 MS   TO ASSURE A T5RUPT
  0013   REF  24  LAST 1038    17,2547  54 030 0           TS      TIME5
  0014   REF   1                17,2550  3 3302 0           CAF     =14MS           RESET T6 TO INITIALIZE THE JET CHANNELS
  0015   REF   4  LAST 1014    17,2551  54 031 1           TS      TIME6           IN 14 MS
  00153                         17,2552  0 0006 1           EXTEND
  00155  REF  14  LAST 1000    17,2553  22 012 1           QXCH    QRUPT
  00157  REF   3  LAST 1014    17,2554  0 4542 0           TC      C13STALL
  0016   REF   9  LAST 1034    17,2555  3 4752 0           CAF     NEGMAX
  0017                          17,2556  0 0006 1           EXTEND
  0018   REF  11  LAST 1014    17,2557  05 013 0           WOR     CHAN13
  0021   REF   1                17,2560  3 2623 1           CAF     XLNMASK         = 7700 OCT
  0022                          17,2561  0 0006 1           EXTEND                  EXAMINE THE TRANSLATION
  0023   REF   5  LAST 1016    17,2562  06 031 0           RXOR    CHAN31          HAND CONTROLLER
  0024   REF   2  LAST 1038    17,2563  7 2623 0           MASK    XLNMASK
  0025                          17,2564  0 0006 1           EXTEND
  0026   REF   1                17,2565  1 2625 0           BZF     NOXLNCMD
  0027   REF  30  LAST 1031    17,2566  55'502 0           TS      T5TEMP
  0028                          17,2567  0 0006 1           EXTEND
  0029   REF  24  LAST 1017    17,2570  7 4760 0           MP      BIT9
  0030   REF  33  LAST 1020    17,2571  7 6214 1           MASK    THREE
  0031   REF   3  LAST  112    17,2572  55'513 0           TS      XNDX1           AC QUAD  X-TRANSLATION INDEX
  0032   REF   2  LAST  112    17,2573  55'514 1           TS      XNDX2           BD QUAD  X-TRANSLATION INDEX
  0033   REF  31  LAST 1038    17,2574  3 1502 1           CA      T5TEMP
  0034                          17,2575  0 0006 1           EXTEND                  1 = + XLN
  0035   REF  28  LAST 1018    17,2576  7 4762 1           MP      BIT7            2 = - XLN
  0036   REF  34  LAST 1038    17,2577  7 6214 1           MASK    THREE           3 = NO XLN
  0037   REF   3  LAST  112    17,2600  55'515 0           TS      YNDX            Y-TRANSLATION INDEX

  0038   REF  32  LAST 1038    17,2601  3 1502 1           CA      T5TEMP
  0039                          17,2602  0 0006 1           EXTEND
  0040   REF  28  LAST 1016    17,2603  7 4764 1           MP      BIT5
  0041   REF  35  LAST 1038    17,2604  7 6214 1           MASK    THREE
  0042   REF   2  LAST  112    17,2605  55'516 0           TS      ZNDX            Z-TRANSLATION INDEX

  0043   REF  64  LAST  979    17,2606  3 1465 1           CA      DAPDATR1        SET ATTKALMN TO PICK UP FILTER GAINS FOR
  00432  REF  50  LAST 1024    17,2607  7 4753 0           MASK    BIT14           TRANSLATIONS.
  00434                         17,2610  0 0006 1           EXTEND                  CHECK DAPDATR1 BIT 14 FOR LEM ATTACHED.
  00436  REF   1                17,2611  1 2614 1           BZF     NOLEM
```

```
L        JET SELECTION LOGIC                                                                      USER'S PAGE NO.   2       E6 53

 00438   REF  36  LAST 1038    17,2612  4 6214 1              CS        THREE              IF LEM IS ON, SET ATTKALMN = -3
 0044                          17,2613  1 2615 0              TCF       +2
 00442   REF  40  LAST 1029    17,2614  4 4767 1  NOLEM       CS        TWO                IF LEM IS OFF, SET ATTKALMN = -2.
 00444   REF  10  LAST 1021    17,2615  55'617 1              TS        ATTKALMN
 0045    REF   4  LAST  721    17,2616  11'631 0              CCS       XTRANS             (+, -1, 0)
 0046    REF   4  LAST 1038    17,2617  55'513 0              TS        XNDX1              USING BD-X  ZERO XNDX1
 0047    REF   1               17,2620  1 2631 0              TCF       PWORD
 0048    REF   3  LAST 1038    17,2621  55'514 1              TS        XNDX2              USING AC-X  ZERO XNDX2
 0049    REF   2  LAST 1039    17,2622  1 2631 0              TCF       PWORD
 0050                          17,2623   07700 1  XLNMASK     OCT       7700


 0051                          17,2624   37772 1  DELTATT3    DEC       16378              = 60 MS
 0052    REF   5  LAST 1001       7663            DELATT20    =         OCT37776           = 20 MS
 0053    REF   5  LAST 1039    17,2625  55'513 0  NOXLNCMD    TS        XNDX1              ZERO ALL REQUESTS FOR TRANSLATION
 0054    REF   4  LAST 1039    17,2626  55'514 1              TS        XNDX2
 0055    REF   4  LAST 1038    17,2627  55'515 0              TS        YNDX
 0056    REF   3  LAST 1038    17,2630  55'516 0              TS        ZNDX

R0057    PITCH COMMANDS  TIMING(NO X-TRANS, NO QUAD FAILS) 32MCT

 0058    REF   3  LAST 1024    17,2631  11'562 0  PWORD       CCS       TAU1               CHECK FOR PITCH COMMANDS
 0059    REF 100  LAST 1024    17,2632  3 4770 0              CAF       ONE
 0060                          17,2633  1 2635 1              TCF       +2                  0 = NO PITCH
 0061    REF  41  LAST 1039    17,2634  3 4767 0              CAF       TWO                +1 =  + PITCH
 0062    REF   2  LAST  112    17,2635  55'520 0              TS        PINDEX             +2 =  - PITCH

 0063    REF   5  LAST  722    17,2636  11'626 0              CCS       RACFAIL            FLAG FOR REAL AC QUAD FAILURES
 0064    REF   1               17,2637  1 2643 0              TCF       AFAILP
 0065    REF   1               17,2640  1 2653 1              TCF       TABPCOM            0 = NO REAL AC FAILURES
 0066    REF   1               17,2641  1 2645 0              TCF       CFAILP             + = A QUAD FAILED
 0067    REF   2  LAST 1039    17,2642  1 2653 1              TCF       TABPCOM            - = C QUAD FAILED
A0068                                                                                      IF FAILURES ARE PRESENT IGNORE
A0069                                                                                      X-TRANSLATIONS ON THIS AXIS

 0070    REF   5  LAST 1004    17,2643  3 4322 0  AFAILP      CAF       NINE               IF FAILURE IS PRESENT 1JET OPERATION
 0071    REF   3  LAST 1039    17,2644  1 2655 1              TCF       TABPCOM +2         IS ASSUMED. IGNORE X-TRANSLATION
 0072    REF   3  LAST  878    17,2645  3 5775 1  CFAILP      CAF       TWELVE
 0073    REF   4  LAST 1039    17,2646  1 2655 1              TCF       TABPCOM +2

 0074                          17,2647   00000 1  XLNNDX      DEC       0                  INDECES FOR TRANSLATION COMMANDS
 0075                          17,2650   00003 1              DEC       3                  FOR USE IN TABLE LOOK UP
 0076                          17,2651   00006 1              DEC       6
 0077                          17,2652   00000 1              DEC       0

 0078    REF   3  LAST  755       5775            TWELVE      =         OCT14
R0079    TABLE LOOK UP FOR PITCH COMMANDS WITH AND WITHOUT X-TRANSLATION AND AC QUAD FAILURES PRESENT.
R0081    BITS 9, 10 CONTAIN THE NUMBER OF PITCH JETS USED TO PERFORM THE PITCH ROTATION

 0083    REF   6  LAST 1039    17,2653  51'513 1  TABPCOM     INDEX     XNDX1
 0084   REF   1              17,2654  3 2647 0                CA      XLNNDX
 0085  *REF   3  LAST 1039   17,2655  6 1520 1     +2         AD      PINDEX
 0086   REF 226  LAST 1031   17,2656  50 000 1                INDEX   A
 0087   REF   1              17,2657  3 2703 1                CA      PYTABLE
 0088   REF   1              17,2660  7 2722 0                MASK    PJETS           =1417 OCT
 0089   REF   2  LAST  107   17,2661  55'452 1                TS      PWORD1
 0090                        17,2662  0 0006 1                EXTEND
 0091   REF  29  LAST 1038   17,2663  7 4762 1                MP      BIT7
 0092   REF   2  LAST  112   17,2664  55'523 0                TS      NPJETS          = NO. OF PITCH JETS

R0093   YAW JET COMMANDS  TIMING(NO X-TRANS, NO QUAD FAILURES)  32MCT

 0094   REF   3  LAST 1024   17,2665  11'563 1  YWORD         CCS     TAU2            CHECK FOR YAW COMMANDS
 0095   REF 101  LAST 1039   17,2666  3 4770 0                CAF     ONE
 0096                        17,2667  1 2671 1                TCF     +2
 0097   REF  42  LAST 1039   17,2670  3 4767 0                CAF     TWO
 0098   REF   2  LAST  112   17,2671  55'521 1                TS      YINDEX          YAW ROTATION INDEX

 0099   REF   5  LAST  722   17,2672  11'627 1                CCS     RBDFAIL         FLAG FOR B OR D QUAD FAILURES
 0100   REF   1              17,2673  1 2677 1                TCF     BFAILY          0  = NO BD FAILURE
 0101   REF   1              17,2674  1 2724 0                TCF     TABYCOM         +  = B QUAD FAILED
 0102   REF   1              17,2675  1 2701 1                TCF     DFAILY          -  = D QUAD FAILED
 0103   REF   2  LAST 1040   17,2676  1 2724 0                TCF     TABYCOM

 0104   REF   6  LAST 1039   17,2677  3 4322 0  BFAILY        CAF     NINE
 0105   REF   3  LAST 1040   17,2700  1 2726 1                TCF     TABYCOM +2
 0106   REF   4  LAST 1039   17,2701  3 5775 1  DFAILY        CAF     TWELVE
 0107   REF   4  LAST 1040   17,2702  1 2726 1                TCF     TABYCOM +2
```

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L        JET SELECTION LOGIC                                                                USER'S PAGE NO.  4      E6 S3

R0108    TABLE FOR PITCH(YAW) COMMANDS
R0109    BITS 4,3,2,1 = PITCH, X-TRANSLATION JETS SELECTED
R0110    BITS     10,9 = NO. PITCH JETS USED TO PERFORM ROTATION
R0111    BITS 8,7,6,5 = YAW, X-TRANSLATION JETS SELECTED
R0112    BITS 12,11 : NO. YAW JETS USED TO PERFORM ROTATION

A0113                                                                             ROT  TRANS  QUAD  BIAS
 0114                          17,2703   00000 1  PYTABLE  OCT     0              0     0            0
 0115                          17,2704   05125 1           OCT     5125           +     0            0
 0116                          17,2705   05252 1           OCT     5252           -     0            0
 0117                          17,2706   00231 1           OCT     0231           0     +            3
 0118                          17,2707   02421 1           OCT     2421           +     +            3
 0119                          17,2710   02610 1           OCT     2610           -     +            3
 0120                          17,2711   00146 1           OCT     0146           0     -            6
 0121                          17,2712   02504 1           OCT     2504           +     -            6
 0122                          17,2713   02442 1           OCT     2442           -     -            6
 0123                          17,2714   00000 1           OCT     0              0          A(B)    9
 0124                          17,2715   02421 1           OCT     2421           +          A(B)    9
 0125                          17,2716   02442 1           OCT     2442           -          A(B)    9
 0126                          17,2717   00000 1           OCT     0              0          C(D)    12
 0127                          17,2720   02504 1           OCT     2504           +          C(D)    12
 0128                          17,2721   02610 1           OCT     2610           -          C(D)    12

R0129    MASKS FOR PITCH AND YAW COMMANDS

 0130                          17,2722   01417 1  PJETS    OCT     1417
 0131                          17,2723   06360 1  YJETS    OCT     6360

R0132    TABLE LOOK UP FOR YAW COMMANDS WITH AND WITHOUT X-TRANSLATION AND AC QUAD FAILURES PRESENT
R0134    BITS 11, 12 CONTAIN THE NUMBER OF YAW JETS USED TO PERFORM THE YAW ROTATION

 0136    REF   5  LAST 1039    17,2724  51'514 0  TABYCOM  INDEX   XNDX2
 0137    REF   2  LAST 1040    17,2725  3 2647 0           CA      XLNNDX
 0138   *REF   3  LAST 1040    17,2726  6 1521 0     +2    AD      YINDEX
 0139    REF 227  LAST 1040    17,2727  50 000 1           INDEX   A
 0140    REF   2  LAST 1040    17,2730  3 2703 1           CA      PYTABLE
 0141    REF   1               17,2731  7 2723 1           MASK    YJETS          = 6360 OCT
 0142    REF   2  LAST  107    17,2732  55'454 1           TS      YWORD1
 0143                          17,2733  0 0006 1           EXTEND
 0144    REF  29  LAST 1038    17,2734  7 4764 1           MP      BITS
 0145    REF   1               17,2735  55'524 1           TS      NYJETS         NO. OF YAW JETS USED TO PERFORM ROTATION
```

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L       JET SELECTION LOGIC                                                                USER'S PAGE NO.   5      E6 S3

P0146   ROLL COMMANDS  TIMING(NO Y,Z TRANS, NO QUAD FAILS)   45MCT

 0147   REF   4  LAST 1034   17,2736  11'561 0  RWORD      CCS     TAU             CHECK FOR ROLL COMMANDS
 0148   REF 102  LAST 1040   17,2737  3 4770 0             CAF     ONE
 0149                        17,2740  1 2742 0             TCF     +2
 0150   REF  43  LAST 1040   17,2741  3 4767 0             CAF     TWO
 0151   REF   2  LAST  112   17,2742  55'517 1             TS      RINDEX

 0152   REF   3  LAST  721   17,2743  11'630 1             CCS     ACORBD          FLAG FOR AC OR BD QUAD SELECTION FOR
 0153   REF   1              17,2744  1 3035 0             TCF     BDROLL          ROLL COMMANDS
 0154   REF   2  LAST 1042   17,2745  1 3035 0             TCF     BDROLL          +, +0 = BD ROLL
 0155                        17,2746  1 2747 0             TCF     +1              -, -0 = AC ROLL

 0156   REF   6  LAST 1039   17,2747  11'626 0  ACROLL     CCS     RACFAIL         CHECK FOR REAL FAILURES
 0157   REF   1              17,2750  1 2754 1             TCF     RAFAIL          ON AC QUADS
 0158   REF   1              17,2751  1 2764 1             TCF     RXLNS
 0159   REF   1              17,2752  1 2756 0             TCF     RCFAIL
 0160   REF   2  LAST 1042   17,2753  1 2764 1             TCF     RXLNS

 0161   REF   7  LAST 1040   17,2754  3 4322 0  RAFAIL     CAF     NINE            QUAD FAILURE  WILL GET
 0162   REF   1              17,2755  1 2766 0             TCF     TABRCOM         1-JET OPERATION
 0163   REF   5  LAST 1040   17,2756  3 5775 1  RCFAIL     CAF     TWELVE
 0164   REF   2  LAST 1042   17,2757  1 2766 0             TCF     TABRCOM

 0165                        17,2760   00000 1  XLNINDX    DEC     0
 0166                        17,2761   00001 0             DEC     1               INDECES FOR TRANSLATION
 0167                        17,2762   00002 0             DEC     2
 0168                        17,2763   00000 1             DEC     0

R0169   TABLE LOOK UP FOR AC-ROLL COMMANDS WITH AND WITHOUT Y-TRANSLATION AND ACQUAD FAILURES PRESENT
R0171   BITS 9,10,11 CONTAIN THE MAGNITUDE AND DIRECTION OF THE ROLL

 0172   REF   5  LAST 1039   17,2764  51'515 1  RXLNS      INDEX   YNDX            NO AC QUAD FAILURES
 0173   REF   3  LAST 1041   17,2765  3 2647 0             CA      XLNNDX          INCLUDE +,-,0, Y-TRANSLATION
 0174   REF   3  LAST 1042   17,2766  6 1517 0  TABRCOM    AD      RINDEX
 0175   REF 228  LAST 1041   17,2767  50 000 1             INDEX   A
 0176   REF   1              17,2770  3 3117 0             CA      RTABLE
 0177   REF   1              17,2771  7 3136 1             MASK    ACRJETS         = 3760 OCT
 0178   REF   3  LAST 1014   17,2772  55'450 0             TS      RWORD1

R0179   CHECK FOR Z-TRANSLATIONS ON BD

 0180   REF   4  LAST 1039   17,2773  3 1516 1  BDZCHECK   CA      ZNDX
 0181                        17,2774  0 0006 1             EXTEND
 0182   REF   1              17,2775  6 3027 1             BZMF    NOBDZ           NO Z-TRANSLATION
```

```
R0183              TABLE LOOK UP FOR BD Z-TRANSLATION WITH AND WITHOUT REAL BD QUAD FAILURES.  Z-TRANSLATION WILL BE POSS-
R0185     IBLE AS LONG AS ROLL COMMANDS CAN BE SATISFIED WITH THE AC ROLL JETS.   CRITERION.. IF THE RESULTANT NET ROLL
R0187     COMMANDS = 0 (WITH Z-TRANSLATION) AND IF TAU = 0, THEN INCLUDE THE BD Z-TRANSLATICN COMMANDS. IF THE RESULTANT
R0189     ROLL COMMAND = 0, AND IF TAU NZ, THEN IGNORE THE BD Z-TRANSLATION

 0190     REF   6  LAST 1040    17,2776  11'627 1                CCS      RBDFAIL
 0191     REF  37  LAST 1039    17,2777  3 6214 0                CAF      THREE
 0192                           17,3000  1 3002 1                TCF      +2
 0193     REF  25  LAST 1009    17,3001  3 6211 0                CAF      SIX
 0194     REF   5  LAST 1042    17,3002  51'516 1                INDEX    ZNDX
 0195     REF   1               17,3003  6 2760 1                AD       XLNINDX
 0196     REF 229  LAST 1042    17,3004  50 000 1                INDEX    A
 0197     REF   1               17,3005  3 3140 1                CA       YZTABLE
 0198     REF   1               17,3006  7 3151 0                MASK     BDZJETS            = 3417 OCT
 0199     REF   4  LAST 1042    17,3007  6 1450 1                AD       RWORD1             ADD TO ROLL COMMANDS
 0200     REF  33  LAST 1038    17,3010  55'502 0                TS       T5TEMP             IF POSSIBLE.  MUST CHECK TAU FIRST

 0201                           17,3011  0 0006 1                EXTEND
 0202     REF  30  LAST 1040    17,3012  7 4762 1                MP       BIT7               DETERMINE THE NET ROLL COMMAND WITH
 0203     REF   1               17,3013  6 6061 0                AD       =-4                Z-TRANSLATION ADDED ON
 0204     REF   2  LAST  112    17,3014  55'522 1                TS       NRJETS             NET NO. OF +,- ROLL JETS ON
 0205                           17,3015  0 0006 1                EXTEND
 0206     REF   1               17,3016  1 3022 0                BZF      TAUCHECK

 0207     REF  34  LAST 1043    17,3017  3 1502 1   ACRBDZ       CA       T5TEMP             Z-TRANSLATION ACCEPTED EVEN THO WE MAY
 0208     REF   5  LAST 1043    17,3020  55'450 0                TS       RWORD1             HAVE INTRODUCED AN UNDESIREABLE ROLL
 0209     REF   1               17,3021  1 3263 1                TCF      ROLLTIME           BRANCH TO JET ON-TIME CALCULATIONS

 0210     REF   5  LAST 1042    17,3022  11'561 0   TAUCHECK     CCS      TAU
 0211     REF   2  LAST 1042    17,3023  1 3027 0                TCF      NOBDZ
 0212     REF   1               17,3024  1 3017 0                TCF      ACRBDZ
 0213     REF   3  LAST 1043    17,3025  1 3027 0                TCF      NOBDZ
 0214     REF   2  LAST 1043    17,3026  1 3017 0                TCF      ACRBDZ

 0215     REF   6  LAST 1043    17,3027  3 1450 1   NOBDZ        CA       RWORD1             Z-TRANSLATION NOT ACCEPTED
 0216                           17,3030  0 0006 1                EXTEND
 0217     REF  31  LAST 1043    17,3031  7 4762 1                MP       BIT7
 0218     REF   1               17,3032  6 7701 0                AD       =-2
 0219     REF   3  LAST 1043    17,3033  55'522 1                TS       NRJETS
 0220     REF   2  LAST 1043    17,3034  1 3263 1                TCF      ROLLTIME           BRANCH TO JET ON-TIME CALCULATION
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L        JET SELECTION LOGIC                                                                USER'S PAGE NO.   7      E6 53

P0221    BD QUAD SELECTION FOR ROLL COMMANDS

 0222    REF   7  LAST 1043    17,3035  11'627 1  BDROLL     CCS      RBDFAIL
 0223    REF   1               17,3036  1 3042 0             TCF      RBFAIL
 0224    REF   1               17,3037  1 3046 1             TCF      RZXLNS
 0225    REF   1               17,3040  1 3044 0             TCF      RDFAIL
 0226    REF   2  LAST 1044    17,3041  1 3046 1             TCF      RZXLNS
 0227    REF   8  LAST 1042    17,3042  3 4322 0  RBFAIL     CAF      NINE
 0228    REF   1               17,3043  1 3050 0             TCF      TABRZCMD
 0229    REF   6  LAST 1042    17,3044  3 5775 1  RDFAIL     CAF      TWELVE
 0230    REF   2  LAST 1044    17,3045  1 3050 0             TCF      TABRZCMD

 0231    REF   6  LAST 1043    17,3046  51'516 1  RZXLNS     INDEX    ZNDX                 NO BD FAILURES
 0232    REF   4  LAST 1042    17,3047  3 2647 0             CA       XLNNDX               +,-,0 Z-TRANSLATION PRESENT
 0233    REF   4  LAST 1042    17,3050  6 1517 0  TABRZCMD   AD       RINDEX
 0234    REF 230  LAST 1043    17,3051  50 000 1             INDEX    A
 0235    REF   2  LAST 1042    17,3052  3 3117 0             CA       RTABLE
 0236    REF   1               17,3053  7 3137 0             MASK     BDRJETS              = 34017 OCT
 0237    REF   7  LAST 1043    17,3054  55'450 0             TS       RWORD1

 0238    REF   6  LAST 1042    17,3055  3 1515 1  ACYCHECK   CA       YNDX                 ANY Y-TRANSLATION
 0239                          17,3056  0 0006 1             EXTEND
 0240    REF   1               17,3057  1 3111 1             BZF      NOACY                NO Y-TRANSLATION
 0241    REF   7  LAST 1042    17,3060  11'626 0             CCS      RACFAIL
 0242    REF  38  LAST 1043    17,3061  3 6214 0             CAF      THREE
 0243                          17,3062  1 3064 1             TCF      +2
 0244    REF  26  LAST 1043    17,3063  3 6211 0             CAF      SIX
 0245    REF   7  LAST 1044    17,3064  51'515 1             INDEX    YNDX
 0246    REF   2  LAST 1043    17,3065  6 2760 1             AD       XLNINDX
 0247    REF 231  LAST 1044    17,3066  50 000 1             INDEX    A
 0248    REF   2  LAST 1043    17,3067  3 3140 1             CA       YZTABLE
 0249    REF   1               17,3070  7 3152 0             MASK     ACYJETS              = 34360 OCT
 0250    REF   8  LAST 1044    17,3071  6 1450 1             AD       RWORD1
 0251    REF  35  LAST 1043    17,3072  55'502 0             TS       T5TEMP
 0252                          17,3073  0 0006 1             EXTEND                        FOR EXPLANATION SEE CODING ON RTABLE
 0253    REF  32  LAST 1021    17,3074  7 4765 0             MP       BIT4
 0254    REF   2  LAST 1043    17,3075  6 6061 0             AD       =-4
 0255    REF   4  LAST 1043    17,3076  55'522 1             TS       NRJETS               NO. OF NET ROLL JETS
 0256                          17,3077  0 0006 1             EXTEND
 0257    REF   1               17,3100  1 3104 0             BZF      TAUCHCK              IF NRJETS = 0

 0258    REF  36  LAST 1044    17,3101  3 1502 1  BDRACZ     CA       T5TEMP               Y-TRANSLATION ACCEPTED
 0259    REF   9  LAST 1044    17,3102  55'450 0             TS       RWORD1
 0260    REF   3  LAST 1043    17,3103  1 3263 1             TCF      ROLLTIME             BRANCH TO JET ON-TIME CALCULATIONS

 0261    REF   6  LAST 1043    17,3104  11'561 0  TAUCHCK    CCS      TAU
 0262    REF   2  LAST 1044    17,3105  1 3111 1             TCF      NOACY
 0263    REF   1               17,3106  1 3101 0             TCF      BDRACZ
 0264    REF   3  LAST 1044    17,3107  1 3111 1             TCF      NOACY
 0265    REF   2  LAST 1044    17,3110  1 3101 0             TCF      BDRACZ
 0266    REF  10  LAST 1044    17,3111  3 1450 1   NOACY      CA      RWORD1            Y-TRANSLATION NOT ACCEPTED
 0267                          17,3112  0 0006 1              EXTEND
 0268    REF  33  LAST 1044    17,3113  7 4765 0              MP      BIT4
 0269    REF   2  LAST 1043    17,3114  6 7701 0              AD      =-Z
 0270    REF   5  LAST 1044    17,3115  55'522 1              TS      NRJETS
 0271    REF   4  LAST 1044    17,3116  1 3263 1              TCF     ROLLTIME
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R0272              TABLE FOR ROLL, Y AND Z-TRANSLATION COMMANDS

R0273       EITHER AC OR BD ROLL MAY BE SELECTED. IF AC ROLL IS SELECTED, Y-TRANSLATIONS MAY BE SATISFIED SIMULTANEOUSLY
R0275    PROVIDED THAT THERE ARE NO AC QUAD FAILURES. IF THERE ARE AC FAILURES, Y-TRANSLATION COMMANDS WILL BE IGNORED,
R0277    IN WHICH CASE THE ASTRONAUT SHOULD SWITCH TO BD ROLL.
R0278       IF BDROLL IS SELECTED, Z-TRANSLATIONS MAY BE SATISFIED SIMULTANEOUSLY PROVIDED THAT THERE ARE NO BD QUAD
R0280    FAILURES. IF THERE ARE BD FAILURES, Z-TRANSLATION COMMANDS WILL BE IGNORED, IN WHICH CASE THE ASTRONAUT SHOULD
R0282    SWITCH TO AC ROLL.
R0283       NOTE THAT IF ONE QUAD FAILS (E.G. B FAILED), Z-TRANSLATION IS STILL POSSIBLE AND THAT THE UNDESIREABLE ROLL
R0285    INTRODUCED BY THIS TRANSLATION WILL BE COMPENSATED BY THE TWO AC ROLL JETS ACTUATED BY THE AUTOPILOT LOGIC.

R0287              WORD MAKE UP....RTABLE

R0288       TWO WORDS, CORRESPONDING TO AC OR BD ROLL SELECTION, HAVE BEEN COMBINED INTO ONE TABLE.  THE WORD CORRESPOND-
R0290    ING TO AC ROLL HAS THE FOLLOWING INTERPRETATION..
R0291       BITS 9,10,11 ARE CODED TO GIVE THE NET ROLL TORQUE FOR THE WORD SELECTED. THE CODING IS..
R0293                       BIT NO.  11 10 9    NO. OF ROLL JETS

R0294                                 0  0  0           -2
R0295                                 0  0  1           -1
R0296                                 0  1  0            0
R0297                                 0  1  1           +1
R0298                                 1  0  0           +2


R0299       THIS WORD MAY THEN BE ADDED TO THE WORD SELECTED FROM THE YZ-TRANSLATION TABLE, WHICH HAS THE SAME TYPE OF
R0301    CODING AS ABOVE, AND THE NET ROLL DETERMINED BY SHIFTING THE RESULTANT WORD RIGHT 8 PLACES AND SUBTRACTING FOUR.

R0303       THE WORD CORRESPONDING TO BD ROLL HAS A SIMILIAR INTERPRETATION, EXCEPT THAT BITS 12, 13, 14 ARE CODED
R0305    (AS ABOVE) TO GIVE THE NET ROLL TORQUE.

A0306                                                                                    ROLL   TRANS   QUADFAIL   BIAS

 0307                         17,3117   11000 1  RTABLE   OCT    11000                                              0
 0308                         17,3120   22125 1           OCT    22125                  +                           0
 0309                         17,3121   00252 1           OCT    00252                  -                           0
 0310                         17,3122   11231 1           OCT    11231                  0      +Y(+Z)               3
 0311                         17,3123   15421 1           OCT    15421                  +      +Y(+Z)               3
 0312                         17,3124   04610 1           OCT    04610                  -      +Y(+Z)               3
 0313                         17,3125   11146 1           OCT    11146                  0      -Y(-Z)               6
 0314                         17,3126   15504 1           OCT    15504                  +      -Y(-Z)               6
 0315                         17,3127   04442 1           OCT    04442                  -      -Y(-Z)               6
 0316                         17,3130   11000 1           OCT    11000                  0               A(B)        9
 0317                         17,3131   15504 1           OCT    15504                  +               A(B)        9
 0318                         17,3132   04610 1           OCT    04610                  -               A(B)        9
 0319                         17,3133   11000 1           OCT    11000                  0               C(D)       12
 0320                         17,3134   15421 1           OCT    15421                  +               C(D)       12
 0321                         17,3135   04442 1           OCT    04442                  -               C(D)       12
```

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R0322              RTABLE MASKS -

 0323                          17,3136   03760 0  ACRJETS  OCT     03760
 0324                          17,3137   34017 0  BDRJETS  OCT     34017
```

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R0325           Y, Z TRANSLATION TABLE

R0326        ONCE AC OR BD ROLL IS SELECTED THE QUAD PAIR WHICH IS NOT BEING USED TO SATISFY THE ROLL COMMANDS MAY BE
R0328   USED TO SATISFY THE REMAINING TRANSLATION COMMANDS.  HOWEVER, WE MUST MAKE SURE THAT ROLL COMMANDS ARE SATISFIED
R0330   WHEN THEY OCCUR.  THEREFORE, THE Y-Z TRANSLATIONS FROM THIS TABLE WILL BE IGNORED IF THE NET ROLL TORQUE OF THE
R0332   COMBINED WORD IS ZERO AND THE ROLL COMMANDS ARE NON-ZERO.  THIS SITUATION WOULD OCCUR, FOR EXAMPLE, IF WE EN-
R0334   COUNTER SIMULTANEOUS +R +Y -Z COMMANDS AND  A QUAD D FAILURE WHILE USING AC FOR ROLL.
R0336      TO FACILITATE THE LOGIC, THE Y-Z TRANSLATION TABLE HAS BEEN CODED IN A MANNER SIMILIAR TO THE  ROLL TABLE
R0338   ABOVE.
R0339      BITS 9,10,11 ARE CODED TO GIVE THE NET ROLL TORQUE INCURRED BY Z-TRANSLATIONS. THE WORD SELECTED CAN THEN BE
R0341   ADDED  TO THE AC-ROLL WORD AND THE RESULTANT ROLL TORQUE DETERMINED FROM THE COMBINED WORD.  SIMILIARLY BITS
R0343   12,13,14 ARE CODED TO GIVE THE NET ROLL TORQUE INCURRED BY Y-TRANSLATIONS WHEN BD-ROLL IS SELECTED.

A0345                                                                                TRANSLATION    QUADFAIL    BIAS

 0346                        17,3140   11000 1  YZTABLE  OCT      11000                  0                         0
 0347                        17,3141   11231 1           OCT      11231               +Z(+Y)                       0
 0348                        17,3142   11146 1           OCT      11146               -Z(-Y)                       0
 0349                        17,3143   11000 1           OCT      11000                  0           B(A)          3
 0350                        17,3144   04610 1           OCT      04610               +Z(+Y)         B(A)          3
 0351                        17,3145   15504 1           OCT      15504               -Z(-Y)         B(A)          3
 0352                        17,3146   11000 1           OCT      11000                  0           D(C)          6
 0353                        17,3147   15421 1           OCT      15421               +Z(+Y)         D(C)          6
 0354                        17,3150   04442 1           OCT      04442               -Z(-Y)         D(C)          6

R0355           YZ-TABLE MASKS-

 0356                        17,3151   03417 0  BDZJETS  OCT      03417
 0357                        17,3152   34360 0  ACYJETS  OCT      34360

R0358           ADDITIONAL CONSTANTS

 0359   REF   8  LAST  957      7701             =-2      =       NEG2
 0360   REF   1                 6061             =-4      =       NEG4
```

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P0361             CALCULATION OF JET ON-TIMES

R0362      THE ROTATION COMMANDS (TAU:S), WHICH WERE DETERMINED FROM THE JET SWITCHING LOGIC ON THE BASIS OF SINGLE JET
R0364   OPERATION, MUST NOW BE UPDATED BY THE ACTUAL NUMBER OF JETS TO BE USED IN SATISFYING THESE COMMANDS.  TAU MUST
R0366   ALSO BE DECREMENTED ACCORDING TO THE EXPECTED TORQUE GENERATED BY THE NEW COMMANDS ACTING OVER THE NEXT T5 INT-
R0368   ERVAL.
R0369      IN ORDER TO MAINTAIN ACCURATE KNOWLEDGE OF VEHICLE ANGULAR RATES, WE MUST ALSO PROVIDE EXPECTED FIRING TIMES
R0371   (DFT:S, ALSO IN TERMS OF 1-JET OPERATION) FOR THE RATE FILTER.
R0372      NOTE THAT TRANSLATIONS CAN PRODUCE ROTATIONS EVEN THOUGH NO ROTATIONS WERE CALLED FOR.  NEVERTHELESS, WE MUST
R0374   UPDATE DFT.
R0375      WHEN THE ROTATIONS HAVE FINISHED, WE MUST PROVIDE CHANNEL INFORMATION TO THE T6 PROGRAM TO CONTINUE ON WITH
R0377   THE TRANSLATIONS.  THIS WILL BE DONE IN THE NEXT SECTION.  HOWEVER, TO INSURE THAT JETS ARE NOT FIRED FOR LESS
R0379   THAN A MINIMUM IMPULSE (14MS), ALL JET CHANNEL COMMANDS WILL BE HELD FIXED FROM THE START OF THE T5 PROGRAM FOR
R0381   ATLEAST 14MS UNTIL THE INITIALIZATION OF NEW COMMANDS.  MOREOVER, A 14MS ON-TIME WILL BE ADDED TO ANY ROTATIONAL
R0383   COMMANDS GENERATED BY THE MANUAL CONTROLS OR THE JET SWITCHING LOGIC, AND ALL TRANSLATION COMMANDS WILL BE
R0385   ACTIVE FOR ATLEAST ONE CYCLE OF THE T5 PROGRAM (.1SEC)

R0386             PITCH JET ON-TIME CALCULATION

 0387   REF   4  LAST 1039   17,3153  11'562 0  PITCHTIM CCS     TAU1
 0388   REF   1              17,3154  1 3163 1           TCF     PTAUPOS
 0389                        17,3155  1 3157 0           TCF     +2
 0390   REF   1              17,3156  1 3161 0           TCF     PTAUNEG
 0391   REF   2  LAST  112   17,3157  55'550 1           TS      DFT1             NO PITCH ROTATION
 0392   REF   1              17,3160  1 3361 1           TCF     PBYPASS          COMMANDS

 0393   REF   3  LAST 1040   17,3161  4 1523 0  PTAUNEG  CS      NPJETS
 0394   REF   4  LAST 1049   17,3162  55'523 0           TS      NPJETS
 0395   REF   5  LAST 1049   17,3163  3 1562 1  PTAUPOS  CA      TAU1
 0396                        17,3164  0 0006 1           EXTEND
 0397   REF   5  LAST 1049   17,3165  5 1523 1           INDEX   NPJETS
 0398   REF   1              17,3166  7 3342 0           MP      NJET
 0399   REF   3  LAST 1014   17,3167  55'460 0           TS      BLAST1
 0400   REF   1              17,3170  6 3275 1           AD      =-.1SEC
 0401                        17,3171  0 0006 1           EXTEND
 0402   REF   1              17,3172  6 3203 0           BZMF    AD14MSP
 0403   REF   6  LAST 1049   17,3173  51'523 1           INDEX   NPJETS
 0404   REF   1              17,3174  3 3276 1           CA      DFTMAX           THE PITCH ON-TIME IS GREATER THAN .1 SEC
 0405   REF   3  LAST 1049   17,3175  55'550 1           TS      DFT1
 0406                        17,3176  4 0000 0           COM
 0407   REF   6  LAST 1049   17,3177  27'562 0           ADS     TAU1             UPDATE TAU1
 0408   REF   1              17,3200  3 3277 0           CAF     =+.1SEC          LIMIT THE LENGTH OF PITCH ROTATION
 0409   REF   4  LAST 1049   17,3201  55'460 0           TS      BLAST1           COMMANDS TO 0.1 SEC SO THAT ONLY
 0410   REF   1              17,3202  1 3346 1           TCF     ASMBLWP          X-TRANSLATIONS WILL CONTINUE ON SWITCH
A0411                                                                             OVER TO TVC
 0412   REF   5  LAST 1049   17,3203  4 1460 0  AD14MSP  CS      BLAST1           SEE IF JET ON TIME LESS THAN
 0413   REF   2  LAST 1038   17,3204  6 3302 0           AD      =14MS            MINIMUM IMPULSE TIME
 0414                        17,3205  0 0006 1           EXTEND
 0415   REF   1              17,3206  6 3211 0           BZMF    PBLASTOK         IF SO LIMIT MINIMUM ON TIME TO 14 MS
 0416   REF   3  LAST 1049   17,3207  3 3302 0           CAF     =14MS
 0417    REF   6  LAST 1049    17,3210  55'460 0              TS      BLAST1
 0418    REF   7  LAST 1050    17,3211  3 1460 1   PBLASTOK CA      BLAST1
 0419                          17,3212  0 0006 1              EXTEND                  THE PITCH COMMANDS WILL BE COMPLETED
 0420    REF   7  LAST 1049    17,3213  7 1523 0              MP      NPJETS          WITHIN THE TS-CYCLE TIME
 0421    REF   4  LAST 1049    17,3214  23'550 0              LXCH    CFT1            FOR USE IN UPDATING RATE FILTER
 0422    REF   7  LAST 1049    17,3215  55'562 0              TS      TAU1            ZERO TAU1 (ACC CONTAINS ZERO)
 0423    REF   2  LAST 1049    17,3216  1 3346 1              TCF     ASMBLWP
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P0424            YAW JET ON-TIME CALCULATION

 0425   REF   4  LAST 1040   17,3217  11'563 1  YAWTIME   CCS     TAU2
 0426   REF   1              17,3220   1 3227 1           TCF     YTAUPOS
 0427                        17,3221   1 3223 0           TCF     +2
 0428   REF   1              17,3222   1 3225 0           TCF     YTAUNEG
 0429   REF   2  LAST  112   17,3223  55'551 0            TS      DFT2                NO YAW ROTATION COMMANDS
 0430   REF   1              17,3224   1 3525 1           TCF     YBYPASS

 0431   REF   2  LAST 1041   17,3225   4 1524 1  YTAUNEG  CS      NYJETS
 0432   REF   3  LAST 1051   17,3226  55'524 1            TS      NYJETS
 0433   REF   5  LAST 1051   17,3227   3 1563 0  YTAUPOS  CA      TAU2
 0434                        17,3230   0 0006 1           EXTEND
 0435   REF   4  LAST 1051   17,3231   5 1524 0           INDEX   NYJETS
 0436   REF   2  LAST 1049   17,3232   7 3342 0           MP      NJET
 0437   REF   3  LAST 1014   17,3233  55'462 1            TS      BLAST2
 0438   REF   2  LAST 1049   17,3234   6 3275 1           AD      =-.1SEC
 0439                        17,3235   0 0006 1           EXTEND
 0440   REF   1              17,3236   6 3247 0           BZMF    AD14MSY
 0441   REF   5  LAST 1051   17,3237  51'524 0            INDEX   NYJETS
 0442   REF   2  LAST 1049   17,3240   3 3276 1           CA      DFTMAX              YAW COMMANDS WILL LAST LONGER THAN .1SEC
 0443   REF   3  LAST 1051   17,3241  55'551 0            TS      DFT2
 0444                        17,3242   4 0000 0           COM
 0445   REF   6  LAST 1051   17,3243  27'563 1            ADS     TAU2                DECREMENT TAU2
 0446   REF   2  LAST 1049   17,3244   3 3277 0           CAF     =+.1SEC             LIMIT THE LENGTH OF YAW ROTATION COMMAND
 0447   REF   4  LAST 1051   17,3245  55'462 1            TS      BLAST2              TO 0.1 SEC SO THAT ONLY X-TRANSLATION
 0448   REF   1              17,3246   1 3512 0           TCF     ASMBLWY             WILL CONTINUE ON SWITCH OVER TO TVC

 0449   REF   5  LAST 1051   17,3247   4 1462 1  AD14MSY  CS      BLAST2              SEE IF JET ON-TIME LESS THAN
 0450   REF   4  LAST 1049   17,3250   6 3302 0           AD      =14MS               MINIMUM IMPULSE TIME
 0451                        17,3251   0 0006 1           EXTEND
 0452   REF   1              17,3252   6 3255 0           BZMF    YBLASTOK            IF SO, LIMIT MINIMUM ON-TIME TO 14 MS
 0453   REF   5  LAST 1051   17,3253   3 3302 0           CAF     =14MS
 0454   REF   6  LAST 1051   17,3254  55'462 1            TS      BLAST2
 0455   REF   7  LAST 1051   17,3255   3 1462 0  YBLASTOK CA      BLAST2              YAW COMMANDS WILL BE COMPLETED WITHIN
 0456                        17,3256   0 0006 1           EXTEND                      THE T5CYCLE TIME
 0457   REF   6  LAST 1051   17,3257   7 1524 1           MP      NYJETS
 0458   REF   4  LAST 1051   17,3260  23'551 1            LXCH    DFT2
 0459   REF   7  LAST 1051   17,3261  55'563 1            TS      TAU2                ZERO TAU2
 0460   REF   2  LAST 1051   17,3262   1 3512 0           TCF     ASMBLWY
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L        JET SELECTION LOGIC                                                                    USER'S PAGE NO.  15      E6 53

P0461              ROLL ON-TIME CALCULATION-

 0462    REF   7  LAST 1044    17,3263  11'561 0  ROLLTIME CCS      TAU
 0463    REF   1               17,3264  1 3303 0           TCF      RBLAST
 0464                          17,3265  1 3267 0           TCF      +2
 0465    REF   2  LAST 1052    17,3266  1 3303 0           TCF      RBLAST
 0466    REF   6  LAST 1045    17,3267  51'522 0           INDEX    NRJETS
 0467    REF   3  LAST 1051    17,3270  3 3276 1           CA       DFTMAX              UPDATE DFT EVEN THO NO ROLL COMMANDS ARE
 0468    REF   3  LAST 1004    17,3271  55'547 1           TS       DFT                 PRESENT
 0469    REF   1               17,3272  1 3505 0           TCF      RBYPASS

 0470                          17,3273   77037 0           DEC      -480                = -.3SEC
 0471                          17,3274   77277 0           DEC      -320                = -.2SEC
 0472                          17,3275   77537 0  =-.1SEC  DEC      -160                = -.1SEC
 0473                          17,3276   00000 1  DFTMAX   DEC      0                        0
 0474                          17,3277   00240 1  =+.1SEC  DEC      160                 = +.1SEC
 0475                          17,3300   00500 1           DEC      320                 = +.2SEC
 0476                          17,3301   00740 1           DEC      480                 = +.3SEC
 0477                          17,3302   00027 1  =14MS    DEC      23                  =14MS

 0478    REF   8  LAST 1052    17,3303  3 1561 1  RBLAST   CA       TAU
 0479                          17,3304  0 0006 1           EXTEND
 0480    REF   7  LAST 1052    17,3305  5 1522 0           INDEX    NRJETS
 0481    REF   3  LAST 1051    17,3306  7 3342 0           MP       NJET
 0482    REF   2  LAST 1007    17,3307  55'456 0           TS       BLAST               BLAST IS AN INTERMEDIATE VARIABLE
A0483                                                                                   USED IN DETERMINING THE JET ON-TIMES
 0484    REF   3  LAST 1051    17,3310  6 3275 1           AD       =-.1SEC
 0485                          17,3311  0 0006 1           EXTEND
 0486    REF   1               17,3312  6 3323 0           BZMF     AD14MSR
 0487    REF   8  LAST 1052    17,3313  51'522 0           INDEX    NRJETS              THE ROLL ROTATION WILL LAST LONGER
 0488    REF   4  LAST 1052    17,3314  3 3276 1           CA       DFTMAX              THAN THE T5 CYCLE TIME
 0489    REF   4  LAST 1052    17,3315  55'547 1           TS       DFT
 0490                          17,3316  4 0000 0           COM
 0491    REF   9  LAST 1052    17,3317  27'561 0           ADS      TAU
 0492    REF   3  LAST 1051    17,3320  3 3277 0           CAF      =+.1SEC             LIMIT THE LENGTH OF ROLL ROTATION
 0493    REF   3  LAST 1052    17,3321  55'456 0           TS       BLAST               COMMANDS TO 0.1 SEC SO THAT ONLY Y-Z
 0494    REF   1               17,3322  1 3366 0           TCF      ASMBLWR             TRANSLATION COMMANDS CONTINUE

 0495    REF   4  LAST 1052    17,3323  4 1456 0  AD14MSR  CS       BLAST               SEE IF THE JET ON-TIME LESS THAN
 0496    REF   6  LAST 1051    17,3324  6 3302 0           AD       =14MS               MINIMUM IMPULSE TIME
 0497                          17,3325  0 0006 1           EXTEND
 0498    REF   1               17,3326  6 3331 0           BZMF     RBLASTOK
 0499    REF   7  LAST 1052    17,3327  3 3302 0           CAF      =14MS               IF SO, LIMIT MINIMUM ON-TIME TO 14 MS
 0500    REF   5  LAST 1052    17,3330  55'456 0           TS       BLAST
 0501    REF   6  LAST 1052    17,3331  3 1456 1  RBLASTOK CA       BLAST
 0502                          17,3332  0 0006 1           EXTEND
 0503    REF   9  LAST 1052    17,3333  7 1522 1           MP       NRJETS
 0504    REF   5  LAST 1052    17,3334  23'547 0           LXCH     DFT
 0505    REF  10  LAST 1052    17,3335  55'561 0           TS       TAU                 ZERO TAU
 0506    REF   2  LAST 1052    17,3336  1 3366 0           TCF      ASMBLWR
 0507                          17,3337   65252 1              DEC      -.333333          = -1/3
 0508                          17,3340   57777 1              DEC      -.500000          = -1/2
 0509                          17,3341   40000 0              DEC      -.999999          = -1 (NEGMAX)
 0510                          17,3342   00000 1   NJET       DEC      0
 0511                          17,3343   37777 1              DEC      .999999           = +1 (POSMAX)
 0512                          17,3344   20000 0              DEC      .500000           = +1/2
 0513                          17,3345   12525 0              DEC      .333333           = +1/3
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L        JET SELECTION LOGIC                                                                  USER'S PAGE NO.  17       E6 53

R0514       WHEN THE ROTATION COMMANDS ARE COMPLETED, IT IS NECESSARY TO REPLACE THESE COMMANDS BY NEW COMMANDS WHICH
R0516    CONTINUE ON WITH THE TRANSLATIONS IF ANY ARE PRESENT.
R0517       IN THIS SECTION THESE NEW COMMANDS ARE GENERATED AND STORED FOR REPLACEMENT OF THE CHANNEL COMMANDS WHEN THE
R0519    CORRESPONDING ROTATIONS ARE COMPLETED.

R0520    GENERATION OF THE SECOND PITCH(X-TRANS) WORD...PWORD2

  0521   REF   8  LAST 1044    17,3346  11'626 0  ASMBLWP  CCS     RACFAIL
  0522   REF   1               17,3347  1 3355 0           TCF     FPX2              IF FAILURE ON AC IGNORE X-TRANSLATION
  0523                         17,3350  1 3352 1           TCF     +2
  0524   REF   2  LAST 1054    17,3351  1 3355 0           TCF     FPX2
  0525   REF   7  LAST 1039    17,3352  51'513 1           INDEX   XNDX1
  0526   REF   5  LAST 1044    17,3353  3 2647 0           CA      XLNNDX
  0527   REF 232  LAST 1044    17,3354  50 000 1           INDEX   A
  0528   REF   3  LAST 1041    17,3355  3 2703 1  FPX2     CA      PYTABLE
  0529   REF   2  LAST 1040    17,3356  7 2722 0           MASK    PJETS
  0530   REF   2  LAST  107    17,3357  55'453 0           TS      PWORD2
  0531   REF   1               17,3360  1 3217 1           TCF     YAWTIME

  0532   REF   3  LAST 1040    17,3361  3 1452 0  PBYPASS  CA      PWORD1            THE T6 PROGRAM WILL LOAD PWORD2
  0533   REF   3  LAST 1054    17,3362  55'453 0           TS      PWORD2            UPON ENTRY
  0534   REF 182  LAST 1027    17,3363  3 4772 1           CAF     ZERO
  0535   REF   8  LAST 1050    17,3364  55'460 0           TS      BLAST1            THERE IS NO PWORD2
  0536   REF   2  LAST 1054    17,3365  1 3217 1           TCF     YAWTIME
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P0537    GENERATION OF THE SECOND ROLL (Y,Z) WORD (RWORD2)

 0538    REF   8  LAST 1044    17,3366  11'515 0  ASMBLWR   CCS      YNDX               CHECK FOR Y-TRANS
 0539    REF   1               17,3367  1 3377 0            TCF      ACBD2Y
 0540    REF 183  LAST 1054    17,3370  3 4772 1  NO2Y      CAF      ZERO
 0541   *REF   2  LAST  107    17,3371  55'451 1    +1      TS       RWORD2
 0542    REF   7  LAST 1044    17,3372  11'516 0            CCS      ZNDX               CHECK FOR Z-TRANS
 0543    REF   1               17,3373  1 3442 1            TCF      ACBD2Z
 0544    REF 184  LAST 1055    17,3374  3 4772 1  NO2Z      CAF      ZERO
 0545   *REF   3  LAST 1055    17,3375  27'451 1    +1      ADS      RWORD2
 0546    REF   1               17,3376  1 3153 1            TCF      PITCHTIM           RWORD2 ASSEMBLED

 0547    REF   4  LAST 1042    17,3377  11'630 1  ACBD2Y    CCS      ACORBD
 0548    REF   1               17,3400  1 3415 0            TCF      AC2Y               CAN DO Y-TRANS
 0549    REF   2  LAST 1055    17,3401  1 3415 0            TCF      AC2Y
 0550                          17,3402  1 3403 1            TCF      +1                 USING AC FOR ROLL
 0551    REF   9  LAST 1054    17,3403  11'626 0            CCS      RACFAIL
 0552    REF   1               17,3404  1 3370 1            TCF      NO2Y               USING AC AND AC HAS FAILED
 0553                          17,3405  1 3407 0            TCF      +2
 0554    REF   2  LAST 1055    17,3406  1 3370 1            TCF      NO2Y               DITTO

 0555    REF   9  LAST 1055    17,3407  51'515 1            INDEX    YNDX               NO FAILURES, CAN DO Y
 0556    REF   6  LAST 1054    17,3410  3 2647 0            CA       XLNNDX
 0557    REF 233  LAST 1054    17,3411  50 000 1            INDEX    A
 0558    REF   3  LAST 1044    17,3412  3 3117 0            CA       RTABLE
 0559    REF   2  LAST 1042    17,3413  7 3136 1            MASK     ACRJETS
 0560    REF   3  LAST 1055    17,3414  1 3371 0            TCF      NO2Y +1

 0561    REF  10  LAST 1055    17,3415  11'626 0  AC2Y      CCS      RACFAIL
 0562    REF  39  LAST 1044    17,3416  3 6214 0            CAF      THREE
 0563                          17,3417  1 3421 1            TCF      +2
 0564    REF  27  LAST 1044    17,3420  3 6211 0            CAF      SIX
 0565    REF  10  LAST 1055    17,3421  51'515 1            INDEX    YNDX
 0566    REF   3  LAST 1044    17,3422  6 2760 1            AD       XLNINDX
 0567    REF 234  LAST 1055    17,3423  50 000 1            INDEX    A
 0568    REF   3  LAST 1044    17,3424  3 3140 1            CA       YZTABLE
 0569    REF   2  LAST 1044    17,3425  7 3152 0            MASK     ACYJETS
 0570    REF   4  LAST 1055    17,3426  55'451 1            TS       RWORD2
 0571                          17,3427  0 0006 1            EXTEND
 0572    REF  34  LAST 1045    17,3430  7 4765 0            MP       BIT4
 0573    REF   3  LAST 1045    17,3431  6 7701 0            AD       =-2
 0574    REF  10  LAST 1052    17,3432  55'522 1            TS       NRJETS
 0575    REF   7  LAST 1052    17,3433  4 1456 0            CS       BLAST
 0576    REF   4  LAST 1052    17,3434  6 3277 0            AD       =+.1SEC
 0577                          17,3435  0 0006 1            EXTEND
 0578    REF  11  LAST 1055    17,3436  7 1522 1            MP       NRJETS
 0579    REF  99  LAST 1024    17,3437  3 0001 0            CA       L
 0580    REF   6  LAST 1052    17,3440  27'547 1            ADS      DFT
 0581    REF   4  LAST 1055    17,3441  1 3372 0            TCF      NO2Y +2
 0582    REF   5  LAST 1055    17,3442  11'630 1  ACBD2Z    CCS     ACORBD
 0583    REF   1               17,3443  1 3473 0            TCF     BDF2Z          USING BD-ROLL
 0584    REF   2  LAST 1056    17,3444  1 3473 0            TCF     BDF2Z          MUST CHECK FOR BD FAILURES
 0585                          17,3445  1 3446 0            TCF     +1
 0586    REF   8  LAST 1044    17,3446  11'627 1            CCS     RBDFAIL        USING AC FOR ROLL, CAN DO Z-TRANS
 0587    REF  40  LAST 1055    17,3447  3 6214 0            CAF     THREE
 0588                          17,3450  1 3452 0            TCF     +2
 0589    REF  28  LAST 1055    17,3451  3 6211 0            CAF     SIX
 0590    REF   8  LAST 1055    17,3452  51'516 1            INDEX   ZNDX
 0591    REF   4  LAST 1055    17,3453  6 2760 1            AD      XLNINDX
 0592    REF 235  LAST 1055    17,3454  50 000 1            INDEX   A
 0593    REF   4  LAST 1055    17,3455  3 3140 1            CA      YZTABLE
 0594    REF   2  LAST 1043    17,3456  7 3151 0            MASK    BDZJETS
 0595    REF   5  LAST 1055    17,3457  27'451 1            ADS     RWORD2
 0596                          17,3460  0 0006 1            EXTEND
 0597    REF  32  LAST 1043    17,3461  7 4762 1            MP      BIT7
 0598    REF   4  LAST 1055    17,3462  6 7701 0            AD      =-2
 0599    REF  12  LAST 1055    17,3463  55'522 1            TS      NRJETS
 0600    REF   8  LAST 1055    17,3464  4 1456 0            CS      BLAST
 0601    REF   5  LAST 1055    17,3465  6 3277 0            AD      =+.1SEC
 0602                          17,3466  0 0006 1            EXTEND
 0603    REF  13  LAST 1056    17,3467  7 1522 1            MP      NRJETS
 0604    REF 100  LAST 1055    17,3470  3 0001 0            CA      L
 0605    REF   7  LAST 1055    17,3471  27'547 1            ADS     DFT
 0606    REF   2  LAST 1055    17,3472  1 3153 1            TCF     PITCHTIM

 0607    REF   9  LAST 1056    17,3473  11'627 1  BDF22     CCS     RBDFAIL
 0608    REF   1               17,3474  1 3374 0            TCF     NO2Z           USING BD-ROLL AND BD HAS FAILED
 0609                          17,3475  1 3477 1            TCF     +2
 0610    REF   2  LAST 1056    17,3476  1 3374 0            TCF     NO2Z           DITTO
 0611    REF   9  LAST 1056    17,3477  51'516 1            INDEX   ZNDX
 0612    REF   7  LAST 1055    17,3500  3 2647 0            CA      XLNNDX
 0613    REF 236  LAST 1056    17,3501  50 000 1            INDEX   A
 0614    REF   4  LAST 1055    17,3502  3 3117 0            CA      RTABLE
 0615    REF   2  LAST 1044    17,3503  7 3137 0            MASK    BDRJETS
 0616    REF   3  LAST 1056    17,3504  1 3375 1            TCF     NO2Z +1

 0617    REF  11  LAST 1045    17,3505  3 1450 1  RBYPASS   CA      RWORD1
 0618    REF   6  LAST 1056    17,3506  55'451 1            TS      RWORD2
 0619    REF 185  LAST 1055    17,3507  3 4772 1            CAF     ZERO
 0620    REF   9  LAST 1056    17,3510  55'456 0            TS      BLAST
 0621    REF   3  LAST 1056    17,3511  1 3153 1            TCF     PITCHTIM
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P0622               GENERATION OF THE SECOND YAW (X-TRANS) WORD...YWORD2

 0623    REF  10  LAST 1056    17,3512  11'627 1  ASMBLWY  CCS     RBDFAIL
 0624    REF   1               17,3513  1 3521 0           TCF     FYX2                IF FAILURE ON BD IGNORE X-TRANSLATION
 0625                          17,3514  1 3516 1           TCF     +2
 0626    REF   2  LAST 1057    17,3515  1 3521 0           TCF     FYX2
 0627    REF   6  LAST 1041    17,3516  51'514 0           INDEX   XNDX2
 0628    REF   8  LAST 1056    17,3517  3 2647 0           CA      XLNNDX
 0629    REF 237  LAST 1056    17,3520  50 000 1           INDEX   A
 0630    REF   4  LAST 1054    17,3521  3 2703 1  FYX2     CA      PYTABLE
 0631    REF   2  LAST 1041    17,3522  7 2723 1           MASK    YJETS
 0632    REF   2  LAST  107    17,3523  55'455 0           TS      YWORD2
 0633    REF   1               17,3524  1 3531 1           TCF     T6SETUP

 0634    REF   3  LAST 1041    17,3525  3 1454 0  YBYPASS  CA      YWORD1
 0635    REF   3  LAST 1057    17,3526  55'455 0           TS      YWORD2
 0636    REF 186  LAST 1056    17,3527  3 4772 1           CAF     ZERO
 0637    REF   8  LAST 1051    17,3530  55'462 1           TS      BLASTZ
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P0638              SORT THE JET ON-TIMES

R0639        AT THIS POINT ALL THE CHANNEL COMMANDS AND JET ON-TIMES HAVE BEEN DETERMINED. IN SUMMARY THESE ARE-

R0641              RWORD1
R0642              RWORD2          BLAST

R0643              PWORD1
R0644              PWORD2          BLAST1

R0645              YWORD1
R0646              YWORD2          BLAST2

R0647         IN THIS SECTION THE JET ON-TIMES ARE SORTED AND THE SEQUENCE OF T6 INTERRUPTS IS DETERMINED.  TO FACILITATE
R0649      THE SORTING PROCESS AND THE T6 PROGRAM, THE VARIABLES BLAST, BLAST1, BLAST2, ARE RESERVED AS DOUBLE PRECISION
R0651      WORDS.  THE LOWER PART OF THESE WORDS CONTAIN A BRANCH INDEX ASSOCIATED WITH THE ROTATION AXIS OF THE HIGHER
R0653      ORDER WORD.

 0654  REF 187  LAST 1057   17,3531  3 4772 1  T6SETUP  CAF     ZERO               BRANCH INDEX FOR ROLL
 0655  REF  10  LAST 1056   17,3532  55'457 1           TS      BLAST +1
 0656  REF  15  LAST 1029   17,3533  3 4766 1           CAF     FOUR               BRANCH INDEX FOR PITCH
 0657  REF   9  LAST 1054   17,3534  55'461 1           TS      BLAST1 +1
 0658  REF   9  LAST 1014   17,3535  3 4775 0           CAF     ELEVEN             BRANCH INDEX FOR YAW
 0659  REF   9  LAST 1057   17,3536  55'463 0           TS      BLAST2 +1

 0660  REF  11  LAST 1058   17,3537  4 1456 0           CS      BLAST
 0661  REF  10  LAST 1058   17,3540  6 1460 1           AD      BLAST1
 0662                       17,3541  0 0006 1           EXTEND
 0663  REF   1              17,3542  6 3566 1           BZMF    DXCHT12            T1 GR T2
 0664  REF  11  LAST 1058   17,3543  4 1460 0  CHECKT23 CS      BLAST1
 0665  REF  10  LAST 1058   17,3544  6 1462 0           AD      BLAST2
 0666                       17,3545  0 0006 1           EXTEND
 0667  REF   1              17,3546  6 3572 1           BZMF    DXCHT23
 0668  REF  12  LAST 1058   17,3547  4 1460 0  CALCDT6  CS      BLAST1
 0669  REF  11  LAST 1058   17,3550  27'462 1           ADS     BLAST2
 0670  REF  12  LAST 1058   17,3551  4 1456 0           CS      BLAST
 0671  REF  13  LAST 1058   17,3552  27'460 0           ADS     BLAST1             END OF SORTING PROCEDURE
 0672                       17,3553  0 0006 1           EXTEND                     RESET T5LOC TO BEGIN PHASE1
 0673  REF   1              17,3554  3 3565 1           DCA     RCS2CADR
 0674  REF  20  LAST 1035   17,3555  52 113 0           DXCH    T5LOC
 0675  REF  57  LAST 1014   17,3556  4 4770 1  ENDJETS  CS      BIT1               RESET BIT1 FOR INITIALIZATION OF
 0676  REF  51  LAST 1032   17,3557  7 1501 0           MASK    RCSFLAGS           T6 PROGRAM
 0677  REF  52  LAST 1058   17,3560  55'501 0           TS      RCSFLAGS
 0678  REF 188  LAST 1058   17,3561  4 4772 0           CS      ZERO               RESET T5PHASE FOR PHASE1
 0679  REF  10  LAST 1021   17,3562  55'464 1           TS      T5PHASE
 0680  REF  38  LAST 1035   17,3563  1 5323 1           TCF     RESUME             RESUME INTERRUPTED PROGRAM


 0681  REF  37  LAST 1038   E6,1510                     EBANK=  KMPAC
 0682  REF   4  LAST 1000   17,3564   02140 0  RCS2CADR 2CADR   RCSATT
 0682                       17,3565   42066 1
 0683    REF  13  LAST 1058    17,3566  53'457 1  DXCHT12   DXCH     BLAST
 0684    REF  14  LAST 1058    17,3567  53'461 1            DXCH     BLAST1
 0685    REF  14  LAST 1059    17,3570  53'457 1            DXCH     BLAST
 0686    REF   1               17,3571  1 3543 1            TCF      CHECKT23

 0687    REF  15  LAST 1059    17,3572  53'461 1  DXCHT23   DXCH     BLAST1
 0688    REF  12  LAST 1058    17,3573  53'463 0            DXCH     BLAST2
 0689    REF  16  LAST 1059    17,3574  53'461 1            DXCH     BLAST1
 0690    REF  15  LAST 1059    17,3575  4 1456 0            CS       BLAST
 0691    REF  17  LAST 1059    17,3576  6 1460 1            AD       BLAST1
 0692                          17,3577  0 0006 1            EXTEND
 0693                          17,3600  6 3602 0            BZMF     +2
 0694    REF   1               17,3601  1 3547 0            TCF      CALCDT6
 0695    REF  16  LAST 1059    17,3602  53'457 1            DXCH     BLAST
 0696    REF  18  LAST 1059    17,3603  53'461 1            DXCH     BLAST1
 0697    REF  17  LAST 1059    17,3604  53'457 1            DXCH     BLAST
 0698    REF   2  LAST 1059    17,3605  1 3547 0            TCF      CALCDT6
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P0699              T6 PROGRAM AND CHANNEL SETUP

 0701   REF   1                  17,2000                        SETLOC DAP55
 0702                            17,3606                        BANK

 07025 *REF   1                                                 COUNT* $$/T6RPT
 0703   REF  19  LAST 1038       17,3606  22 016 0  T6START     LXCH   BANKRUPT
 0704                            17,3607  0 0006 1              EXTEND
 0705   REF  15  LAST 1038       17,3610  22 012 1              QXCH   QRUPT
 0706   REF   5  LAST 1038       17,3611  10 031 1              CCS    TIME6          CHECK TO SEE IF TIME6 WAS RESET
 0707   REF  39  LAST 1058       17,3612  1 5323 1              TCF    RESUME         AFTER T6RUPT OCCURED(IN T5RUPT)
 0708                            17,3613  1 3615 1              TCF    +2             IF SO WAIT FOR NEXT T6RUPT BEFORE
 0709   REF  40  LAST 1060       17,3614  1 5323 1              TCF    RESUME         TAKING ACTION

 0710   REF  53  LAST 1058       17,3615  4 1501 0              CS     RCSFLAGS
 0711   REF  58  LAST 1058       17,3616  7 4770 1              MASK   BIT1           IF BIT1 IS 0 RESET TO 1
 0712                            17,3617  0 0006 1              EXTEND                AND INITIALIZE CHANNEL
 0713   REF   1                  17,3620  1 3631 1              BZF    T6RUPTOR
 0714   REF  54  LAST 1060       17,3621  27'501 0              ADS    RCSFLAGS
 0715   REF  12  LAST 1056       17,3622  3 1450 1              CA     RWORD1
 0716                            17,3623  0 0006 1              EXTEND                INITIALIZE CHANNELS 5,6 WITH WORD1
 0717   REF   7  LAST  995       17,3624  01 006 0              WRITE  CHAN6
 0718   REF   4  LAST 1054       17,3625  3 1452 0              CA     PWORD1
 0719   REF   4  LAST 1057       17,3626  6 1454 0              AD     YWORD1
 0720                            17,3627  0 0006 1              EXTEND
 0721   REF   3  LAST  703       17,3630  01 005 0              WRITE  CHAN5

 0722   REF  18  LAST 1059       17,3631  11'456 0  T6RUPTOR CCS    BLAST
 0723   REF   1                  17,3632  1 3711 1              TCF    ZBLAST         ZERO BLAST1
 0724   REF   1                  17,3633  1 3650 0              TCF    REPLACE        REPLACE WORD1
 0725                            17,3634  1 3636 0              TCF    +2
 0726   REF   2  LAST 1060       17,3635  1 3650 0              TCF    REPLACE
 0727   REF  19  LAST 1059       17,3636  11'460 0  T6L1        CCS    BLAST1
 0728   REF   1                  17,3637  1 3714 1              TCF    ZBLAST1
 0729   REF   1                  17,3640  1 3655 0              TCF    REPLACE1
 0730                            17,3641  1 3643 1              TCF    +2
 0731   REF   2  LAST 1060       17,3642  1 3655 0              TCF    REPLACE1
 0732   REF  13  LAST 1059       17,3643  11'462 1  T6L2        CCS    BLAST2
 0733   REF   1                  17,3644  1 3717 1              TCF    ZBLAST2
 0734   REF   1                  17,3645  1 3662 1              TCF    REPLACE2
 0735   REF  41  LAST 1060       17,3646  1 5323 1              TCF    RESUME
 0736   REF   2  LAST 1060       17,3647  1 3662 1              TCF    REPLACE2

 0737   REF  19  LAST 1060       17,3650  51'457 0  REPLACE     INDEX  BLAST +1
 0738   REF   1                  17,3651  0 3667 0              TC     REPLACER
 0739   REF 103  LAST 1042       17,3652  4 4770 1              CS     ONE
 0740   REF  20  LAST 1060       17,3653  55'456 0              TS     BLAST
 0741   REF   1                  17,3654  1 3636 0              TCF    T6L1

 0742   REF  20  LAST 1060       17,3655  51'461 0  REPLACE1 INDEX  BLAST1 +1
 0743    REF   2  LAST 1060    17,3656  0 3667 0                TC      REPLACER
 0744    REF 104  LAST 1060    17,3657  4 4770 1                CS      ONE
 0745    REF  21  LAST 1060    17,3660  55'460 0                TS      BLAST1
 0746    REF   1               17,3661  1 3643 1                TCF     T6L2

 0747    REF  14  LAST 1060    17,3662  51'463 1   REPLACE2 INDEX   BLAST2 +1
 0748    REF   3  LAST 1061    17,3663  0 3667 0                TC      REPLACER
 0749    REF 105  LAST 1061    17,3664  4 4770 1                CS      ONE
 0750    REF  15  LAST 1061    17,3665  55'462 1                TS      BLAST2
 0751    REF  42  LAST 1060    17,3666  1 5323 1                TCF     RESUME

 0752    REF   7  LAST 1056    17,3667  3 1451 0   REPLACER CA      RWORD2
 0753                          17,3670  0 0006 1                EXTEND                                 INITIALIZE CHANNELS 5,6 WITH WORD 2
 0754    REF   8  LAST 1060    17,3671  01 006 0                WRITE   CHAN6
 0755    REF 176  LAST 1020    17,3672  0 0002 0                TC      Q

 0756    REF   3  LAST 1057    17,3673  3 2723 0   REPLACEP CA      YJETS
 0757                          17,3674  0 0006 1                EXTEND
 0758    REF   4  LAST 1060    17,3675  02 005 0                RAND    CHAN5
 0759    REF   4  LAST 1054    17,3676  6 1453 1                AD      PWORD2
 0760                          17,3677  0 0006 1                EXTEND
 0761    REF   5  LAST 1061    17,3700  01 005 0                WRITE   CHAN5
 0762    REF 177  LAST 1061    17,3701  0 0002 0                TC      Q

 0763    REF   3  LAST 1054    17,3702  3 2722 1   REPLACEY CA      PJETS
 0764                          17,3703  0 0006 1                EXTEND
 0765    REF   6  LAST 1061    17,3704  02 005 0                RAND    CHAN5
 0766    REF   4  LAST 1057    17,3705  6 1455 1                AD      YWORD2
 0767                          17,3706  0 0006 1                EXTEND
 0768    REF   7  LAST 1061    17,3707  01 005 0                WRITE   CHAN5
 0769    REF 178  LAST 1061    17,3710  0 0002 0                TC      Q

 0770    REF 189  LAST 1058    17,3711  3 4772 1   ZBLAST   CAF     ZERO
 0771    REF  21  LAST 1060    17,3712  57'456 1                XCH     BLAST
 0772    REF   1               17,3713  1 3721 1                TCF     ENABT6
 0773    REF 190  LAST 1061    17,3714  3 4772 1   ZBLAST1  CAF     ZERO
 0774    REF  22  LAST 1061    17,3715  57'460 1                XCH     BLAST1
 0775    REF   2  LAST 1061    17,3716  1 3721 1                TCF     ENABT6
 0776    REF 191  LAST 1061    17,3717  3 4772 1   ZBLAST2  CAF     ZERO
 0777    REF  16  LAST 1061    17,3720  57'462 0                XCH     BLAST2
 0778    REF   6  LAST 1060    17,3721  54 031 1   ENABT6   TS      TIME6
 07785   REF   4  LAST 1038    17,3722  0 4542 0                TC      C13STALL
 0779    REF  10  LAST 1038    17,3723  3 4752 0                CAF     NEGMAX
 0780                          17,3724  0 0006 1                EXTEND
 0781    REF  12  LAST 1038    17,3725  05 013 0                WOR     CHAN13                         ENABLE T6RUPT
 0782    REF  43  LAST 1061    17,3726  1 5323 1                TCF     RESUME

R0783                   END OF T6 INTERRUPT

 0784                          17,3727             ENDSLECT EQUALS
```

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L        CM ENTRY DIGITAL AUTOPILOT                                                     USER'S PAGE NO.   1      E0 53

R0001    SUBROUTINE TO READ GYMBAL ANGLES AND FORM DIFFERENCES.   GIMBAL ANGLES ARE SAVED IN 2S COMPLEMENT, BUT THE
R0003    DIFFERENCES ARE IN 1S COMP.     ENTER AND READ ANGLES EACH .1 SEC.

R0004              CM/DSTBY = 1  FOR DAP OPERATION
R0005              CM/DSTBY = 0 TO TERMINATE DAP OPERATION.

 0007   REF    1                15,2000                      SETLOC ETRYDAP
 0008                           15,2063                      BANK

 0009  *REF    1                                             COUNT* $$/DAPEN
 0010   REF   26  LAST  896     E6,1661                      EBANK= ADG

 0011   REF    6  LAST  996     15,2063  3 4355 0  READGYMB CA     TEN                  KEEP RESTART DT GOING RELATIVE TO
 0012   REF    5  LAST  829     15,2064  27'725 1           ADS    CM/GYMDT             PIPTIME. (GROUP 6)

A0013                                                                 IF A RESTART OCCURS, SKIP PRESENT CYCLE. THE
A0014                                                                 PHASCHNG PROTECTION IS IN CM/DAPIC.

 0015   REF    7  LAST 1013     15,2065  3 4763 1           CA     NCIMODAP             CHECK FOR FINE ALIGN MODE OF CDU.
 0016   REF   32  LAST 1013     15,2066  7 1334 0           MASK   IMODES33             ( PROTECT ADG/PIP ETC AS WELL AS
 0017                           15,2067  0 0006 1           EXTEND                       GIMBAL DIFFERENCES)
 0018   REF    1                15,2070  1 2076 0           BZF    READGYM1             OK

 0019   REF    2  LAST  804     15,2071  4 4770 1           CS     GYMDIBIT             NOT IN FINE ALIGN, SO IDLE
 0020   REF   10  LAST  894     15,2072  7 0102 0           MASK   CM/FLAGS             SET GYMDIFSW =0
 0021   REF   11  LAST 1063     15,2073  54 102 0           TS     CM/FLAGS
 0022   REF    1                15,2074  0 6000 1           TC     FLUSHJET             QUENCH JETS, SINCE MAY BE A WHILE.
 0023   REF    1                15,2075  0 2143 0           TC     CM/GYMIC +2

 0024   REF   27  LAST 1036     15,2076  3 0032 0  READGYM1 CA     CDUX
 0025   REF   27  LAST 1063     15,2077  57'661 1           XCH    ADG
 0026                           15,2100  0 0006 1           EXTEND
 0027   REF   28  LAST 1063     15,2101  21'661 0           MSU    ADG                  -DELADG=ADG(N-1) - ADG(N)
 0028   REF    2  LAST  115     15,2102  55'675 0           TS     -DELADG

 0029   REF   16  LAST 1026     15,2103  3 0033 1           CA     CDUY
 0030   REF    2  LAST  115     15,2104  57'662 1           XCH    AIG
 0031                           15,2105  0 0006 1           EXTEND
 0032   REF    3  LAST 1063     15,2106  21'662 0           MSU    AIG
 0033   REF    2  LAST  115     15,2107  55'676 0           TS     -DELAIG

 0034   REF   24  LAST 1036     15,2110  3 0034 0           CA     CDUZ
 0035   REF    3  LAST  828     15,2111  57'663 0           XCH    AMG
 0036                           15,2112  0 0006 1           EXTEND
 0037   REF    4  LAST 1063     15,2113  21'663 1           MSU    AMG
 0038   REF    2  LAST  115     15,2114  55'677 1           TS     -DELAMG

 0039   REF   12  LAST 1063     15,2115  3 0102 1  DOBRATE? CA     CM/FLAGS
 0040   REF    3  LAST  828     15,2116  7 4767 1           MASK   CM/DSBIT
 0041   REF  230  LAST 1057     15,2117  10 000 0           CCS    A
```

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L        CM ENTRY DIGITAL AUTOPILOT                                                                  USER'S PAGE NO.   2      E6 S3

 0042    REF   1                  15,2120  1 2135 0              TCF     CKGYMSW

 0046    REF   2  LAST 1063       15,2121  0 6000 1              TC      FLUSHJET          TURN OFF ALL JETS

 0047    REF  92  LAST  898       15,2122  0 5402 1              TC      PHASCHNG
 0048                             15,2123   00006 1              OCT     00006             DEACTIVATE DAP GROUP 6.

 0049    REF  48  LAST  994       15,2124  0 5314 1              TC      TASKOVER

 0050    REF 106  LAST 1061       15,2125  3 4770 0  DOBRATE     CA      ONE               DO BODYRATE
 0051    REF   2  LAST  116       15,2126 55'720 1  DOBRATE1    TS      JETEM             SKIP BODYRATE.

 0052    REF   7  LAST 1063       15,2127  3 4355 0              CA      TEN               KEEP CDU READ GOING.
 0053    REF  21  LAST  961       15,2130  0 5223 1              TC      TWIDDLE
 0054    REF   2  LAST  236       15,2131   02063 0              ADRES   READGYMB
A0056                                                                          DOES NOT PROTECT TEMK, SQ IN SPSIN/COS

 0057    REF   3  LAST 1064       15,2132 11'720 1               CCS     JETEM
 0058    REF   1                  15,2133  0 2165 1              TC      BODYRATE
 0059    REF  49  LAST 1064       15,2134  0 5314 1              TC      TASKOVER          SKIP CALC ON INITIAL PASS. (PASSES)

 00592   REF  13  LAST 1063       15,2135  4 0102 0  CKGYMSW     CS      CM/FLAGS
 00594   REF   3  LAST 1063       15,2136  7 4770 1              MASK    GYMDIBIT
 00596                            15,2137  0 0006 1              EXTEND
 00598   REF   1                  15,2140  1 2125 1              BZF     DOBRATE
 0060    REF  14  LAST 1064       15,2141 26 102 0   CM/GYMIC    ADS     CM/FLAGS          GYMDIFSW: C(A)=1, KNOW BIT IS 0
 0061    REF 192  LAST 1061       15,2142  3 4772 1              CAF     ZERO
 0062   *REF   2  LAST  115       15,2143 55'711 0      +2       TS      JETAG
 0063    REF   2  LAST  115       15,2144 55'706 0               TS      OLDELP
 0064    REF   2  LAST  115       15,2145 55'707 1               TS      OLDELQ
 0065    REF   2  LAST  115       15,2146 55'710 1               TS      OLDELR
 0066    REF   4  LAST  894       15,2147 55'723 1               TS      GAMDOT            NO GYM DIF, PROB NO GAM DIF.
 0067    REF   1                  15,2150  0 2126 0              TC      DOBRATE1
```

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L        CM ENTRY DIGITAL AUTOPILOT                                                    USER'S PAGE NO.   3      E6 S3

P0068    COME HERE TO CORRECT FOR OVERFLOW IN ANGULAR CALCULATIONS

 0069    REF 101  LAST 1056   15,2151  54 0001 1  ANGOVCOR TS      L                THIS COSTS 2 MCT TO USE.
 0070    REF 179  LAST 1061   15,2152  0 0002 0            TC      Q                NO OVFL
 0071    REF 239  LAST 1063   15,2153  50 0000 1           INDEX   A
 0072    REF   4  LAST  951   15,2154  3 4751 0            CAF     LIMITS
 0073    REF 102  LAST 1065   15,2155  26 0001 1           ADS     L
 0074    REF 180  LAST 1065   15,2156  0 0002 0            TC      Q

 0075   *REF   1                  6000                     SETLOC  FFTAG6
 00755 *                          6000                     BANK

 0076   *REF   1                                           COUNT*  $$/DAPEN
 0077                             6000  3 0007 0  FLUSHJET CA      7                COME HERE TO TURN OFF ALL JETS.
 0078                             6001  0 0006 1           EXTEND
 0079    REF   2  LAST   42       6002  01 006 0           WRITE   ROLLJETS         ZERO CHANNEL 6
 0080                             6003  0 0006 1           EXTEND
 0081    REF   2  LAST   42       6004  01 005 0           WRITE   PYJETS           ZERO CHANNEL 5
 0082    REF 181  LAST 1065       6005  0 0002 0           TC      Q

 0085    REF   2  LAST 1063   15,2000                      SETLOC  ETRYDAP
 0086                         15,2157                      BANK

 00865 *REF   2 LAST 1063 TO 1065:   60     60*            COUNT*  $$/DAPEN
 0087                         15,2157  4 0000 0  RATEAVG  COM                       SUBROUTINE TO ESTIMATE RATES IN PRESENCE
 0088    REF   4  LAST 1064   15,2160  6 1720 0            AD      JETEM            OF CONSTANT ACCELERATION.
 0096                         15,2161  0 0006 1            EXTEND
 0097    REF   5  LAST  592   15,2162  7 4753 0            MP      HALF             DELV (EST) = DELV +(DELV-OLDELV)/2
 0098    REF   5  LAST 1065   15,2163  6 1720 0            AD      JETEM
 0099    REF 182  LAST 1065   15,2164  0 0002 0            TC      Q
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L        CM ENTRY DIGITAL AUTOPILOT                                                             USER'S PAGE NO.   4      E6 S3

P0101     THESE ARE CALLED FOR THE VARIOUS INITIALIZATIONS NEEDED.

 0103   REF   1              20,2000                              SETLOC DAPS1
 0104                        20,3624                              BANK

 0105  *REF   1                                                   COUNT* $$/DAPEN
 0106   REF  29  LAST 1063   E6,1661                              EBANK= AOG

 0107   REF  14  LAST  895   20,3624  0 4611 0  CM/DAPON TC       E6SETTER

 0109   REF  61  LAST  834   20,3625  0 5561 0           TC       DOWNFLAG          RESET DAPBIT1.  T5 RESTART IDENTIFIER.
 01095  REF   1              20,3626   00132 1           ADRES    DAPBIT1           BIT 15  FLAG 6              CM FLAGS.
 0110   REF  62  LAST 1066   20,3627  0 5561 0           TC       DOWNFLAG          RESET DAPBIT2
 01105  REF   1              20,3630   00133 0           ADRES    DAPBIT2           BIT 14  FLAG 6
 0111                        20,3631  0 0006 1           EXTEND
 0112   REF   1              20,3632  3 3747 0           DCA      T5IDLER1          DISABLE RCS CALCULATION
 0113   REF  21  LAST 1058   20,3633  52 113 0           DXCH     T5LOC
 0114                        20,3634  0 0006 1           EXTEND
 0115   REF   2  LAST 1066   20,3635  3 3747 0           DCA      T5IDLER1          DISABLE RCS JET CALLS
 0116   REF   4  LAST 1014   20,3636  52 111 1           DXCH     T6LOC

 0117   REF   3  LAST 1064   20,3637  0 6000 1           TC       FLUSHJET          JETS DEPARTED  ON SM. ZERO JET BITS.

 0118   REF   5  LAST 1010   20,3640  4 7673 0           CS       13,14,15
 0119   REF  65  LAST 1038   20,3641  7 1465 0           MASK     DAPDATR1          SET  CONFIG  BITS =0 FOR ENTRY
 0120   REF  66  LAST 1066   20,3642  55'465 0           TS       DAPDATR1
 0121                        20,3643  0 3647 1           TC       +4

 0122   REF   9  LAST  951   20,3644  3 5011 1  NOTYET   CA       .5SEC
 0123   REF 213  LAST  941   20,3645  0 4636 0           TC       BANKCALL
 0124   REF  17  LAST  941   20,3646   01731 0           CADR     DELAYJOB          (DELAYJOB DOES INHINT)
 0125   REF   2  LAST  894   20,3647  3 4756 1  +4       CA       CMDIFBIT          GAMDIFSW = 94D BIT11   INITLY=0
 0126   REF  15  LAST 1064   20,3650  7 0102 0           MASK     CM/FLAGS          IF ZERO, WAIT UNTIL CM/POSE UPDATE.
 0127                        20,3651  0 0006 1           EXTEND
 0128   REF   1              20,3652  1 3644 0           BZF      NOTYET

 0129   REF 107  LAST 1064   20,3653  4 4770 1           CS       ONE               ACTIVATE CM/DAP
 0130   REF  55  LAST 1060   20,3654  55'501 0           TS       RCSFLAGS          USE BIT3 TO INITIALIZE NEEDLER ON
A0131                                                                               NEXT PASS.
 0132   REF   3  LAST  798   20,3655  55'727 0           TS       P63FLAG           SO WAKEP62 WILL NOT BE INITIATED UNTIL
A0133                                                                               HEADSUP IS SET IN P62.
A0134                                                                   FLAG TO PREVENT MULTIPLE CALLS TO WAKEP62.

 0135                        20,3656  3 0007 0           CA       7
 0136   REF   3  LAST 1064   20,3657  55'711 0           TS       JETAG
 01361  REF   4  LAST  187   20,3660  55'713 1           TS       PAXERR1           KEEP NEEDLES ZERO UNTIL DAP UPDATE
A01362                                                                              IN CASE CMDAPMOD IS NOT +1.
 0137                        20,3661  0 0004 0           INHINT
 0138                        20,3662  0 0006 1           EXTEND
 0139   REF   5  LAST  895   20,3663  3 1666 0           DCA      ALFA/180          DO ATTITUDE HOLD UNTIL KEYBOARD
 0140   REF   3  LAST  796   20,3664  53'604 0          DXCH    ALFACOM          ESTABLISHES HEADSUP.
 0141   REF   5  LAST  895   20,3665  3 1664 1          CA      ROLL/180
 0142   REF   2  LAST  116   20,3666  55'717 0          TS      ROLLHOLD         FOR ATTITUDE HOLD IN MODE +1.
 0143                        20,3667  0 0006 1          EXTEND
 0144   REF   6  LAST 1065   20,3670  7 4753 0          MP      HALF
 0145   REF  14  LAST  881   20,3671  55'715 1          TS      ROLLC            NOT INTERESTED IN LO WORD.

 0146   REF  16  LAST 1066   20,3672  4 0102 0          CS      CM/FLAGS
 0147   REF   2  LAST  828   20,3673  7 4755 0          MASK    CMARMBIT           CMDAPARM = 93D BIT12 INITLY=0
 0148   REF  17  LAST 1067   20,3674  26 102 0          ADS     CM/FLAGS         SET BIT TO 1.

 0149   REF  23  LAST  827   20,3675  4 0076 1          CS      FLAGWRD2         SET  NODOFLAG  TO PREVENT FURTHER
 0150   REF   3  LAST  212   20,3676  7 4770 1          MASK    NODOBIT          V 37 ENTRIES
 0151   REF  24  LAST 1067   20,3677  26 076 1          ADS     FLAGWRD2

 0152                        20,3700  0 0003 1          RELINT

 0153   REF  53  LAST  962   20,3701  0 4655 0          TC      POSTJUMP
 0154   REF   1              20,3702   54343 1          CADR    P62.1
```

```
P0155    INITIALIZE CM/DAP.   WAITLIST CALL FOR READGYMB.  SET SWITCH CM/DSTBY =1
R0156    SO READACCS WILL ENTER A WTLST CALL FOR  SETJTAG  .
R0157     CMDAPARM  = 0   , SO ONLY BODY RATE AND ATTITUDE CALCULATIONS ARE DONE.
R0158    SET AVEGEXIT TO CONTINUE AT CM/POSE
R0159

 0160    REF  15  LAST 1066   20,3703  0 4611 0  CM/DAPIC TC      E6SETTER

 0162                         20,3704  0 0004 0           INHINT
 0163    REF  17  LAST  857   20,3705  4 1044 1  CM/DAP2C CS      PIPTIME +1
A0164                                                                     PRIO OF P62 L PRIO AVG,:PIPTM=PIPTM1
 0165    REF   6  LAST 1065   20,3706  55'720 1           TS      JETEM

 0166    REF   1              20,3707  3 4753 1           CA      POS1/2
 0167    REF   2  LAST 1068   20,3710  6 4753 1           AD      POS1/2
 0168    REF  18  LAST  776   20,3711  6 0025 0           AD      TIME1               OVFL GUARANTEED
 0169    REF   7  LAST 1068   20,3712  27'720 1           ADS     JETEM               C(A) = DELTA TIME SINCE PIPUP

 0170    REF  24  LAST 1017   20,3713  4 4773 1           CS      FIVE
 0171    REF   8  LAST 1068   20,3714  6 1720 0           AD      JETEM
 0172    REF 240  LAST 1065   20,3715  10 000 0           CCS     A
 0173    REF   1              20,3716  6 3745 1           AD      -CDUT+1
 0174                         20,3717  1 3715 0           TCF     -2
 0175                         20,3720  13 721 1           NOOP
 0176    REF 108  LAST 1066   20,3721  6 4770 0           AD      ONE                 SEND NO ZERO TO WTLST
 0177    REF   6  LAST 1063   20,3722  55'725 1           TS      CM/GYMDT            FOR RESTART
 0178    REF  25  LAST  946   20,3723  0 5233 0           TC      WAITLIST
 0179    REF  30  LAST 1066   E6,1661                     EBANK=  AOG
 0180    REF   3  LAST 1064   20,3724   02063 0           2CADR   READGYMB
 0180                         20,3725   32066 0

 0181    REF   1              20,3726  4 3744 1           CS      CM/SWIC1            GAMDIFSW, GYMDIFSW, CM/DSTBY
 0182    REF  18  LAST 1067   20,3727  7 0102 0           MASK    CM/FLAGS            DAPARM, .05GSW, LATSW, ENTRYDSP
 0183    REF   1              20,3730  6 4355 0           AD      CM/SWIC2            SET CM/DSTBY, LATSW
A01831                                                                                DISABLE ENTRY DISPLAY, SINCE DES. GIMB.
A01832                                                                                CALC. (P62.3) GOES TO ENDEXIT.
 0184    REF  19  LAST 1068   20,3731  54 102 0           TS      CM/FLAGS

 0185                         20,3732  3 0007 0           CA      7
 0186    REF   6  LAST  895   20,3733  55'666 1           TS      BETA/180            NECESSARY: NO OVFL CORRECTION
 0188    REF 109  LAST 1068   20,3734  3 4770 0           CA      ONE                 INITIALIZE THE TM OF BODY RATES VIA
 0189    REF   1              20,3735  54 305 0           TS      SW/NDX                UPBUFF.

 0190    REF  35  LAST  883   20,3736  0 5362 0           TC      2PHSCHNG            DOES INHINT/RELINT
 0191                         20,3737   40116 0           OCT     40116               SAVE TBASE6
 0192                         20,3740   05024 1           OCT     05024
 0193                         20,3741   13000 0           OCT     13000

 01935 *REF   1               01,2336            6P11SPT1 =       6.11SPOT
 0194    REF  54  LAST 1067   20,3742  0 4655 0           TC      POSTJUMP
 0195   REF   1                20,3743   54327 0            CADR    P62.2

 0196                          20,3744   16017 0  CM/SWIC1 OCT     16017
 01961  REF   8  LAST 1064        4355            CM/SWIC2 =       TEN                 00012 : CM/DSTBY, LATSW
 0197                          20,3745   77766 0  -COUT+1  OCT     77766
 0198   REF  22  LAST 1066        0112                     EBANK=  T5LOC
 0199   REF   4  LAST  714     20,3746   03226 1  T5IDLER1 2CADR   T5IDLOC
 0199                          20,3747   12060 1
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L        CM ENTRY DIGITAL AUTOPILOT                                                         USER'S PAGE NO.   8       E6 S3

R0200    THIS SECTION CALCULATES THE ANGULAR BODY RATES EACH .1 SEC.  THE ANGULAR RATES ARE THOSE ALONG THE BODY AXES
R0202    XB, YB, ZB, AND ARE NORMALLY DESIGNATED  P, Q, R.         REQUIREMENT:  TEMPORARY ERASE. JETEM, JETEM +1

R0204             SINCE RESTARTS ZERO THE JET OUTPUT CHANNELS, NO ATTEMPT IS MADE TO RESTART THE  ENTRY DAPS. THAT IS,
R0206    THE 0.1 SEC DAPS WILL MISS A CYCLE, AND WILL PICK UP AT THE NEXT 0.1 SEC UPDATE. MOST OF THE TIME THE 2 SEC
R0208    ROLL SYSTEM WILL MISS ONLY 0.1 SEC OF CONTROL. HOWEVER IF THE RESTART OCCURS AFTER THE  SECTION TIMETST HAS
R0210    STARTED, THEN THE ROLL SYSTEM WILL MISS ONE CYCLE.
R0211    THIS IS NECESSARY  UNDER THE GROUNDRULE THAT NO JET COMMANDS SHALL BE LESS THAN 14 MS.

 0213    REF  31  LAST 1068   E6,1661                          EBANK= AOG
 0215    REF   3  LAST 1065   15,2000                          SETLOC ETRYDAP
 02151                        15,2165                          BANK

 0216   *REF   3 LAST 1065 TO 1066:      6     66*             COUNT* $$/DAPEN
 0218    REF   5  LAST 1063   15,2165  3 1663 0  BODYRATE CA     AMG              THESE ARE 2S COMPL NOS, BUT USE ANYWAY.
 0219    REF   3  LAST  997   15,2166  0 5060 1           TC     SPCOS
 0220    REF   2  LAST  116   15,2167  55'511 1           TS     COSM

 0221    REF  32  LAST 1070   15,2170  3 1661 1           CA     AOG              C(AOG) = AOG/180
 0222    REF   3  LAST  997   15,2171  0 5061 0           TC     SPSIN            SINO
 0223    REF   2  LAST  116   15,2172  55'512 1           TS     SINO             SINO = SIN(AOG)

 0224                         15,2173  0 0006 1           EXTEND
 0225    REF   3  LAST 1070   15,2174  7 1511 1           MP     COSM
 0226    REF   2  LAST  116   15,2175  55'514 1           TS     SINOCOSM         SO CM

 0227    REF  33  LAST 1070   15,2176  3 1661 1           CA     AOG
 0228    REF   4  LAST 1070   15,2177  0 5060 1           TC     SPCOS            COSO
 0229    REF   2  LAST  116   15,2200  55'513 0           TS     COSO

 0230                         15,2201  0 0006 1           EXTEND
 0231    REF   4  LAST 1070   15,2202  7 1511 1           MP     COSM
 0232    REF   1              15,2203  55'515 0           TS     COSOCOSM         CO CM

R0233    PITCHDOT:    Q TCDU/180 = IDOT TCDU/180 COSO COSM + MDOT TCDU/180 SINO

 0234    REF   3  LAST 1063   15,2204  4 1677 1           CS     -DELAMG
 0235                         15,2205  0 0006 1           EXTEND
 0236    REF   3  LAST 1070   15,2206  7 1512 1           MP     SINO
 0237    REF   9  LAST 1068   15,2207  53'721 0           DXCH   JETEM            2 LOCS _
 0238    REF   3  LAST 1063   15,2210  4 1676 0           CS     -DELAIG
 0239                         15,2211  0 0006 1           EXTEND
 0240    REF   2  LAST 1070   15,2212  7 1515 0           MP     COSOCOSM
 0241    REF  10  LAST 1070   15,2213  21'721 0           DAS    JETEM
 0242    REF  11  LAST 1070   15,2214  3 1720 0           CA     JETEM
 0243    REF   3  LAST 1064   15,2215  57'707 0           XCH    OLDELQ
 0244    REF   1              15,2216  0 2157 0           TC     RATEAVG
 0245    REF   5  LAST  188   15,2217  55'702 1           TS     QREL             PITCHDOT = Q TCDU/180
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L       CM ENTRY DIGITAL AUTOPILOT                                                    USER'S PAGE NO.   9      E6 S3

P0246   YAWDOT:   R TCDU/180 = -IDOT TCDU/180 COSM SINO + MDOT TCDU/180 COSO

 0247   REF   4  LAST 1070   15,2220  4 1677 1              CS      -DELAMG
 0248                        15,2221  0 0006 1              EXTEND
 0249   REF   3  LAST 1070   15,2222  7 1513 0              MP      COSO
 0250   REF  12  LAST 1070   15,2223  53'721 0              DXCH    JETEM
 0251   REF   4  LAST 1070   15,2224  3 1676 1              CA      -DELAIG
 0252                        15,2225  0 0006 1              EXTEND
 0253   REF   3  LAST 1070   15,2226  7 1514 1              MP      SINOCOSM
 0254   REF  13  LAST 1071   15,2227  21'721 0              DAS     JETEM
 0255   REF  14  LAST 1071   15,2230  3 1720 0              CA      JETEM
 0256   REF   3  LAST 1064   15,2231  57'710 0              XCH     OLDELR
 0257   REF   2  LAST 1070   15,2232  0 2157 0              TC      RATEAVG
 0258   REF   4  LAST  188   15,2233  55'703 0              TS      RREL           YAWDOT = R TCDU/180

R0259    ROLLDOT:   P TCDU/180 = ODOT TCDU/180 + IDOT TCDU/180 SINM

 0260   REF   6  LAST 1070   15,2234  3 1663 0              CA      AMG
 0261   REF   4  LAST 1070   15,2235  0 5061 0              TC      SPSIN
 0262   REF   2  LAST  116   15,2236  55'510 0              TS      SINM

 0263                        15,2237  0 0006 1              EXTEND
 0264   REF   5  LAST 1071   15,2240  7 1676 0              MP      -DELAIG
 0265   REF  15  LAST 1071   15,2241  55'720 1              TS      JETEM
 0266   REF 193  LAST 1064   15,2242  3 4772 1              CA      ZERO
 0267                        15,2243  20 001 1              DDOUBL                 ROUND L INTO A
 0268   REF   3  LAST 1063   15,2244  6 1675 1              AD      -DELAOG
 0269   REF  16  LAST 1071   15,2245  6 1720 0              AD      JETEM
 0270   REF 241  LAST 1068   15,2246  4 0000 0              CS      A
 0271   REF  17  LAST 1071   15,2247  55'720 1              TS      JETEM
 0272   REF   3  LAST 1064   15,2250  57'706 1              XCH     OLDELP
 0273   REF   3  LAST 1071   15,2251  0 2157 0              TC      RATEAVG
 0274   REF   5  LAST  188   15,2252  55'701 1              TS      PREL           ROLLDOT = P TCDU/180

A0275                                                            IF GAMDOT  < 0.5 DEG/SEC, THEN GAMDOT =0

 0276   REF   5  LAST 1064   15,2253  11'723 1              CCS     GAMDOT
 0277                        15,2254  0 2256 1              TC      +2
 0278   REF   1              15,2255  0 2300 0              TC      NOGAMDOT
 0279   REF   6  LAST 1067   15,2256  4 1664 0              CS      ROLL/180
 0280   REF   5  LAST 1071   15,2257  0 5061 0              TC      SPSIN
 0281                        15,2260  0 0006 1              EXTEND
 0282   REF   6  LAST 1071   15,2261  7 1723 1              MP      GAMDOT
 0283   REF  18  LAST 1071   15,2262  55'721 0              TS      JETEM  +1      -SR GAMDOT
 0284                        15,2263  0 0006 1              EXTEND
 0285   REF   1              15,2264  7 2626 0              MP      SINTRIM        SIN(-20)    (FOR NOMINAL L/D = .3)
 0287   REF   6  LAST 1071   15,2265  27'701 1              ADS     PREL           PREL TCDU/180=(P-SALF SR GAMDOT)TCDU/180

 0288   REF   7  LAST 1071   15,2266  3 1664 1              CA      ROLL/180
 0289   REF   5  LAST 1070   15,2267  0 5060 1              TC      SPCOS
 0290                          15,2270  4 0000 0           COM
 0291                          15,2271  0 0006 1           EXTEND
 0292   REF   7  LAST 1071     15,2272  7 1723 1           MP       GAMDOT
 0293   REF   6  LAST 1070     15,2273  27'702 1           ADS      QREL          QREL TCDU/180=(Q-CR GAMDOT) TCDU/180

 0294   REF  19  LAST 1071     15,2274  4 1721 0           CS       JETEM +1      B( ) = -SR GAMDOT
 0295                          15,2275  0 0006 1           EXTEND
 0296   REF   1                15,2276  7 2627 1           MP       COSTRIM       COS(-20)   (FOR NOMINAL L/D = .3)
 0297   REF   5  LAST 1071     15,2277  27'703 0           ADS      RREL          RREL TCDU/180=(R+CALF SR GAMDOT)TCDU/180

 0298   REF   3  LAST 1067     15,2300  3 4755 1  NOGAMDOT CA       CMARMBIT      CMDAPARM = 93D BIT12
 0299   REF  20  LAST 1068     15,2301  7 0102 0           MASK     CM/FLAGS
 0300                          15,2302  0 0006 1           EXTEND
 0301   REF  50  LAST 1064     15,2303  1 5314 0  STBYDUMP BZF      TASKOVER      DAP NOT ARMED.

 0302   REF  26  LAST 1034     15,2304  3 4750 1           CA       POSMAX        PICK UP AT ATTRATES IN 10 MS OR SO.
 0303   REF  25  LAST 1038     15,2305  54 030 0           TS       TIME5

 0304                          15,2306  0 0006 1           EXTEND
 0305   REF   1                15,2307  3 2313 1           DCA      ATDOTCAD
 0306   REF  23  LAST 1069     15,2310  52 113 0           DXCH     T5LOC
A0307                                                                   DOES NOT PROTECT TEMK, SQ IN SPSIN/COS

 0308   REF  51  LAST 1072     15,2311  0 5314 1           TC       TASKOVER

 0309   REF  34  LAST 1070     E6,1661                     EBANK=   AOG
 0310   REF   1                15,2312   02314 0  ATDOTCAD 2CADR    ATTRATES
 0310   REF   1                15,2313   32066 0
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P0311   CALCULATE BODY ATTITUDE RATES AND INTEGRATE TO OBTAIN ATTITUDE ANGLES.

R0312               CB PHIDOT TCDU/180 = (CA PREL + SA RREL) TCDU/180
R0313               BETADOT TCDU/180 = (-SA PREL + CA RREL) TCDU/180
R0314               ALFADOT TCDU = (QREL + SB PHIDOT) TCDU/180

 0315   REF  20  LAST 1060   15,2314  22 016 0  ATTRATES LXCH    BANKRUPT        CONTINUE HERE VIA T5
 0316                        15,2315   0 0006 1           EXTEND                   TASK MAY BE SKIPPED AT RESTART.
 0317   REF  16  LAST 1060   15,2316  22 012 1           QXCH    QRUPT
 0318   REF   8  LAST  370   15,2317   3 0021 1           CA      SR
 0319                        15,2320   6 0000 1           DOUBLE
 0320   REF   2  LAST  117   15,2321  55'623 0           TS      CM/SAVE
A0321                                                                  DOES NOT PROTECT TEMK, SQ IN SPSIN/COS

 0322   REF   7  LAST 1072   15,2322   3 1702 0           CA      QREL
 0323   REF   6  LAST 1066   15,2323   6 1665 0           AD      ALFA/180
 0324   REF   1              15,2324   0 2151 0           TC      ANGOVCOR
 0325   REF   7  LAST 1073   15,2325  55'665 1           TS      ALFA/180
 0326   REF   6  LAST 1071   15,2326   0 5060 1           TC      SPCOS
 0327   REF   2  LAST  116   15,2327  55'506 1           TS      CALFA           CALFA
 0328   REF   2  LAST  115   15,2330  55'705 0           TS      PHIDOT

 0329                        15,2331   0 0006 1           EXTEND
 0330   REF   7  LAST 1071   15,2332   7 1701 1           MP      PREL
 0331   REF   3  LAST 1073   15,2333  57'705 1           XCH     PHIDOT          CA PREL
 0332                        15,2334   0 0006 1           EXTEND
 0333   REF   6  LAST 1072   15,2335   7 1703 0           MP      RREL            CA RREL
 0334   REF   2  LAST  115   15,2336  55'704 1           TS      BETADOT

 0335   REF   8  LAST 1073   15,2337   3 1665 0           CA      ALFA/180
 0336   REF   6  LAST 1071   15,2340   0 5061 0           TC      SPSIN
 0337   REF   2  LAST  116   15,2341  55'507 0           TS      SALFA           SIN(ALFA)

 0338                        15,2342   0 0006 1           EXTEND
 0339   REF   7  LAST 1073   15,2343   7 1703 0           MP      RREL            SA RREL
 0340   REF   4  LAST 1073   15,2344  27'705 0           ADS     PHIDOT          CB PHIDOT, SAVED.

 0341   REF   3  LAST 1073   15,2345   4 1507 0           CS      SALFA
 0342                        15,2346   0 0006 1           EXTEND
 0343   REF   8  LAST 1073   15,2347   7 1701 1           MP      PREL
 0344   REF   3  LAST 1073   15,2350  27'704 1           ADS     BETADOT         SAVE BETADOT TCDU/180
 0345   REF   7  LAST 1068   15,2351  27'666 1           ADS     BETA/180        BETA DONE.

 0346   REF   7  LAST 1073   15,2352   0 5061 0           TC      SPSIN
 0347                        15,2353   0 0006 1           EXTEND
 0348   REF   5  LAST 1073   15,2354   7 1705 0           MP      PHIDOT          NEGLECT CB IN  CB PHIDOT
 0349   REF   9  LAST 1073   15,2355   6 1665 0           AD      ALFA/180
 0350   REF   2  LAST 1073   15,2356   0 2151 0           TC      ANGOVCOR
 0351   REF  10  LAST 1073   15,2357  55'665 1           TS      ALFA/180        ALFA DONE.
 0352                          15,2360  4 0000 0                COM
 0353   REF    4  LAST 1067    15,2361  6 1603 0                AD      ALFACOM
 0354   REF    3  LAST 1073    15,2362  0 2151 0                TC      ANGOVCOR         JUST IN CASE ...
 0355   REF   11  LAST 1022    15,2363  55'477 0                TS      AK1
 0356   REF    2  LAST  117    15,2364  55'572 1                TS      QAXERR           FOR PITCH FDAI   AND EDIT.

 0357   REF    6  LAST 1073    15,2365  3 1705 1                CA      PHIDOT           PHIDOT TCDU/180, NEGLECTING CB
 0358   REF    8  LAST 1071    15,2366  6 1664 1                AD      ROLL/180
 0359   REF    4  LAST 1074    15,2367  0 2151 0                TC      ANGOVCOR
 0360   REF    5  LAST  183    15,2370  55'714 0                TS      ROLLTM           ROLL/180 FOR TM.
 0361   REF    9  LAST 1074    15,2371  55'664 0                TS      ROLL/180         ROLL DONE.

R0362        START YAW AUTOPILOT HERE .  RATE DAMPING WITH ENFORCED COORDINATED ROLL MANEUVER.

 03631  REF    8  LAST 1073    15,2372  4 1666 1                CS      BETA/180         IF IN ATM, SAVE 'RAXERR' FOR TM ONLST.
 03632  REF    2  LAST  116    15,2373  6 1604 1                AD      BETACOM
 03633  REF    1               15,2374  55'573 0                TS      RAXERR           IF OUTSIDE ATM, USE TM REGISTER 'RAXERR'
A03634                                                                         AS A TEMPORARY. (DAP OPERATION IS IN INTERRUPT, SO
A03635                                                                         IS OK.)  FINAL C(RAXERR) AT END OF DAP CYCLE WILL
A03636                                                                         BE R-AXIS ERROR.

 0364   REF    1               15,2375  3 4766 1                CA      .05GBIT          .05GSW = 102D BIT3  SW=0, LESS .05G
 0365   REF   21  LAST 1072    15,2376  7 0102 0                MASK    CM/FLAGS         SWITCH =1, GREATER THAN .05 G
 0366                          15,2377  0 0006 1                EXTEND
 0367   REF    1               15,2400  1 2466 0                BZF     EXDAP            IF G LESS THAN .05
 0368   REF  110  LAST 1068    15,2401  4 4770 1                CS      ONE              IF G GEQ  THAN .05
 0369   REF    6  LAST  797    15,2402  55'700 0                TS      CMDAPMOD         SAVE -1 FOR USE IN CM/RCS

 0370   REF   12  LAST 1074    15,2403  55'477 0                TS      AK1              TO ZERO PITCH AND YAW FDAI NEEDLES
 0371   REF   12  LAST 1022    15,2404  55'500 1                TS      AK2              IN ATM.  (MODE =-1)

 03713  REF    9  LAST 1073    15,2405  4 1701 1                CS      PREL             YAW ERROR = RREL - PREL TAN(ALFA)
 0372                          15,2406  0 0006 1                EXTEND
 0373   REF    2  LAST 1071    15,2407  7 2626 0                MP      SINTRIM          LET SIN(-20) BE APPROX FOR TAN(-20)
 0374   REF    8  LAST 1073    15,2410  6 1703 1                AD      RREL
 0375   REF    1               15,2411  0 2456 1                TC      20/SOZ           GO TEST DZ. GET TAG: +0 IF IN DZ
 0376   REF  242  LAST 1071    15,2412  50 000 1                INDEX   A                +/- 1 IF NOT
 0377   REF    1               15,2413  3 2631 1                CAF     YJETCODE

 0378   REF   20  LAST 1072    15,2414  55'720 1                TS      JETEM

R0379       START PITCH AUTOPILOT HERE.  RATE DAMPING ONLY.

 0380   REF    8  LAST 1073    15,2415  3 1702 0                CA      QREL
 0381   REF    2  LAST 1074    15,2416  0 2456 1                TC      20/SOZ
 0382   REF  243  LAST 1074    15,2417  50 000 1      EXDAPIN   INDEX   A                COME HERE FROM EX ATM DAP
 0383   REF    1               15,2420  3 2634 1                CAF     P/RJCODE
 0384   REF   21  LAST 1074    15,2421  27'720 1                ADS     JETEM            COMBINE ALL NEW BITS.

 0385                          15,2422  0 0006 1                EXTEND                   DOES NOT REQUIRE SAVING OLD CODES.
 0386   REF   3  LAST 1065   15,2423  01 005 0          WRITE  PYJETS           SET PYCHAN TO DESIRED BIT CONFIG.

 0387   REF   4  LAST 1066   15,2424  11'711 0          CCS    JETAG
 0388   REF   1              15,2425  0 2645 1          TC     CM/RCS
 0389   REF   1              15,2426  0 3325 0          TC     CM/FDAI
 0390   REF   1              15,2427  0 3332 0          TC     CM/FDAIR -1      (JETAG=-1 EQUIVALENT TO CMDAPMOD=+1)
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P0391   DEAD ZONE LOGIC USED BY ENTRY DIGITAL AUTOPILOTS.

 0392   REF 244  LAST 1074   15,2430  10 000 0  3DDZ      CCS     A                  YAWLIM=1.0-3/180=16384-273=16111
 0393   REF   1              15,2431  6 2624 0            AD      YAWLIM
 0394   REF   1              15,2432  1 2462 1            TCF     DZCOM
 0395   REF   2  LAST 1076   15,2433  6 2624 0            AD      YAWLIM
 0396   REF   1              15,2434  1 2463 0            TCF     DZNOCOM

A0397                                                                  BIASED DZ FOR EXT ATM DAP.
 0398   REF   1              15,2435  55'624 1  BIASEDZ   TS      JETEM2             SAVE RATE/180. ERROR/180 IS IN L.
 0399   REF 245  LAST 1076   15,2436  10 000 0            CCS     A                  START ERROR DZ.
 0400   REF   1              15,2437  4 2623 0            CS      CM/BIAS            = .6/180
 0401                        15,2440  1 2442 0            TCF     +2
 0402   REF   2  LAST 1076   15,2441  3 2623 1            CA      CM/BIAS
 0403   REF 103  LAST 1065   15,2442  6 0001 0            AD      L                  BIAS THE ERROR.
 0404   REF 183  LAST 1065   15,2443  22 002 0            LXCH    Q                  SAVE CALLERS RETURN ADDRESS.
 0405   REF   1              15,2444  0 2430 1            TC      3DDZ               GO GENERATE THE ERROR BIT.
 0406   REF 104  LAST 1076   15,2445  52 002 1            DXCH    L                  BIT TO L, RESTORE CALLERS Q.
 0407   REF   2  LAST 1076   15,2446  11'624 1  4D/SDZ    CCS     JETEM2             CAME HERE IN EXT ATM. C(L) = ERROR BIT
 0408   REF   1              15,2447  6 2621 0            AD      4D/SLIM            IF RATE GEQ 4D/S, SET L=0 AND TAKE
 0409                        15,2450  1 2452 1            TCF     +2                 JET BITS ACCORDING TO SGN OF RATE.
 0410   REF   2  LAST 1076   15,2451  6 2621 0            AD      4D/SLIM
 0411   REF 246  LAST 1076   15,2452  54 000 0            TS      A
 0412                        15,2453  1 2455 0            TCF     +2                 RATE OK. CONTINUE
 0413                        15,2454  22 007 0            ZL                         RATE GEQ 4 D/S. OVER RIDE ERROR BIT
 0414   REF   3  LAST 1076   15,2455  57'624 0            XCH     JETEM2             AND CONTINUE TO GET SIGN.

 0415   REF 247  LAST 1076   15,2456  10 000 0  2D/SDZ    CCS     A                  COME HERE TO TEST IF A WITHIN 2DEG/S DZ
 0416   REF   1              15,2457  6 2622 0            AD      YDOTLIM            1.0 - YDOT DZ        ( OR PDOT)
 0417                        15,2460  1 2463 0            TCF     +3
 0418   REF   2  LAST 1076   15,2461  6 2622 0            AD      YDOTLIM            YDOT DZ = 2 DEG/SEC
 0419                        15,2462  4 0000 0  DZCOM     COM
 0420   REF  22  LAST 1074   15,2463  55'721 0  DZNOCOM   TS      JETEM  +1          GENERATE TAG, SET C(A)= -+1 OUTSIDE DZ
 0421   REF 194  LAST 1071   15,2464  3 4772 1            CA      ZERO               SET C(A) = +0 INSIDE
 0422   REF 184  LAST 1076   15,2465  0 0002 0            TC      Q
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P0423              EXTRA ATMOSPHERIC DIGITAL AUTOPILOT

R0424              1.    IF ABS(CALF) -C(45) POS, USE                             IF CALFA POS, CMDAPMOD= +0
R0426                 BETA:   YAW ERROR = SGN(CALF) (BETACOM -BETA)               IF CALFA NEG, CMDAPMOD =-0
R0428                                RATE = BETADOT                               IF CMDAPMOD =-0, RATE =  RREL
R0430                              R-AXIS = CONTROL

R0431                 ROLL:   RCLL ERROR = SGN(CALF) (ROLLC - ROLL)               IF CMDAPMOD = -0, RATE DAMP ONLY.
R0433                                RATE = PREL
R0434                              P-AXIS = CONTROL

R0435              2.    IF C(45) GEQ CALFA GEQ -C(45), USE                       CMDAPMOD = +1
R0437                 BETA:   ROLL ERROR = SGN(-SALF) (BETACOM -BETA)
R0438                                RATE = BETADOT
R0439                              P-AXIS = CONTROL

R0440                 ROLL:   YAW ERROR = SGN(SALF) (ROLLC -ROLL)                 RATE DAMP ONLY.
R0442                                RATE = RREL
R0443                              R-AXIS = CONTROL

R0444              3.    FOR ALL CASES , USE
R0445                 ALFA:   PITCH ERROR = (ALFACOM - ALFA)
R0446                                RATE = QREL
R0447                              Q-AXIS = CONTROL

R0448

 0449   REF   7 LAST 1074   15,2466  55'700 0  EXDAP      TS      CMDAPMOD         +0 FOR NOW
 0453   REF   3 LAST 1073   15,2467  11'506 1             CCS     CALFA
 0454   REF   1             15,2470  6 2625 1             AD      C45LIM           =1.0-COS(45)
 0455                       15,2471  1 2473 1             TCF     +2
 0456   REF   2 LAST 1077   15,2472  6 2625 1             AD      C45LIM
 0457   REF 248 LAST 1076   15,2473  54 000 0             TS      A
 0458   REF   1             15,2474  1 2555 1             TCF     EXDAP2           HERE IF ABS(CALFA) L  COS(45)

 04582  REF   4 LAST 1077   15,2475  11'506 1             CCS     CALFA            |CALFA| > 0.707
 04583                      15,2476  1 2477 0             TCF     +1               CONTINUE IF POS; GO TO EXDAP4 IF NEG.

 0459   REF   4 LAST 1066   15,2477  11'727 0             CCS     P63FLAG          VALID VALUES ARE:  -1, +1, +0.
 0460   REF   1             15,2500  0 2513 1             TC      EXDAP4
 0461                       15,2501  0 2503 0             TC      +2
 0462   REF   2 LAST 1077   15,2502  0 2513 1             TC      EXDAP4
 0463   REF  93 LAST 1064   15,2503  0 5402 1             TC      PHASCHNG         SINGLE PASS THROUGH HERE.
 0464                       15,2504   40334 1             OCT     40334
 04645 *REF   1             01,2170            4P33SPT1 =       4.33SPOT
 0465   REF 111 LAST 1074   15,2505  4 4770 1             CS      ONE
 0466   REF   5 LAST 1077   15,2506  55'727 0             TS      P63FLAG          SET FLAG TO ASSURE SINGLE PASS.
 0467   REF   1             15,2507  3 2620 1             CA      NSEC
 0468   REF  26 LAST 1068   15,2510  0 5233 0             TC      WAITLIST
 0469   REF  35 LAST 1072   E6,1661                       EBANK=  AOG
 0470   REF   2  LAST  233   15,2511   02375 1            2CADR   WAKEP62          CALL TO TERMINATE P62 IN N SEC.
 0470                        15,2512   54066 0
A0471                                                                              65 DEG/ 3DEG/SEC = 21 SEC NOMINAL
A0472                                                                              TRANSIT TIME FROM ALFA=45 TO ALFA TRIM.

 0473   REF   5  LAST 1075   15,2513  11'711 0  EXDAP4    CCS     JETAG            ROLLJET INTERFACE TEST BETWEEN .1 SEC
 0474   REF   1              15,2514  1 2522 1            TCF     EXDAP3           DAP AND THE 2 SEC CM/RCS DAP
 0475   REF   2  LAST 1078   15,2515  1 2522 1            TCF     EXDAP3
 0476   REF 195  LAST 1076   15,2516  3 4772 1            CA      ZERO
 0477                        15,2517  0 0006 1            EXTEND                   TURN OFF ROLL JETS IF ON AND WAIT
 0478   REF   3  LAST 1065   15,2520  01 006 0            WRITE   ROLLJETS         UNTIL START  OF 2 SEC CM/RCS CYCLE
 0479   REF   6  LAST 1078   15,2521  55'711 0            TS      JETAG            RESTORE PROPER VALUE +0

A0480                                                                    ROLL FDAI WILL BE IN ERROR UNTIL NEXT CM/RCS CALL.
 0481   REF   5  LAST 1077   15,2522  11'506 1  EXDAP3    CCS     CALFA            HERE IF ABS(CALFA) GEQ COS(45)
 0482   REF   2  LAST 1074   15,2523  3 1573 1            CA      RAXERR           C()= BETACOM - BETA/180
 0483   REF   1              15,2524  1 2530 1            TCF     EXDAP1
 0484   REF 196  LAST 1078   15,2525  4 4772 0            CS      ZERO
 0485   REF   8  LAST 1077   15,2526  55'700 0            TS      CMDAPMOD         FOR CM/RCS
 0486   REF   3  LAST 1078   15,2527  4 1573 0            CS      RAXERR           COMPLEMENT OF YAW ERROR.
 0487   REF   4  LAST 1078   15,2530  55'573 0  EXDAP1    TS      RAXERR           FOR YAW FDAI
 0488   REF  13  LAST 1074   15,2531  55'500 1            TS      AK2              WANT RAXERR FOR TM.
 0489   REF 105  LAST 1076   15,2532  54 001 1            TS      L
 0490   REF   9  LAST 1078   15,2533  11'700 0            CCS     CMDAPMOD         COORDINATE BETA CONTROL.
 0491                        15,2534  0 2537 1            TC      +3               C(CMDAPMOD) CAN BE +1, +0, OR -0.
 0492   REF 112  LAST 1077   15,2535  3 4770 0            CA      ONE              USE BETADOT TO COORD IN MODE +0
 0493   REF 249  LAST 1077   15,2536  50 000 1            INDEX   A                OTHERWISE USE RREL.
 0494   REF   9  LAST 1074   15,2537  3 1703 1            CA      RREL
 0495   REF   1              15,2540  0 2435 1            TC      BIASEDZ          GO TEST DZ. +0 IF IN DZ, +-1 OTHERWISE
A0496                                                                              IF GEQ 4D/S, SET ERROR BIT IN L =0)
 0497                        15,2541  0 0006 1            EXTEND
 0498   REF  12  LAST 1016   15,2542  04 001 1            ROR     LCHAN            L HAS BETA BIT
 0499   REF 250  LAST 1078   15,2543  50 000 1            INDEX   A
 0500   REF   2  LAST 1074   15,2544  3 2631 1            CAF     YJETCODE
 0501   REF  23  LAST 1076   15,2545  55'720 1            TS      JETEM

 0502   REF   3  LAST 1074   15,2546  3 1572 0            CA      QAXERR           ALFA ERROR.
 0503   REF 106  LAST 1078   15,2547  54 001 1            TS      L
 0504   REF   9  LAST 1074   15,2550  3 1702 0            CA      QREL             FOR ALFADOT USE QREL
 0505   REF   2  LAST 1078   15,2551  0 2435 1            TC      BIASEDZ
 0506                        15,2552  0 0006 1            EXTEND
 0507   REF  13  LAST 1078   15,2553  04 001 1            ROR     LCHAN
 0508   REF   1              15,2554  1 2417 0            TCF     EXDAPIN          CONTINUE ON IN DAP

 0509   REF  10  LAST 1078   15,2555  25'700 1  EXDAP2    INCR    CMDAPMOD         SET CMDAPMOD TO +1

 0510   REF 113  LAST 1078   15,2556  4 4770 1            CS      ONE              INDICATE CHANGE FROM .1 SEC UPDATE TO
 0511   REF   7  LAST 1078   15,2557  55'711 0            TS      JETAG            TO 2 SEC FOR ROLL JETS.( IF CMDAPMOD
A0512                                                                              =0 AND JETAG =-1, QUENCHES JETS IF ON)
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L         CM ENTRY DIGITAL AUTOPILOT                                                          USER'S PAGE NO. 17       E6 53

 0513   REF   6  LAST 1077   15,2560  11'727 0              CCS     P63FLAG          IF FLAG WAS +1, SET =0.
 0514   REF   7  LAST 1079   15,2561  55'727 0              TS      P63FLAG
 0515                        15,2562  12 563 1              NOOP

 0516   REF   4  LAST 1073   15,2563  11'507 0              CCS     SALFA            BETA CONTROL WITH P JETS
 0517   REF   5  LAST 1078   15,2564  4 1573 0              CS      RAXERR           B()= BETACOM - BETA/180
 0518                        15,2565  1 2567 0              TCF     +2
 0519   REF   6  LAST 1079   15,2566  3 1573 1              CA      RAXERR
 0520   REF   5  LAST 1066   15,2567  55'713 1              TS      PAXERR1          TEMP SAVE.  ERROR/180
 0521                        15,2570  0 0006 1              EXTEND
 0522   REF   7  LAST 1067   15,2571  7 4753 0              MP      HALF             CM/FDAI EXPECTS ERROR/360.
 0523   REF   6  LAST 1079   15,2572  57'713 0              XCH     PAXERR1          ERROR/360 FOR FDAI, GET ERROR/180.
 0524   REF 107  LAST 1078   15,2573  54 001 1              TS      L
 0525   REF   5  LAST 1079   15,2574  11'507 0              CCS     SALFA
 0526   REF   4  LAST 1073   15,2575  4 1704 1              CS      BETADOT          USE BETADOT TO COORD IN MODE +1
 0527                        15,2576  0 2600 0              TC      +2
 0528   REF   5  LAST 1079   15,2577  3 1704 0              CA      BETADOT
 0529   REF   3  LAST 1078   15,2600  0 2435 1              TC      BIASEDZ
 0530                        15,2601  0 0006 1              EXTEND
 0531   REF  14  LAST 1078   15,2602  04 001 1              ROR     LCHAN
 0532   REF 251  LAST 1078   15,2603  50 000 1              INDEX   A
 0533   REF   2  LAST 1074   15,2604  3 2634 1              CAF     P/RJCODE         GET ROLL CODE
 0534                        15,2605  0 0006 1              EXTEND                   ROLL CONTROL WITH YAW JETS.
 0535   REF   4  LAST 1078   15,2606  01 006 0              WRITE   ROLLJETS         WE,LL SKIP REGULAR ROLL SYST

 0536   REF   3  LAST 1067   15,2607  3 1717 1              CA      ROLLHOLD         ROLL/180 AT CM/DAPON TIME.
 0537                        15,2610  0 0006 1              EXTEND
 0538   REF  10  LAST 1074   15,2611  21'664 0              MSU     ROLL/180         1,S COMPL, BUT SO WHATS A BIT.?
 0539   REF 108  LAST 1079   15,2612  54 001 1              TS      L                FORCE A LIMIT CYCLE IN YAW RATE.
 0540   REF   6  LAST 1079   15,2613  11'507 0              CCS     SALFA
 0541   REF 109  LAST 1079   15,2614  3 0001 0              CA      L                TO REMOVE ITS BIASING EFFECT ON M DOT.
 0542   REF   2  LAST 1078   15,2615  0 2530 0              TC      EXDAP1
 0543   REF 110  LAST 1079   15,2616  4 0001 1              CS      L
 0544   REF   3  LAST 1079   15,2617  0 2530 0              TC      EXDAP1

 0545                        15,2620   04064 1  NSEC        DEC     2100             65 DEG/ 3 DEG/SEC
A0546                                                                    IF NSEC IS CHANGED, REMEMBER TO CHANGE 4.33SPOT.
 0547                        15,2621   37734 0  4D/SLIM     DEC     16348            1.0 -4/180 D/S = 4/1800 EXP 14
 0548                        15,2622   37756 1  YDOTLIM     DEC     16366            =1.0 - YDOT DZ= 16384 -18
A0549                                                                                YDOT DZ = YDOT TC00/180 = 2/1800 EXP 14

 0550                        15,2623   00067 0  CM/BIAS     DEC     55               =.6/180 B14  = 55
 0551                        15,2624   37267 0  YAWLIM      DEC     16055            YAWLIM=1.0-3.6/180=16384-329=16055
 0552                        15,2625   11277 0  C45LIM      DEC     .29289           =1.0-COS(45)
R0553
 05531                       15,2626   65033 1  SINTRIM     DEC     - .34202         SIN(-20)      (FOR NOMINAL L/D = .3)
 05532                       15,2627   36044 1  COSTRIM     DEC      .93969          COS(-20)      (FOR NOMINAL L/D = .3)

R05534  TO MAKE DAP INSENSITIVE TO PITCH ERRORS DUE TO ACCUMULATED NAV ERRORS,USE NOMINAL VALUE (-20 DEG) FOR TRIM ALFA
R05536  USED DURING ATMOSPHERIC COORDINATION. OUTSIDE ATMOSPHERE, NAV ERRORS WILL BE SLIGHT, BUT ALFA CAN DIFFER GREATLY
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```
R05538  FROM TRIM, SO USE ON-BOARD ESTIMATES.

A0554                                                   JET CODE TABLES FOLLOW _

 0555                             15,2630   00120 1             OCTAL   00120             POS Y
 0556                             15,2631   00000 1  YJETCODE OCTAL   00000             RCS JET BITS
 0557                             15,2632   00240 1             OCTAL   00240             NEG Y
 0558                             15,2633   00005 1             OCTAL   00005             POS R JET BITS     ALSO POS P JET BITS
 0559                             15,2634   00000 1  P/RJCODE OCTAL   00000
 0560                             15,2635   00012 1             OCTAL   00012             NEG R              ALSO NEG P
```

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P0561   RCS       THIS SECTION IS ENTERED EACH 2 SEC BY WAITLIST CALL FOLLOWING A DELAY OF 1.2 SEC AFTER PIPUP.
R0563   THE TASK SETJTAG  SETS A FLAG IN  JETAG  TO SIGNIFY THAT ROLL UPDATE IS DUE.  IN ROUGHLY 5 CS  BPDYRATE WILL BE
R0565   EXECUTED AND JETAG WILL CAUSE  CM/RCS  TO ACT ON ROLLC IMMEDIATELY THEREAFTER.   THE
R0567   TASK SAVES THE CALL TIME SO THAT CM/RCS CAN DETERMINE HOW MUCH OF THE 2 SEC INTERVAL REMAINS BEFORE THE
R0569   NEXT UPDATE.

 0570   REF  19  LAST 1068   15,2636  4 0025 1  SETJTAG  CS      TIME1              SAVE NOMINAL UPDATE TIME FOR SYNCH
 0571   REF   2  LAST  115   15,2637  55'712 0           TS      TUSED
A0572                                                                                THE 5 CS APPEARS IN TIMETST.
 0573   REF 114  LAST 1078   15,2640  3 4770 0           CA      ONE                RATHER THAN INCR, FOR SAFETY
 0574   REF   8  LAST 1078   15,2641  55'711 0           TS      JETAG              SET JETAG=1 TO CAUSE CM/RCS TO BE
 0575   REF  94  LAST 1077   15,2642  0 5402 1           TC      PHASCHNG
 0576                        15,2643   00001 0           OCT     00001

 0577   REF  52  LAST 1072   15,2644  0 5314 1           TC      TASKOVER           EXECUTED AFTER NEXT BODYRATE UPDATE

R0578   PREDICTIVE ROLL SYSTEM    ENTRY STEERING PROVIDES ROLL COMMAND IN LOC ROLLC. THE FOLLOWING CALCULATES THE
R0580   TRAJECTORY TO THE ORIGIN IN PHASE PLANE (X,V). PROGRAM ENTERS JET ON AND OFF CALLS INTO WTLST TO PRODUCE
R0582   THE DESIRED TRAJECTORY, ONLY THOSE CALLS WHICH CAN BE EXECUTED WITHIN THE INTERVAL T  (2 SEC) ARE ENTERED IN
R0584   WTLST, THE REMAINDER ARE RECONSIDERED AT NEXT UPDATE.

 0585   REF   4  LAST  203      4752            HALFPR   EQUALS NEG1/2 +1

A0586                                                                   CLEAR JETAG BEFORE TIMETST.  SET TO +0 TO SHOW
A0587                                                                   ROLL DAP CALLED. IN EVENT OF RESTART, BODYRATE
A0588                                                                   MAY MISS A CYCLE. CM/RCS WILL MISS A CYCLE ONLY
A0589                                                                   IF A RESTART OCCURS AFTER TIMETST COMMENCES.

 0590   REF 115  LAST 1081   15,2645  4 4770 1  CM/RCS   CS      ONE
 0591   REF   2  LAST  116   15,2646  55'617 1           TS      JNDX               SET NDX FOR POS ROLL, AND CHANGE LATER

 0592   REF   1              15,2647  4 5004 1           CS      2T/TCDU            ROLLDOT = DELAOG + DELAIG SINM =DELR
 0593                        15,2650  0 0006 1           EXTEND
 0594   REF  10  LAST 1074   15,2651  7 1701 1           MP      PREL               DELR/180 = RDOT TCDU/180 = RDOT/1800
 0595   REF 111  LAST 1079   15,2652  6 0001 0           AD      L                  -2 RDOT T/180 IN L
 0596   REF   2  LAST  116   15,2653  55'613 0           TS      -VT/180            SAVE -2VT/180 HERE

 0597   REF  11  LAST 1079   15,2654  4 1664 0           CS      ROLL/180
 0598   REF   9  LAST 1073   15,2655  54 021 0           TS      SR                 SAVE (-R/180) /2

 0599   REF  22  LAST 1074   15,2656  4 0102 0           CS      CM/FLAGS
 0600   REF   1              15,2657  7 4765 0           MASK    LATSWBIT           LATSW = 101D BIT4
 0601                        15,2660  0 0006 1           EXTEND                     ROLL OVER TOP $
 0602   REF   1              15,2661  1 2667 0           BZF     GETLCX             NO, TAKE SHORTEST PATH
 0603   REF  23  LAST 1081   15,2662  26 102 0           ADS     CM/FLAGS           YES, ENFORCE ROLL OVER TOP.. (BIT =0)
 0604   REF  15  LAST 1067   15,2663  3 1715 0           CA      ROLLC              (ROLLC/180) /2
 0605   REF  10  LAST 1081   15,2664  6 0021 1           AD      SR                 -(R/180) /2
 0606   REF   2  LAST  116   15,2665  57'614 0           XCH     LCX/360            DIFFERENT X REQD HERE. DISCONT AT 180.
 0607   REF   1              15,2666  1 2727 0           TCF     COMPAT             POSSIBLE OVFL ABOVE.
 0608   REF   3  LAST 1068   15,2667  3 4753 1  GETLCX    CA       POS1/2          FORM RCOM/360
 0609                        15,2670  6 0000 1            DOUBLE
 0610   REF  16  LAST 1081   15,2671  6 1715 0            AD       ROLLC
 0611   REF   3  LAST 1081   15,2672  57'614 0            XCH      LCX/360         IGNORE POSSIBLE OVFL.

 0612   REF  11  LAST 1081   15,2673  3 0021 1            CA       SR              FORM -R/360
 0613   REF   5  LAST 1081   15,2674  6 4751 0            AD       NEG1/2
 0614   REF   6  LAST 1082   15,2675  6 4751 0            AD       NEG1/2          IGNORE OVFL
 0615   REF   4  LAST 1082   15,2676  57'614 0            XCH      LCX/360         -R/360
 0616   REF   5  LAST 1082   15,2677  27'614 1            ADS      LCX/360         LCX/360 = RCOM/360 -R/360  RANGE (-1,1)

R0617   DOES SGN(-VT) (VT/180) (VT/180) (180/(4 A1 TT COSALFA)) + X/360 + SGN(X) / 2              OVFL   ?

 0619   REF   3  LAST 1081   15,2700  11'613 0            CCS      -VT/180         TAKE SHORTEST ANGULAR PATH
 0620   REF 116  LAST 1081   15,2701  6 4770 0            AD       ONE             (BASED ON SINGLE JET ACCELERATION)
 0621                        15,2702  1 2704 1            TCF      +2
 0622   REF 117  LAST 1082   15,2703  6 4770 0            AD       ONE
 0623                        15,2704  0 0006 1            EXTEND
 0624   REF   4  LAST 1082   15,2705  7 1613 0            MP       -VT/180         C(-VT/180) = -2 VT/180
 0625                        15,2706  0 0006 1            EXTEND
 0626   REF   1              15,2707  7 3375 1            MP       1/16A1          = 180/(16 A1 TT )
 0627                        15,2710  0 0006 1            EXTEND
 0628   REF   6  LAST 1078   15,2711  11'506 1            DV       CALFA
 0629   REF 112  LAST 1081   15,2712  54 0001 1           TS       L
 0630   REF   6  LAST 1082   15,2713  11'614 1            CCS      LCX/360
 0631   REF   4  LAST 1082   15,2714  3 4753 1            CAF      POS1/2
 0632                        15,2715  1 2717 0            TCF      +2
 0633   REF   5  LAST 1082   15,2716  4 4753 0            CS       POS1/2
 0634   REF   7  LAST 1082   15,2717  6 1614 0            AD       LCX/360         IS LCX/360 LESS THAN 180 DEG  $
 0635   REF 113  LAST 1082   15,2720  6 0001 0            AD       L
 0636   REF 114  LAST 1082   15,2721  54 0001 1           TS       L
 0637   REF   2  LAST 1081   15,2722  1 2727 0            TCF      COMPAT          YES, GO ON.
 0638   REF 252  LAST 1079   15,2723  50 0000 1 TRTAGXPI  INDEX    A               NO, SHIFT X BY - SGN(X) 2 PI
 0639   REF   1              15,2724  4 4752 1            CS       HALFPR          +A YIELDS -1/2
 0640                        15,2725  6 0000 1            DOUBLE
 0641   REF   8  LAST 1082   15,2726  27'614 1            ADS      LCX/360

 0642   REF   9  LAST 1082   15,2727  3 1614 0  COMPAT    CA       LCX/360         CORRECT FOR ASSUMED COORD TURN.
 0643                        15,2730  0 0006 1            EXTEND
 0644   REF   7  LAST 1082   15,2731  7 1506 1            MP       CALFA           COS ALFA
 0645   REF  10  LAST 1082   15,2732  55'614 1            TS       LCX/360         SCALED LCX OK HERE.

 0646   REF  11  LAST 1078   15,2733  11'700 0            CCS      CMDAPMOD        FOUR POSSIBILITIES HERE
 0647   REF   1              15,2734  0 3323 0            TC       DZCALL1         EXIT, SETTING JETAG=0.(C(A)=0)
A0648                                                                              ALL 3 AXES ALREADY DONE.
 0649                        15,2735  0 2736 1            TC       +1              G LESS THAN .05. CA POS. CONTINUE
 0650   REF  11  LAST 1082   15,2736  3 1614 0            CA       LCX/360         G GEQ .05. CONTINUE IN CM/RCS
 0651   REF  12  LAST 1082   15,2737  55'614 1            TS       LCX/360         CMDAPMOD=-0. DAMPING ONLY. SET LCX=0
 06511  REF  12  LAST 1027   15,2740  55'571 1            TS       ERRORZ          INITIAL ROLL ERROR (UNREFLECTED) FOR TM.
 0652   REF   7  LAST 1079   15,2741  55'713 1            TS       PAXERR1         SAVE LCX FOR FDAI AND EDIT.(  /360)
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L        CM ENTRY DIGITAL AUTOPILOT                                                    USER'S PAGE NO.  21       E6 S3

 0653    REF   5  LAST 1082   15,2742  3 1613 1             CA     -VT/180          GET - 2 VT/180
 0654    REF  12  LAST 1082   15,2743  54 021 0             TS     SR
 0655    REF  13  LAST 1083   15,2744  3 0021 1             CA     SR               GET -VT/180, LEAVE -VT/360 IN SR FOR DZ
 0656    REF   1              15,2745  55'570 0             TS     -VT/180E                         DIAGNOSTIC  ****
 0657    REF   6  LAST 1083   15,2746  57'613 1             XCH    -VT/180          NOW CONTENTS OF -VT/180 AS LABELED
 0658                         15,2747  0 0006 1             EXTEND
 0659    REF   7  LAST 1083   15,2750  7 1613 0             MP     -VT/180          B(A) = -2VT/180
 0660                         15,2751  0 0006 1             EXTEND
 0661    REF   1              15,2752  7 3375 1             MP     180/8ATT
 0662    REF   2  LAST  116   15,2753  55'616 0             TS     VSQ/4API

R0663     IS SGN(VT) ( (180/4A1 TT) VT/180 VT/180 - .5 BUFLIM/360 )  -X/360     - .5 BUFLIM/360   POS  ?

 0665                         15,2754  6 0000 1   WHICHALF DOUBLE                   FOR SECOND BURN,  A1
 0666                         15,2755  4 0000 0             COM
 0667    REF   1              15,2756  6 3401 1             AD     BUFLIM           =BUFLIM/(2 360)
 0668    REF 115  LAST 1082   15,2757  54 001 1             TS     L
 0669    REF   8  LAST 1083   15,2760  11'613 0             CCS    -VT/180
 0670    REF 116  LAST 1083   15,2761  4 0001 1             CS     L
 0671                         15,2762  1 2764 1             TCF    +2
 0672    REF 117  LAST 1083   15,2763  3 0001 0             CA     L
 0673    REF  13  LAST 1082   15,2764  6 1614 0             AD     LCX/360
 0674    REF   2  LAST 1083   15,2765  6 3401 1             AD     BUFLIM
 0675                         15,2766  0 0006 1             EXTEND
 0676    REF   1              15,2767  6 3004 0             BZMF   REFLECT          POINT (X,V) IN LHP.

R0677     IS SGN(VT) ( (180/4A1 TT) VT/180 VT/180 - .5 BUFLIM/360 )  -X/360     + .5 BUFLIM/360   NEG  ?

 0679                         15,2770  4 0000 0             COM
 0680    REF   3  LAST 1083   15,2771  6 3401 1             AD     BUFLIM
 0681    REF   4  LAST 1083   15,2772  6 3401 1             AD     BUFLIM
 0682                         15,2773  0 0006 1             EXTEND
 0683    REF   1              15,2774  6 3013 0             BZMF   DZ1              POINT (X,V) IN RHP.

R0684     IS POINT WITHIN VELOCITY DZ ?

 0685    REF   1              15,2775  4 4355 1             CS     VSQMIN           IS VSQ/4API - (VSQ/4API) MIN  NEG  ?
 0686    REF   3  LAST 1083   15,2776  6 1616 1             AD     VSQ/4API
 0687                         15,2777  0 0006 1             EXTEND
 0688    REF   1              15,3000  6 3305 1             BZMF   DZCALL           YES.

R0689           POINT IS IN BUFFER ZONE. THRUST TO X AXIS.

 0690    REF   3  LAST 1081   15,3001  4 1617 1             CS     JNDX
 0691    REF   2  LAST  117   15,3002  55'620 0             TS     JNDX1
 0692    REF   1              15,3003  0 3066 1             TC     OVRLINE1

 0699    REF   9  LAST 1083   15,3004  4 1613 0   REFLECT   CS     -VT/180          REFLECT LHP INTO RHP REL TO TERM CONTR
 0700    REF  10  LAST 1083   15,3005  55'613 0             TS     -VT/180
 0701    REF  14  LAST 1083   15,3006  54 021 0             TS     SR               -VT/360  SAVED FOR DZ.
 0702   REF  14  LAST 1083   15,3007  4 1614 1            CS      LCX/360
 0703   REF  15  LAST 1084   15,3010  55'614 1            TS      LCX/360
 0704   REF   4  LAST 1083   15,3011  4 1617 1            CS      JNDX
 0705   REF   5  LAST 1084   15,3012  55'617 1            TS      JNDX

R0706     IS VSQ/4API - (VSQ/4API) MIN  NEG   $

 0707   REF   2  LAST 1083   15,3013  4 4355 1  DZ1       CS      VSQMIN             IS VSQ/4API - (VSQ/4API) MIN  NEG  $
 0708   REF   4  LAST 1083   15,3014  6 1616 1            AD      VSQ/4API
 0709                        15,3015  0 0006 1            EXTEND
 0710   REF   1              15,3016  6 3020 0            BZMF    DZ2                YES, GO TEST FURTHER.
 0711   REF   1              15,3017  1 3025 1            TCF     MAXVTEST           NO

R0712     IS X/360 - XMIN/360 -VT/360  NEG  $

 0713   REF   1              15,3020  4 3377 0  DZ2       CS      XMIN/360           XMIN/360 = 4/360
 0714   REF  16  LAST 1084   15,3021  6 1614 0            AD      LCX/360
 0715   REF  15  LAST 1083   15,3022  6 0021 1            AD      SR                 C(SR) = -VT/360
 0716                        15,3023  0 0006 1            EXTEND                     IS X/360 - XMIN/360 -VT/360  NEG  $
 0717   REF   2  LAST 1083   15,3024  6 3305 1            BZMF    DZCALL             YES,IN DZ. EXIT SETTING JETAG=0.

R0718     IS  XD/360 - VM/360K - XS/360   POS   ?

 0719   REF   6  LAST 1084   15,3025  4 1617 1  MAXVTEST  CS      JNDX
 0720   REF   3  LAST 1083   15,3026  55'620 0            TS      JNDX1              NOW CAN SET JNDX1 FOR TON2 JETS.
 0721   REF   1              15,3027  4 3401 0            CS      XS/360             XS/360 = (XMIN -YMIN/K) /360
 0722   REF   5  LAST 1084   15,3030  6 1616 1            AD      VSQ/4API
 0723   REF  17  LAST 1084   15,3031  6 1614 0            AD      LCX/360
 0724   REF   2  LAST  116   15,3032  55'615 0            TS      XD/360             XD/360= X/360 +VSQ/4API    X INTERCEPT
A0725                                                                                BUT C(XD/360) = (XD - XS) /360
 0726   REF   1              15,3033  6 3400 0            AD      -VM/360K           X INTERCEPT FOR MAX V (VM)
 0727                        15,3034  4 0000 0            COM
 0728                        15,3035  0 0006 1            EXTEND
 0729   REF   1              15,3036  6 3044 1            BZMF    MAXVTIM1           YES, THRUST TO VM
 0730   REF   3  LAST 1084   15,3037  3 1615 1            CA      XD/360
 0731                        15,3040  0 0006 1            EXTEND
 0732   REF   1              15,3041  7 4753 0            MP      KTRCS
 0733                        15,3042  20 001 1            DDOUBL                     GO SAVE PREDICTED DRIFTING VELOCITY.

 0734   REF   1              15,3043  0 3047 1            TC      GETON1             INSURE THAT Q IS POS AS TAG.
 0735                        15,3044  0 0006 1  MAXVTIM1  EXTEND
 0736                        15,3045  22 007 0            ZQ                         SET +0 AS TAG
 0737   REF   1              15,3046  4 3400 1            CS      -VMT/180
 0738   REF   1              15,3047  55'567 0  GETON1    TS      VDT/180            VDT/180 OR VMT/180.
 0739   REF  11  LAST 1083   15,3050  6 1613 1            AD      -VT/180
 0740                        15,3051  6 0000 1            DOUBLE
 0741                        15,3052  0 0006 1            EXTEND
 0742   REF   2  LAST 1083   15,3053  7 3375 1            MP      180/8ATT
 0743   REF   2  LAST  117   15,3054  55'621 1            TS      TON1               TON1 / 4T
 0744                          15,3055  0 0006 1               EXTEND
 0745    REF   1               15,3056  6 3060 1               BZMF     OVRLINE
 0746    REF   1               15,3057  0 3072 1               TC       GETON2             RESET Q POS IF CAME FROM MAXVTIM1

 0747    REF 185  LAST 1076    15,3060  10 002 1  OVRLINE   CCS      Q
 0748    REF   2  LAST 1083    15,3061  1 3066 0            TCF      OVRLINE1
 0749    REF   4  LAST 1084    15,3062  3 1620 1  MAXVTIM2  CA       JNDX1              ABOVE VM, SO THRUST DOWN
 0750    REF   7  LAST 1084    15,3063  55'617 1            TS       JNDX
 0751    REF   3  LAST 1084    15,3064  4 1621 1            CS       TON1
 0752    REF   1               15,3065  1 3071 0            TCF      OVRLINE2 +1

 0753    REF  12  LAST 1084    15,3066  4 1613 0  OVRLINE1  CS       -VT/180            DRIFT AT V
 0754    REF   2  LAST 1084    15,3067  55'567 0            TS       VDT/180
 0755    REF 197  LAST 1078    15,3070  3 4772 1  OVRLINE2  CA       ZERO
 0756   *REF   4  LAST 1085    15,3071  55'621 1    +1      TS       TON1
 0757    REF   3  LAST 1085    15,3072  3 1567 1  GETON2    CA       VDT/180            VDT/180, OR VMT/180 OR VT/180
 0758                          15,3073  6 0000 1            DOUBLE
 0759                          15,3074  0 0006 1            EXTEND
 0760    REF   3  LAST 1084    15,3075  7 3375 1            MP       180/8ATT
 0761                          15,3076  6 0000 1            DOUBLE                      FOR SECOND BURN, A1
 0762    REF   2  LAST  116    15,3077  55'607 0            TS       TON2               = TON2 / 4T

 0763                          15,3100  4 0000 0            COM
 0764                          15,3101  0 0006 1            EXTEND
 0765    REF   1               15,3102  6 3106 0            BZMF     GETOFF
 0766    REF   3  LAST 1085    15,3103  55'607 0            TS       TON2
 07661   REF   8  LAST 1085    15,3104  3 1617 0            CA       JNDX
 07662   REF   5  LAST 1085    15,3105  55'620 0            TS       JNDX1

 0767    REF   4  LAST 1085    15,3106  4 1607 0  GETOFF    CS       TON2               TON2 / 4T
 0768                          15,3107  0 0006 1            EXTEND
 0769    REF   4  LAST 1085    15,3110  7 1567 0            MP       VDT/180            VDT/180, OR VT/180, OR VMT/180.
 0770    REF   4  LAST 1084    15,3111  55'615 0            TS       XD/360             USE AS TEMP
 0771    REF   5  LAST 1085    15,3112  4 1567 0            CS       VDT/180
 07711                         15,3113  0 0006 1            EXTEND
 07712   REF   1               15,3114  1 3130 1            BZF      TOFFOVFL           OMIT THE DIVIDE IF DEN = 0.
 0772    REF  13  LAST 1085    15,3115  6 1613 1            AD       -VT/180
 0773                          15,3116  0 0006 1            EXTEND
 0774    REF   5  LAST 1085    15,3117  7 1621 1            MP       TON1               TON1 /4T
 0775    REF   5  LAST 1085    15,3120  6 1615 1            AD       XD/360             TEMP = -VDT/180 / 2 TON2
 0776    REF  18  LAST 1084    15,3121  6 1614 0            AD       LOX/360
 0777                          15,3122  22 007 0            ZL
 0778    REF 118  LAST 1083    15,3123  56 001 0            XCH      L                  TEST THE DIVIDE
 0779                          15,3124  0 0006 1            EXTEND
 0780    REF   6  LAST 1085    15,3125  11'567 0            DV       VDT/180
 0781                          15,3126  0 0006 1            EXTEND
 0782    REF   1               15,3127  1 3132 0            BZF      GETOFF2            DIVIDE OK

 0787    REF   1               15,3130  3 5020 0  TOFFOVFL  CA       2JETT              OVFL, USE  2T  FOR CONVENIENCE.
 0788    REF   1               15,3131  1 3137 0            TCF      TIMSCAL
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  0796     REF 119  LAST 1085    15,3132  56 0010  GETOFF2  XCH     L                  GET NUMERATOR.
  0797                           15,3133  0 0006 1          EXTEND
  0798     REF   7  LAST 1085    15,3134  11'567 0          DV      VDT/180            C(A) = TOFF / 2T
  0799                           15,3135  0 0006 1          EXTEND
  0800     REF   2  LAST 1085    15,3136  7 5020 1          MP      2JETT
  0801     REF   2  LAST  116    15,3137  55'605 1  TIMSCAL TS      TOFF               IN CS

  0802     REF   1               15,3140  3 3376 0          CAF     4JETT
  0803                           15,3141  0 0006 1          EXTEND
  0804     REF   6  LAST 1085    15,3142  7 1621 1          MP      TON1               C(TON1) = TON1 / 4T
  0805     REF   7  LAST 1086    15,3143  55'621 1          TS      TON1                IN CS

  0806     REF   2  LAST 1086    15,3144  3 3376 0          CAF     4JETT
  0807                           15,3145  0 0006 1          EXTEND
  0808     REF   5  LAST 1085    15,3146  7 1607 0          MP      TON2               C(TON2) = TON2 / 4T
  0809     REF   6  LAST 1086    15,3147  55'607 0          TS      TON2               IN CS

  0810     REF 198  LAST 1085    15,3150  3 4772 1          CA      ZERO               CANNOT REDO AFTER TIMETST. TUSED GONE
  0811     REF   9  LAST 1081    15,3151  55'711 0          TS      JETAG              SET +0 TO SHOW ROLL DAP CALLED.

 A0812                                                                        CAUSE THE TM OF BODY RATES VIA UPBUFF TO BE
 A0813                                                                        INITIALIZED. ALSO CAUSE NEEDLES TO BE DONE ON NEXT
 A0814                                                                        AND ON ALTERNATE PASSES THROUGH CM/DUMPR.

  0815     REF 118  LAST 1082    15,3152  3 4770 0          CA      ONE
  0816     REF   2  LAST 1068    15,3153  54 305 0          TS      SW/NDX
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P0817    TIMETEST SECTION FOR RCS
R0818    ENTER WITH THREE TIME INTERVALS AND THE CORRESPONDING JET CODE INDEXES IN ERASEABLE LOCS TON1, TOFF, TON2, JNDX
R0820    JNDX1.  SECTION PROCESSES TIME INTERVALS FOR WTLST CALLS AND ASSURES THAT WTLST CALLS ARE MADE ONLY
R0822    (1) FOR POS INTERVALS GREATER THAN A SPECIFIED MINIMUM ( HERE CHOSEN AS  2 CS) AND
R0824    (2) FOR THE INTERVALS THAT WILL BE EXECUTED WITHIN THE TIME REMAINING IN THE SAMPLE INTERVAL T  (2 SEC).
R0826    TIMETST  ESTABLISHES 6 LOCS CONTAINING JET CODES AND CORRESPONDING TIME  INTERVALS. THUS: TON1, T1BITS,
R0828    TOFF, TBITS,  TON2, T2BITS.   OF THESE THE FIRST 2 LOCS ARE TEMPORARY, FOR IMMEDIATE ACTION, IN GENERAL.
R0830    SECTION JETCALL  BELOW PROCESSES THIS LIST.

  0831   REF  20  LAST 1081   15,3154  3 0025 0  TIMETST  CA      TIME1              CORRECT FOR POSSIBLE TIME1 OVFL.
  0832   REF   6  LAST 1082   15,3155  6 4753 1           AD      POS1/2
  0833   REF   7  LAST 1087   15,3156  6 4753 1           AD      POS1/2             OVFL GUARANTEED.
  0834   REF   3  LAST 1081   15,3157  27'712 0           ADS     TUSED              B(TUSED) =-TUSED =-OLTIME1

  0835   REF   1              15,3160  3 3374 1           CA      -T-3               =-T +2 -5  (SEE SETJTAG)
 A0836                                                                               THE +2 REQUIRED FOR PROPER BRANCH.
  0837   REF   4  LAST 1087   15,3161  27'712 0           ADS     TUSED              TUSED = TIME(K)-TIME(K-1)-T+2

  0838   REF  44  LAST 1042   15,3162  4 4767 1           CS      TWO                USE 2 SINCE TIME3 UNCERTAIN TO 1
  0839   REF   8  LAST 1086   15,3163  6 1621 0           AD      TON1
  0840                        15,3164  0 0006 1           EXTEND
  0841   REF   1              15,3165  6 3177 0           BZMF    TIMETST1
  0842   REF   9  LAST 1085   15,3166  51'617 0           INDEX   JNDX
  0843   REF   3  LAST 1079   15,3167  3 2634 1           CAF     P/RJCODE
  0844   REF   2  LAST  117   15,3170  55'622 1           TS      T1BITS

  0845   REF   9  LAST 1087   15,3171  3 1621 0           CA      TON1
  0846   REF   5  LAST 1087   15,3172  27'712 0           ADS     TUSED
  0847                        15,3173  0 0006 1           EXTEND
  0848   REF   1              15,3174  6 3201 1           BZMF    TOFFTEST
  0849   REF 199  LAST 1086   15,3175  3 4772 1           CA      ZERO
  0850   REF   1              15,3176  1 3232 0           TCF     TIMETST3
  0851   REF 119  LAST 1086   15,3177  4 4770 1  TIMETST1 CS      ONE
  0852   REF  10  LAST 1087   15,3200  55'621 1           TS      TON1
  0853   REF  45  LAST 1087   15,3201  4 4767 1  TOFFTEST CS      TWO
  0854   REF   3  LAST 1086   15,3202  6 1605 0           AD      TOFF
  0855                        15,3203  0 0006 1           EXTEND
  0856   REF   1              15,3204  6 3213 1           BZMF    TIMETST2
  0857   REF   4  LAST 1087   15,3205  3 1605 0           CA      TOFF
  0858   REF   6  LAST 1087   15,3206  27'712 0           ADS     TUSED
  0859                        15,3207  0 0006 1           EXTEND
  0860   REF   1              15,3210  6 3215 1           BZMF    TON2TEST
  0861   REF 200  LAST 1087   15,3211  3 4772 1           CA      ZERO
  0862   REF   1              15,3212  1 3234 0           TCF     TIMETST4
  0863   REF 120  LAST 1087   15,3213  4 4770 1  TIMETST2 CS      ONE
  0864   REF   5  LAST 1087   15,3214  55'605 1           TS      TOFF
  0865   REF  46  LAST 1087   15,3215  4 4767 1  TON2TEST CS      TWO
  0866   REF   7  LAST 1086   15,3216  6 1607 1           AD      TON2
  0867                        15,3217  0 0006 1           EXTEND
  0868   REF   1              15,3220  6 3235 0           BZMF    TIMETST5
 0869   REF   6  LAST 1085   15,3221  51'620 1            INDEX   JNDX1
 0870   REF   4  LAST 1087   15,3222  3 2634 1            CAF     P/RJCODE
 0871   REF   2  LAST  116   15,3223  55'610 0            TS      T2BITS
 0872   REF   8  LAST 1087   15,3224  3 1607 1            CA      TON2
 0873   REF   7  LAST 1087   15,3225  27'712 0            ADS     TUSED
 0874                        15,3226  0 0006 1            EXTEND
 0875   REF   1              15,3227  6 3237 1            BZMF    JETCALL1
 0876   REF 201  LAST 1087   15,3230  3 4772 1            CA      ZERO
 0877   REF   2  LAST 1087   15,3231  1 3236 1            TCF     TIMETST5 +1
 0878   REF  11  LAST 1087   15,3232  55'621 1  TIMETST3  TS      TON1
 0879   REF 121  LAST 1087   15,3233  4 4770 1            CS      ONE
 0880   REF   6  LAST 1087   15,3234  55'605 1  TIMETST4  TS      TOFF
 0881   REF 122  LAST 1088   15,3235  4 4770 1  TIMETST5  CS      ONE
 0882  *REF   9  LAST 1088   15,3236  55'607 0     +1     TS      TON2
R0883   SECTION  JETCALL  EXAMINES CONTENTS OF JET TIMES IN LIST, ESTABLISHES WTLST ENTRIES, AND EXECUTES CORRESPONDING
R0885   JET CODES. A POSITIVE NZ NUMBER IN A TIME REGISTER INDICATES THAT A WTLST CALL IS TO BE MADE, AND ITS JET BITS
R0887   EXECUTED. A +0 INDICATES THAT THE TIME INTERVAL DOES NOT APPLY, BUT THE  CORRESPONDING JET BITS ARE TO BE
R0889   EXECUTED. A NEG NUMBER INDICATES THAT THE TIME INTERVAL HAS BEEN PROCESSED. IN EVENT OF +0 OR -1, THE
R0891   SUBSEQUENT TIME REGISTER IS EXAMINED FOR POSSIBLE ACTION. THUS JET BITS TO BE EXECUTED MAY COME FROM MORE
R0893   THAN ONE REGISTER.

 0894   REF 202  LAST 1088   15,3237  3 4772 1  JETCALL1  CA      ZERO
 0895   REF   2  LAST  116   15,3240  55'611 1            TS      CUTTAG
 0896   REF   2  LAST  116   15,3241  55'612 1            TS      NUJET
 0897   REF   2  LAST  116   15,3242  55'606 1            TS      TBITS
 0898   REF  12  LAST 1088   15,3243  53'622 1            DXCH    TON1
 0899   REF 253  LAST 1082   15,3244  10 000 0            CCS     A
 0900   REF   1              15,3245  1 3262 0            TCF     JETCALL2         CALL WTLST
 0901   REF   3  LAST 1088   15,3246  23'612 0  JETCALL3  LXCH    NUJET            WTLST ENTRIES COME HERE FROM JETCALL
 0902   REF 123  LAST 1088   15,3247  4 4770 1            CS      ONE
 0903   REF   7  LAST 1088   15,3250  53'606 1            DXCH    TOFF
 0904   REF 254  LAST 1088   15,3251  10 000 0            CCS     A
 0905   REF   2  LAST 1088   15,3252  1 3262 0            TCF     JETCALL2         CALL WTLST
 0906   REF   4  LAST 1088   15,3253  23'612 0            LXCH    NUJET
 0907   REF 124  LAST 1088   15,3254  4 4770 1            CS      ONE
 0908   REF  10  LAST 1088   15,3255  53'610 0            DXCH    TON2
 0909   REF 255  LAST 1088   15,3256  10 000 0            CCS     A
 0910   REF   3  LAST 1088   15,3257  1 3262 0            TCF     JETCALL2         CALL WTLST
 0911   REF   5  LAST 1088   15,3260  23'612 0            LXCH    NUJET
 0912   REF   1              15,3261  0 3270 1            TC      JETACTN          C(A) = +0
 0913   REF 120  LAST 1086   15,3262  56 001 0  JETCALL2  XCH     L                SAVE JET BITS FOR AFTER WTLST CALL
 0914   REF   6  LAST 1088   15,3263  27'612 1            ADS     NUJET
 0915   REF 121  LAST 1088   15,3264  56 001 0            XCH     L
 0916   REF 125  LAST 1088   15,3265  6 4770 0            AD      ONE              RESTORE FOR CCS
 0917   REF  22  LAST 1064   15,3266  0 5223 1            TC      TWIDDLE
 0918   REF   1              15,3267   03276 1            ADRES   JETCALL
 0920   REF   7  LAST 1088   15,3270  3 1612 0  JETACTN   CA      NUJET            COME HERE WHEN DESIRED JET CODE IS KNOWN
 0921  *                     15,3271  0 0006 1     +1     EXTEND                   NO NEED TO SAVE OLD CODES
 0922   REF   5  LAST 1079   15,3272  01 006 0            WRITE   ROLLJETS         SET RCHAN TO NEW BIT CONFIG.
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  0923   REF   3  LAST 1088   15,3273  11'611 1            CCS     OUTTAG
  0924   REF  53  LAST 1081   15,3274  0 5314 1            TC      TASKOVER
  0925   REF   2  LAST 1075   15,3275  0 3333 1  ROLLDUMP  TC      CM/FDAIR

 A0926                                                              EDIT DUMP AT ABOVE LOCATION.

 R0927    WAITLIST ENTRIES COME HERE.

  0928   REF   4  LAST 1063   15,3276  3 4767 0  JETCALL   CAF     CM/DSBIT         CM/DSTBY = BIT2 103D
  0929   REF   4  LAST 1089   15,3277  55'611 1            TS      OUTTAG           SIGNIFY WTLST ENTRY
  0930   REF  24  LAST 1081   15,3300  7 0102 0            MASK    CM/FLAGS         IS SYSTEM DISABLED  $
  0931                        15,3301  0 0006 1            EXTEND
  0932   REF   2  LAST 1088   15,3302  1 3271 1            BZF     JETACTN +1       YES, QUENCH ROLL JETS,IF ON AND EXIT.
  0933                        15,3303  22 007 0            ZL                       NO, CONTINUE.
  0934   REF   1              15,3304  1 3246 0            TCF     JETCALL3         C(A) POS, C(L) =+0

 R0935     DEAD ZONE ENTRIES COME HERE.

  09351  REF  12  LAST 1082   15,3305  4 1700 0  DZCALL    CS      CMDAPMOD         POSSIBLE VALUES OF CMDAPMOD: -1, +0, -0.
  09352  REF  59  LAST 1060   15,3306  7 4770 1            MASK    BIT1
  09353  REF 122  LAST 1088   15,3307  54 001 1            TS      L                C(L)=0 FOR -0; C(L)=1 FOR -1 OR +0.
  09354  REF 256  LAST 1088   15,3310  50 000 1            INDEX   A                ERASBLE ORDER: ROLLTM,ROLLC,ROLLC +1.
  09355  REF   6  LAST 1074   15,3311  3 1714 1            CA      ROLLTM           GET ROLL/180 OR ROLLC  (/360).
  09356  REF 123  LAST 1089   15,3312  50 001 0            INDEX   L
  09357  REF 257  LAST 1089   15,3313  54 000 0            TS      A                IF C(L)=1, STORE 'ROLLC' IN 'L'.
  09358  REF 124  LAST 1089   15,3314  6 0001 0            AD      L                (BOTH MUST BE SCALED DEG/180)
  09359  REF   5  LAST 1074   15,3315  0 2151 0            TC      ANGOVCOR         C(A)=ROLL/180  OR  2 ROLLC  .
  0936   REF   4  LAST 1079   15,3316  55'717 0            TS      ROLLHOLD         IF CMDAPMOD =-0, SAVE ROLL ANGLE,
 A09361                                                                                    OTHERWISE, SAVE ROLL COMMAND.

  09362  REF 203  LAST 1088   15,3317  3 4772 1            CA      ZERO             COME HERE IF IN DZ, AND CANCEL JETS.
  0937                        15,3320  0 0006 1            EXTEND                   INHINT NOT NEEDED HERE.
  0938   REF   6  LAST 1088   15,3321  01 006 0            WRITE   ROLLJETS         TURN OFF ALL ROLL JETS.
  0939   REF   8  LAST 1086   15,3322  55'567 0            TS      VDT/180          SET =0 TO SHOW IN DEAD ZONE.
  0940   REF  10  LAST 1086   15,3323  55'711 0  DZCALL1   TS      JETAG            COME HERE WITH C(A)=0.
  0941   REF   1              15,3324  0 3275 1            TC      ROLLDUMP
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P0942    CM ENTRY FDAI DISPLAY

R0943   CALCULATE BY INTEGRATION THE ROLL ERROR BETWEEN THE 2 SEC CM/RCS UPDATES . DISPLAY ATTITUDE ERRORS AS FOLLOWS:
R0945             ATM DAP:    DISPLAY ONLY ROLL ATTITUDE ERROR.
R0946             EXT ATM DAP:    PRESENT 3 ATTITUDE ERRORS RELATIVE TO THE APPROPRIATE BODY AXES EACH .1 SEC.
R0948                                          ROLL    ROLLC-ROLL
R0949                                          PITCH   ALFAC-ALFA
R0950                                          YAW     BETAC-BETA

R0951   DURING ENTRY, THE FDAI NEEDLES HAVE FULL SCALE OF 67.5 DEG IN ROLL AND  16.875 DEG IN PITCH AND YAW.
R0953   THE SUBROUTINE  NEEDLER  EXPECTS (ANGLE/180) AND SCALES TO 16.875 DEG   FULL SCALE.

A0958                                                                   COME HERE EACH .1 SEC  (CMDAPMOD=+1 COMES BELOW)
 0959   REF   7  LAST 1074   15,3325  4 1705 0  CM/FDAI  CS      PHIDOT          INTEGRATE ROLL ERROR 'TWEEN 2SEC UPDATES
 0960                        15,3326  0 0006 1           EXTEND
 0961   REF   8  LAST 1082   15,3327  7 1506 1           MP      CALFA           FOR ASSUMED COORDINATION.
 0962                        15,3330  0 0006 1           EXTEND
 0963   REF   8  LAST 1079   15,3331  7 4753 0           MP      HALF
 0964  *REF   8  LAST 1082   15,3332  27'713 1     -1    ADS     PAXERR1         ROLL ERROR/360.    OVFL OK

A0965                                                                   EDIT DUMP AT ABOVE LOCATION.
 0966   REF   9  LAST 1090   15,3333  3 4753 1  CM/FDAIR CA      HALF
 0967                        15,3334  0 0006 1           EXTEND
 0968   REF   9  LAST 1090   15,3335  7 1713 1           MP      PAXERR1         FULL SCALE FOR FDAI (ROLL) IS 67.5 D
 0969   REF   1              15,3336  55'476 1           TS      PAXERR          .25 (ROLL ERROR/180) FOR FDAI NEEDLE.

A0970                                                                   PROGRAM TO FILE BODY  RATES FOR TM ON ONE PASS AND
A0971                                                                   TO UPDATE THE NEEDLE DISPLAY ON THE NEXT.
A0972                                                                   SYNCHRONIZATION WITH CM/RCS IS USED SO THAT THE TM
A0973                                                                   IS DONE WITH THE ROLL SYSTEM AND NEEDLES START ON
A0974                                                                   THE SUBSEQUENT PASS.
A0975

 0976   REF   3  LAST 1086   15,3337  4 0305 0  CM/DUMPR CS      SW/NDX          COMBINED ALTERNATION SWITCH AND FILE
 09761  REF   4  LAST 1090   15,3340  54 305 0           TS      SW/NDX
 0977                        15,3341  0 0006 1           EXTEND                  INDEX.
 0978   REF   1              15,3342  6 3346 0           BZMF    CMTMFILE        FILE STARTS WITH SW/NDX +1 AND GOES TO
A0979                                                                            ENDBUF.
A0980                                                                            INDEX IS POS FOR NEEDLES

 0981   REF  36  LAST 1012   15,3343  0 4714 1           TC      IBNKCALL
 0982   REF   9  LAST 1007   15,3344    42425 1          CADR    NEEDLER

 0983   REF   1              15,3345  0 3364 0           TC      CM/END

A0984                                                                            INDEX IS NEG FOR TM FILE

 0985   REF  41  LAST 1056   15,3346  6 6214 0  CMTMFILE AD      THREE
 0986                        15,3347  0 0006 1           EXTEND
 0987   REF   1              15,3350  6 3354 0           BZMF    SAVENDX
 0988   REF  21  LAST 1087   15,3351  3 0025 0            CA      TIME1              INITIALIZE THE TM LIST IN UPBUFF.
 0989   REF   3  LAST   73   15,3352  54 304 1            TS      CMTMTIME
 0990   REF   3  LAST  879   15,3353  4 4776 1            CS      THIRTEEN            INITIALIZE COUNTER
 0991   REF   5  LAST 1090   15,3354  54 305 0  SAVENDX   TS      SW/NDX             A NEGATIVE NUMBER.
 0992                        15,3355  0 0006 1            EXTEND
 0993   REF  11  LAST 1081   15,3356  3 1702 0            DCA     PREL
 0994   REF   6  LAST 1091   15,3357  50 305 1            INDEX   SW/NDX
 0995   REF   2  LAST   73   15,3360  52 324 0            DXCH    ENDBUF -1
 0996   REF  10  LAST 1078   15,3361  3 1703 1            CA      RREL
 0997   REF   7  LAST 1091   15,3362  50 305 1            INDEX   SW/NDX
 0998   REF   3  LAST 1091   15,3363  54 325 1            TS      ENDBUF +1

 0999   REF   3  LAST 1073   15,3364  3 1623 1  CM/END    CA      CM/SAVE
 1000   REF  16  LAST 1084   15,3365  54 021 0            TS      SR
A1001                                                                     DOES NOT PROTECT TEMK, SQ IN SPSIN/COS

 1002                        15,3366  0 0006 1            EXTEND
 1003   REF   1              15,3367  3 3373 0            DCA     T5IDLER2
 1004   REF  24  LAST 1072   15,3370  52 113 0            DXCH    T5LOC
 1005   REF  44  LAST 1061   15,3371  0 5323 0            TC      RESUME

 1006   REF  25  LAST 1091      0112                      EBANK=  T5LOC
 1007   REF   5  LAST 1069   15,3372    03226 1  T5IDLER2 2CADR   T5IDLOC
 1007                        15,3373    12060 1
A1008                                                                     DEFINE THE FOLLOWING 170 REGISTERS IN UPBUFF TO BE
A1009                                                                     USED TO TELEMETER CM VEHICLE BODY RATE INFORMATION.
A1010                                                                     THE INFORMATION IS FILED EACH 0.2 SEC, GIVING 150
A1011                                                                     DATA POINTS EACH 1 SEC.  TM LIST IS READ TWICE
A1012                                                                     EACH 2 SECONDS.

A1013                                                                     THE SEQUENCE IS:    SP TIME         INITIAL TIME
A1014                                                                                         SWITCH           ALSO INDEX.
A1015                                                                                         P                ROLL RATE
A1016                                                                                         Q                PITCH RATE
A1017                                                                                         R                YAW RATE
A1018                                                                                         ETC.

A1019                                               CMTMTIME =     UPBUFF
A1020                                               SW/NDX   =     UPBUFF   +1
A1021                                               ENDBUF   =     UPBUFF   +160
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P10211  SPACER

R1022   CONSTANTS USED IN THE ROLL CONTROL SYSTEM:
R1023   CONSTANTS ARE THE FOLLOWING: A = 9.1 DEG/SECSQ, VM = 20 DEG/SEC,          T = 2 SEC,  TCDU = .1 SEC,
R1025   XMIN = 4 DEG, VMIN = 2 DEG/SEC, K = .25, A1 = 4.55 DEG/SECSQ,           VI = 1 DEG/SEC, INTERCEPT WITH DZ SIDE
R1027   XBUF = 4 DEG

 1028                      15,3374   77464 1  -T-3       DEC     -203              CS
A1029                                         VSQMIN     DEC     .61050061 E-3     VSQ MIN/4 A PI = 4/(4  (9.1)  180)
 10295  REF   1               4355            VSQMIN     =       OCT12
 1030   REF   8  LAST  564    5004            2T/TCDU    =       OCT50             T/TCDU  EXP-14   TCDU =.1SEC
 1031                      15,3375   23617 0  180/8ATT   DEC     .61813187         180/(8  (9.1) 4)=(180/ATT)  EXP -3
 1032   REF   2  LAST 1084 15,3400            -VMT/180   =       -VM/360K          = 20  (2) / 180
 1033   REF   3  LAST  589    5020            2JETT      =       4SECS             CS              2 (2) 100   INTEGER
 1034                      15,3376   01440 0  4JETT      DEC     800               CS              4 (2) 100   INTEGER
 1035                      15,3377   00266 0  XMIN/360   DEC     182               XMIN/360 = 4/ 360  EXP 14  = 182 INTEGER
 1036                      15,3400   70706 1  -VM/360K   DEC     -.22222222        =-20/( 360  (.25))
 1037   REF   4  LAST 1065 15,3375            1/16A1     =       180/8ATT
A10371                                                                    1/16A1  = 180/(16 A1 TT)
A1038                                                                             =180/(16  4.55  4)
 1039                      15,3401   00133 0  XS/360     DEC     91                =(XMIN +VI (T-1/K))/360 = 2/360 EXP 14
 1040   REF   2  LAST 1084 15,3401            BUFLIM     =       XS/360            4/(2  360)

 1041   REF  10  LAST 1090    4753            KTRCS      =       HALF              KT = (.25) 2 = .5

*** END OF ULYSSES .029 ***
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L       DOWN-TELEMETRY PROGRAM                                                    USER'S PAGE NO.   1      E0 S3

R0001   PROGRAM NAME- DOWN TELEMETRY PROGRAM
R0002   MOD NO.- 0         TO COMPLETELY REWRITE THE DOWN TELEMETRY PROGRAM AND DOWNLINK ERASABLE DUMP PROGRAM FOR THE
R0004                      PURPOSE OF SAVING APPROXIMATELY 150 WORDS OF CORE STORAGE.
R0006                      THIS CHANGE REQUIRES AN ENTIRELY NEW METHOD OF SPECIFYING DOWNLINK LISTS.REFER TO DOWNLINK
R0008                      LISTS LOG SECTION FOR MORE DETAILS. HOWEVER THIS CHANGE WILL NOT AFFECT THE GROUND PROCESSING
R0010                      OF DOWN TELEMETRY DATA.
R0011   MOD BY-  KILROY, SMITH, DEWITT
R00115  MOD BY - DENSMORE - JUNE 1969 - ELIMINATE ERASABLE DUMP COUNT
R0012   DATE-     02OCT67
R0013   AUTHORS- KILROY, SMITH, DEWITT, DEWOLF, FAGIN
R0014   LOG SECTION- DOWN-TELEMETRY PROGRAM
R0015   FUNCTIONAL DESCRIPTION- THIS ROUTINE IS INITIATED BY TELEMETRY END
R0016           PULSE FROM THE DOWNLINK TELEMETRY CONVERTER. THIS PULSE OCCURS
R0017           AT 50 TIMES PER SEC(EVERY 20 MS) THEREFORE DODOWNTM IS
R0018           EXECUTED AT THESE RATES. THIS ROUTINE SELECTS THE APPROPRIATE
R0019           AGC DATA TO BE TRANSMITTED DOWNLINK AND LOADS IT INTO OUTPUT
R0020           CHANNELS 34 AND 35. THE INFORMATION IS THEN GATED OUT FROM THE
R0021           LGC IN SERIAL FASHION.
R0022           THIS PROGRAM IS CODED FOR A 2 SECOND DOWNLIST. SINCE DOWNRUPTS
R0023           OCCUR EVERY 20MS AND 2 AGC COMPUTER WORDS CAN BE PLACED IN
R0024           CHANNELS 34 AND 35 DURING EACH DOWNRUPT THE PROGRAM IS CAPABLE
R0025           OF SENDING 200 AGC WORDS EVERY 2 SECONDS.
R0026   CALLING SEQUENCE- NONE
R0027           PROGRAM IS ENTERED VIA TCF DODOWNTM WHICH IS EXECUTED AS A
R0028           RESULT OF A DOWNRUPT. CONTROL IS RETURNED VIA TCF RESUME WHICH
R0029           IN EFFECT IS A RESUME.
R0030   SUBROUTINES CALLED- NONE
R0031   NORMAL EXIT MODE- TCF RESUME
R0032   ALARM OR ABORT EXIT MODE- NONE
R0033   RESTART PROTECTION:
R0034           ON A FRESH START AND RESTART THE 'STARTSUB' SUBROUTINE WILL INITIALIZE THE DOWNLIST POINTER(ACTUALLY
R0036           DNTMGOTO) TO THE BEGINNING OF THE CURRENT DOWNLIST(I.E. CURRENT CONTENTS OF DNLSTADR). THIS HAS THE
R0038           EFFECT OF IGNORING THE REMAINDER OF THE DOWNLIST WHICH THE DOWN-TELEMETRY PROGRAM WAS WORKING ON WHEN
R0040           THE RESTART(OR FRESH START) OCCURRED AND RESUME DOWN TELEMETRY FROM THE BEGINNING OF THE CURRENT
R0042           DOWNLIST.
R0043           ALSO OF INTEREST IS THE FACT THAT ON A RESTART THE AGC WILL ZERO DOWNLINK CHANNELS 13, 34 AND 35.
R0047   DOWNLINK LIST SELECTION:
R0048           THE APPROPRIATE DOWNLINK LISTS ARE SELECTED BY THE FOLLOWING:
R0049           1. FRESH START
R0050           2. V37EXXE  WHERE XX = THE MAJOR MODE BEING SELECTED.
R0051           3. UPDATE PROGRAM(P27)
R0052           4.     NON-V37 SELECTABLE TYPE PROGRAMS(E.G. AGS INITIALIZATION(SUNDANCE,LUMINARY) AND P61-P62
R00522                 TRANSITION(COLOSSUS) ETC.).
R00525  DOWNLINK LIST RULES AND LIMITATIONS:
R00526          READ SECTION(S) WHICH FOLLOW 'DEBRIS' WRITEUP.
R0053   OUTPUT-  EVERY 2 SECONDS 100 DOUBLE PRECISION WORDS(I.E. 200 LGC
R0054           COMPUTER WORDS) ARE TRANSMITTED VIA DOWNLINK.
R0055   ERASABLE INITIALIZATION REQUIRED- NONE
R0056           'DNTMGOTO' AND 'DNLSTADR' ARE INITIALIZED BY THE FRESH START PROGRAM.
R0058   DEBRIS(ERASABLE LOCATIONS DESTROYED BY THIS PROGRAM)-
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R0059             LDATALST,DNTMBUFF TO DNTMBUFF +21D,TMINDEX,DNQ.
R0060
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R0065   DODOWNTM IS ENTERED EVERY 20 MS BY AN INTERRUPT TRIGGERED BY THE
R0066   RECEIPT OF AN ENDPULSE FROM THE SPACECRAFT TELEMETRY PROGRAMMER.

R0067   NOTES REGARDING DOWNLINK LISTS ASSOCIATED WITH THIS PROGRAM:
R0068   1. DOWNLISTS. - DOWNLISTS MUST BE COMPILED IN THE SAME BANK AS THE
R0069      DOWN-TELEMETRY PROGRAM. THIS IS DONE FOR EASE OF CODING, FASTER
R0070      EXECUTION.
R0075   2. EACH DOWNLINK LIST CONSISTS OF A CONTROL LIST AND A NUMBER OF
R0076      SUBLISTS.
R0077   3. A SUBLIST REFERS TO A SNAPSHOT OR DATA COMMON TO THE SAME OR OTHER
R0078      DOWNLINK LISTS.  ANY SUBLIST CONTAINING COMMON DATA NEEDS TO BE
R0079      CODED ONLY ONCE FOR THE APPLICABLE DOWNLINK LISTS.
R0080   4. SNAPSHOT SUBLISTS REFER SPECIFICALLY TO HOMOGENOUS DATA WHICH MUST BE
R0081      SAVED IN A BUFFER DURING ONE DOWNRUPT.
R0082   5. THE 1DNADR FOR THE 1ST WORD OF SNAPSHOT DATA IS FOUND AT THE END
R0083      OF EACH SNAPSHOT SUBLIST, SINCE THE PROGRAM CODING SENDS THIS DP WORD
R0084      IMMEDIATELY AFTER STORING THE OTHERS IN THE SNAPSHOT BUFFER.
R0085   6. ALL LISTS ARE COMBINATIONS OF CODED ERASABLE ADDRESS CONSTANTS
R0086      CREATED FOR THE DOWNLIST PROGRAM.
R0087      A. 1DNADR                1-WORD DOWNLIST ADDRESS.
R0088           SAME AS ECADR, BUT USED WHEN THE WORD ADDRESSED IS THE LEFT
R0089           HALF OF A DOUBLE-PRECISION WORD FOR DOWN TELEMETRY.
R0090      B. 2DNADR - 6DNADR       N-WORD DOWNLIST ADDRESS, N = 2 - 6.
R0091           SAME AS 1DNADR, BUT WITH THE 4 UNUSED BITS OF THE ECADR FORMAT
R0092           FILLED IN WITH 0001-0101.  USED TO POINT TO A LIST OF N DOUBLE-
R0093           PRECISION WORDS, STORED CONSECUTIVELY, FOR DOWN TELEMETRY.
R0094      C. DNCHAN                DOWNLIST CHANNEL ADDRESS.
R0095           SAME AS 1DNADR, BUT WITH PREFIX BITS 0111.  USED TO POINT TO
R0096           A PAIR OF CHANNELS FOR DOWN TELEMETRY.
R0097      D. DNPTR                 DOWN TELEMETRY SUBLIST POINTER.
R0098         SAME AS CAF BUT TAGGED AS A CONSTANT. USED IN CONTROL LIST TO POINT TO A SUBLIST.
R0100         CAUTION--- A DNPTR CANNOT BE USED IN A SUBLIST.
R0101   7. THE WORD ORDER CODE IS SET TO ZERO AT THE BEGINNING OF EACH DOWNLIST (I.E. CONTROL LIST) AND WHEN
R0103      A '1DNADR TIME2' IS DETECTED IN THE CONTROL LIST(ONLY).
R0104   8. IN THE SNAPSHOT SUBLIST ONLY, THE DNADR'S CANNOT POINT TO THE FIRST WORD OF ANY EBANK.

R0106   DOWNLINK LIST RESTRICTIONS:
R0107     (THE FOLLOWING POINTS MAY BE LISTED ELSEWHERE BUT ARE LISTED HERE SO  IT IS CLEAR THAT THESE THINGS CANNOT BE
R0109     DONE)

R0110   1. SNAPSHOT DOWNLIST:
R0111     (A) CANNOT CONTAIN THE FOLLOWING ECADRS(I.E. 1DNADR'S): 0, 400, 1000, 1400, 2000, 2400, 3000, 3400.
R0113     (B) CAN CONTAIN ONLY 1DNADR'S

R0114   2. ALL DOWNLINKED DATA(EXCEPT CHANNELS) IS PICKED UP BY A <DCA<SO DOWNLINK LISTS CANNOT CONTAIN THE
R0116      EQUIVALENT OF THE FOLLOWING ECADRS(I.E. 1DNADRS): 377, 777, 1377, 1777, 2377, 27777, 3377, 3777.

R0118      (NOTE: THE TERM EQUIVALENT ' MEANT THAT THE 1DNADR  TO 6DNADR  WILL BE PROCESSED LIKE 1 TO 6 ECADRS)

R0120   3. CONTROL LISTS AND SUBLISTS CANNOT HAVE ENTRIES = OCTAL 00000 OR OCTAL 77777
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R0122    4. THE '1DNADR TIME2' WHICH WILL CAUSE THE DOWNLINK PROGRAM TO SET THE WORDER CODE TO 3 MUST APPEAR IN THE
R0124       CONTROL SECTION OF THE DOWNLIST.

R0125    5. 'DNCHAN 0' CANNOT BE USED.

R0126    6. 'DNPTR 0' CANNOT BE USED.

R0127    7. DNPTR CANNOT APPEAR IN A SUBLIST.

R0128


R0129    EBANK SETTINGS
R0130             IN THE PROCESS OF SETTING THE EBANK(WHEN PICKING UP DOWNLINK DATA) THE DOWN TELEMETRY PROGRAM PUTS
R0132             'GARBAGE' INTO BITS15-12 OF EBANK. HUGH BLAIR-SMITH WARNS US THAT BITS15-12 OF EBANK MAY BECOME
R0134             SIGNIFICANT SOMEDAY IN THE FUTURE. IF/WHEN THAT HAPPENS, THE PROGRAM SHOULD INSURE(BY MASKING ETC.)
R0136             THAT BITS15-12 OF EBANK ARE ZERO.
R0137    INITIALIZATION REQUIRED- TO INTERRUPT CURRENT LIST AND START A NEW ONE..
R0138         1.  ADRES OF DOWNLINK LIST INTO DNLSTADR
R0139         2.  NEGONE INTO SUBLIST
R0140         3.  NEGONE INTO DNECADR

 0143    REF   7  LAST 1037       4000                            SETLOC FFTAG12
 0144                             4621                            BANK

 0145    REF  25  LAST  189       0337                            EBANK= DNTMBUFF

 0146    REF   1                                                  COUNT* $$/DPROG
 0147    REF  21  LAST 1073       4621  54 016 1    DODOWNTM TS      BANKRUPT
 0148                             4622   0 0006 1                 EXTEND
 0149    REF  17  LAST 1073       4623  22 012 1                  QXCH    QRUPT                SAVE Q
 0150    REF  33  LAST 1056       4624   3 4762 0                 CA      BIT7                 SET WORD ORDER CODE TO 1. EXCEPTION- AT
 01503                            4625   0 0006 1                 EXTEND
 01504   REF  13  LAST 1061       4626  02 013 1                  RAND    CHAN13
 01505   REF 258  LAST 1089       4627  10 000 0                  CCS     A
 01506   REF   3  LAST  271       4630   0 0334 0                 TC      DNTMGOTO
 015065  REF   5  LAST 1061       4631   0 4542 0                 TC      C13STALL
 01507   REF  34  LAST 1096       4632   3 4762 0                 CA      BIT7
 0151                             4633   0 0006 1                 EXTEND                       THE BEGINNING OF EACH LIST THE WORD
 0152    REF  14  LAST 1096       4634  05 013 0                  WOR     CHAN13               CODE WILL BE SET BACK TO 0.
 0153    REF   4  LAST 1096       4635   0 0334 0                 TC      DNTMGOTO             GO TO APPROPRIATE PHASE OF PROGRAM

 01535   REF   2  LAST  179   05,2000                             SETLOC DOWNTELM
 01536                        05,3446                             BANK

 01538   REF   1                                                  COUNT* $$/DPROG
 0154    REF  16  LAST  974   05,3446  3 7702 0    DNPHASE1 CA      NEGONE               INITIALIZE ALL CONTROL WORDS
 0155    REF   1              05,3447 54 336 0                 TS      SUBLIST              WORDS TO MINUS ONE
 0156    REF   1              05,3450 54 335 0                 TS      DNECADR
 0157    REF   1              05,3451  3 3574 1                CA      LDNPHAS2             SET DNTMGOTO =0 ALL SUBSEQUENT DOWNRUPTS
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0158  REF   5  LAST 1096  05,3452  54 334 1               TS      DNTMGOTO       GO TO DNPHASE2
0159  REF   1             05,3453   1 3467 0               TCF     NEWLIST
0160  REF   2  LAST 1096  05,3454  10 335 0  DNPHASE2      CCS     DNECADR        SENDING OF DATA IN PROGRESS
0161  REF   1             05,3455   0 3607 0  DODNADR       TC      FETCH2WD       YES - THEN FETCH THE NEXT 2 SP WORDS
0162  REF  33  LAST  837  05,3456    77753 0  MINTIME2-1DNADR TIME2               NEGATIVE OF TIME2 1DNADR
0163                      05,3457   1 3460 1               TCF     +1             (ECADR OF  3776 + 74001 = 77777)

0164  REF   2  LAST 1096  05,3460  10 336 0               CCS     SUBLIST        IS THE SUBLIST IN CONTROL
0165  REF   1             05,3461   1 3622 0               TCF     NEXTINSL       YES
0166                      05,3462    74001 0  DNADRDCR      OCT     74001          DNADR COUNT AND ECADR DECREMENTER

0167  REF   1             05,3463   3 0333 1  CHKLIST       CA      CTLIST
0168                      05,3464   0 0006 1               EXTEND
0169  REF   2  LAST 1097  05,3465   6 3467 1               BZMF    NEWLIST        IT WILL BE NEGATIVE AT END OF LIST
0170  REF   1             05,3466   1 3474 1               TCF     NEXTINCL
0171  REF   8  LAST  795  05,3467  50 332 0  NEWLIST       INDEX   DNLSTCOD
0172  REF   1             05,3470   3 2362 1               CA      DNTABLE        INITIALIZE CTLIST WITH
0173  REF   2  LAST 1097  05,3471  54 333 0               TS      CTLIST           STARTING ADDRESS OF NEW LIST
0174  REF   9  LAST 1097  05,3472   4 0332 1               CS      DNLSTCOD
0175  REF   1             05,3473   1 3711 1               TCF     SENDID +3
0177  REF   3  LAST 1097  05,3474  50 333 1  NEXTINCL      INDEX   CTLIST
0178                      05,3475   3 0000 1               CA      L
0179  REF 259  LAST 1096  05,3476  10 000 0               CCS     A
0180  REF   4  LAST 1097  05,3477  24 333 1               INCR    CTLIST         SET POINTER TO PICK UP NEXT CTLIST WORD
0181                      05,3500   1 3504 1               TCF     +4             ON NEXT ENTRY TO PROG. (A SHOULD NOT =0)
0182  REF   5  LAST 1097  05,3501  56 333 1               XCH     CTLIST         SET CTLIST TO NEGATIVE AND PLACE(CODING)
0183                      05,3502   4 0000 0               COM                    UNCOMPLEMENTED DNADR INTO A.     (FOR LA)
0184  REF   6  LAST 1097  05,3503  56 333 1               XCH     CTLIST                                          (ST IN )
0185  REF 260  LAST 1097  05,3504  24 000 1   +4           INCR    A                                               (CTLIST)
0186  REF   3  LAST 1097  05,3505  54 335 0               TS      DNECADR        SAVE DNADR
0187  REF   1             05,3506   6 3456 0               AD      MINTIME2       TEST FOR TIME2 (NEG. OF ECADR)
0188  REF 261  LAST 1097  05,3507  10 000 0               CCS     A
0189  REF   1             05,3510   1 3514 0               TCF     SETWO +1       DON'T SET WORD ORDER CODE
0190                      05,3511    47777 0  MINB1314      OCT     47777          MINUS BIT 13 AND 14  (CAN'T GET HERE)
0191  REF   2  LAST 1097  05,3512   1 3514 0               TCF     SETWO +1       DON'T SET WORD ORDER CODE
0192  REF   1             05,3513   0 3536 1  SETWO         TC      WOZERO         GO SET WORD ORDER CODE TO ZERO.
0193  REF   4  LAST 1097  05,3514   3 0335 1   +1           CA      DNECADR        RELOAD A WITH THE DNADR.
0194  REF   1             05,3515   6 3511 1   +2           AD      MINB1314       IS THIS A REGULAR DNADR?
0195                      05,3516   0 0006 1               EXTEND
0196  REF   2  LAST 1097  05,3517   6 3607 0               BZMF    FETCH2WD       YES. (A MUST NEVER BE ZERO)
0197  REF   1             05,3520   6 7674 0               AD      MINB12         NO- IS IT A POINTER (DNPTR) OR A
0198                      05,3521   0 0006 1               EXTEND                     CHANNEL(DNCHAN)
0199  REF   1             05,3522   6 3545 0               BZMF    DODNPTR        IT'S A POINTER. (A MUST NEVER BE ZERO)

0200                      05,3523   0 0006 1  DODNCHAN      TC      6              (EXECUTED AS EXTEND) IT S A CHANNEL
0201  REF   5  LAST 1097  05,3524  50 335 1               INDEX   DNECADR
0202                      05,3525  44'000 1               INDEX   0 -4000        (EXECUTED AS READ)
0203  REF 125  LAST 1089  05,3526  54 001 1               TS      L
0204                      05,3527   0 0006 1               TC      6              (EXECUTED AS EXTEND)
0205  REF   6  LAST 1097  05,3530  50 335 1               INDEX   DNECADR
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 0206                           05,3531  43'777 1            INDEX   0 -4001             (EXECUTED AS READ)
 0207   REF   7  LAST 1097      05,3532  54 335 0            TS      DNECADR             SET DNECADR
 0208   REF  17  LAST 1096      05,3533  3 7702 0            CA      NEGONE                  TO MINUS
 0209   REF   8  LAST 1098      05,3534  56 335 1            XCH     DNECADR                      WHILE PRESERVING A.
 0210   REF   1                 05,3535  1 3635 0            TCF     DNTMEXIT            GO SEND CHANNELS

 0211                           05,3536  0 0006 1  WOZERO    EXTEND
 02113  REF  28  LAST 1014      05,3537  22 070 0            QXCH    RUPTREG1
 02115  REF   6  LAST 1096      05,3540  0 4542 0            TC      C13STALL
 02117  REF  35  LAST 1096      05,3541  4 4762 1            CS      BIT7
 0212                           05,3542  0 0006 1            EXTEND
 0213   REF  15  LAST 1096      05,3543  03 013 0            WAND    CHAN13              SET WORD ORDER CODE TO ZERO
 0214   REF  29  LAST 1098      05,3544  0 0070 0            TC      RUPTREG1            RETURN TO CALLER

 0215   REF   9  LAST 1098      05,3545  50 335 1  DODNPTR   INDEX   DNECADR             DNECADR CONTAINS ADRES OF SUBLIST
 0216                           05,3546  0 0000 1            0       0                   CLEAR AND ADD LIST ENTRY INTO A.
 0217   REF 262  LAST 1097      05,3547  10 000 0            CCS     A                   IS THIS A SNAPSHOT SUBLIST
 0218   REF  10  LAST 1098      05,3550  3 0335 1            CA      DNECADR             NO, IT IS A REGULAR SUBLIST.
 0219   REF   1                 05,3551  1 3621 0            TCF     DOSUBLST            A MUST NOT BE ZERO.

 0220   REF  11  LAST 1098      05,3552  56 335 1            XCH     DNECADR             YES, IT IS A SNAPSHOT SUBLIST.
 0221   REF   3  LAST 1097      05,3553  54 336 0            TS      SUBLIST             C(DNECADR) INTO SUBLIST
 0222   REF 204  LAST 1089      05,3554  3 4772 1            CAF     ZERO                      A    INTO    A
 0223   REF   3  LAST   74      05,3555  56 335 1            XCH     TMINDEX             (NOTE.. TMINDEX = DNECADR)

R0224   THE FOLLOWING CODING (FROM SNAPLOOP TO SNAPEND)IS FOR THE PURPOSE OF TAKING A SNAPSHOT OF 12 DP REGISTERS.
R0226   THIS IS DONE BY SAVING 11 DP REGISTERS IN DNTMBUFF AND SENDING THE FIRST DP WORD IMMEDIATELY.
R0228   THE SNAPSHOT PROCESSING IS THE MOST TIME CONSUMING AND THEREFORE THE CODING AND LIST STRUCTURE WERE DESIGNED
R0230   TO MINIMIZE TIME. THE TIME OPTIMIZATION RESULTS IN RULES UNIQUE TO THE SNAPSHOT PORTION OF THE DOWNLIST.
R0232   THESE RULES ARE.......
R0233                1.    ONLY 1DNADR'S CAN APPEAR IN THE SNAPSHOT SUBLIST
R0234                2.    THE 1DNADR'S CANNOT REFER TO THE FIRST LOCATION IN ANY  BANK.

 0236   REF  26  LAST  905      05,3556  54 003 0  SNAPLOOP  TS      EBANK               SET EBANK
 0237   REF   3  LAST  384      05,3557  7 4350 1            MASK    LOW8                ISOLATE RELATIVE ADDRESS
 0238                           05,3560  0 0006 1            EXTEND
 0239   REF 263  LAST 1098      05,3561  5 0000 1            INDEX   A
 0240                           E3,1401                      EBANK=  1401
 0241                           05,3562  3 1402 0            DCA     1401                PICK UP 2 SNAPSHOT WORDS.
 0242   REF  26  LAST 1096         0337                      EBANK=  DNTMBUFF
 0243   REF   4  LAST 1098      05,3563  50 335 1            INDEX   TMINDEX
 0244   REF  27  LAST 1098      05,3564  52 340 1            DXCH    DNTMBUFF            STORE 2 SNAPSHOT WORDS IN BUFFER
 0245   REF   5  LAST 1098      05,3565  24 335 1            INCR    TMINDEX             SET BUFFER INDEX FOR NEXT 2 WORDS.
 0246   REF   6  LAST 1098      05,3566  24 335 1            INCR    TMINDEX
 0247   REF   4  LAST 1098      05,3567  24 336 1  SNAPAGN   INCR    SUBLIST             SET POINTER TO NEXT 2 WORDS OF SNAPSHOT
 0248   REF   5  LAST 1098      05,3570  50 336 1            INDEX   SUBLIST
 0249                           05,3571  0 0000 1            0       0                   = CA SSSS (SSSS = NEXT ENTRY IN SUBLIST)
 0250   REF 264  LAST 1098      05,3572  10 000 0            CCS     A                   TEST FOR LAST TWO WORDS OF SNAPSHOT.
 0251   REF   1                05,3573  1 3556 0            TCF      SNAPLOOP         NOT LAST TWO.
 0252   REF   1                05,3574   03454 1  LDNPHAS2 GENADR   DNPHASE2
 0253   REF   6  LAST 1098     05,3575  54 336 0            TS       SUBLIST          YES, LAST.  SAVE A.
 0254   REF  18  LAST 1098     05,3576  3 7702 0            CA       NEGONE           SET DNECADR AND
 0255   REF  12  LAST 1098     05,3577  54 335 0            TS       DNECADR              SUBLIST POINTERS
 0256   REF   7  LAST 1099     05,3600  56 336 1            XCH      SUBLIST                  TO NEGATIVE VALUES.
 0257   REF  27  LAST 1098     05,3601  54 003 0            TS       EBANK
 0258   REF   4  LAST 1098     05,3602  7 4350 1            MASK     LOW8
 0259                          05,3603  0 0006 1            EXTEND
 0260   REF 265  LAST 1098     05,3604  5 0000 1            INDEX    A
 0261                          E3,1401                      EBANK=   1401
 0262                          05,3605  3 1402 0            DCA      1401             PICK UP FIRST 2 WORDS OF SNAPSHOT.
 0263   REF  28  LAST 1098        0337                      EBANK=   DNTMBUFF
 0264   REF   2  LAST 1098     05,3606  1 3635 0  SNAPEND   TCF      DNTMEXIT             NOW GO SEND THEM.

 0265   REF  13  LAST 1099     05,3607  3 0335 1  FETCH2WD  CA       DNECADR
 0266   REF  28  LAST 1099     05,3610  54 003 0            TS       EBANK            SET EBANK
 0267   REF   5  LAST 1099     05,3611  7 4350 1            MASK     LOW8             ISOLATE RELATIVE ADDRESS
 0268   REF 126  LAST 1097     05,3612  54 001 1            TS       L
 0269   REF   1                05,3613  3 3462 1            CA       DNADRDCR         DECREMENT COUNT AND ECADR
 0270   REF  14  LAST 1099     05,3614  26 335 0            ADS      DNECADR
 0271                          05,3615  0 0006 1            EXTEND
 0272   REF 127  LAST 1099     05,3616  5 0001 0            INDEX    L
 0273                          E3,1400                      EBANK=   1400
 0274                          05,3617  3 1401 0            DCA      1400             PICK UP 2 DATA WORDS
 0275   REF  29  LAST 1099        0337                      EBANK=   DNTMBUFF
 0276   REF   3  LAST 1099     05,3620  1 3635 0            TCF      DNTMEXIT             NOW GO SEND THEM.

 0277   REF   8  LAST 1099     05,3621  54 336 0  DOSUBLST  TS       SUBLIST          SET SUBLIST POINTER
 0278   REF   9  LAST 1099     05,3622  50 336 1  NEXTINSL  INDEX    SUBLIST
 0279                          05,3623  0 0000 1            0                         = CA SSSS (SSSS = NEXT ENTRY IN SUBLIST)
 0280   REF 266  LAST 1099     05,3624  10 000 0            CCS      A                IS IT THE END OF THE SUBLIST
 0281   REF  10  LAST 1099     05,3625  24 336 1            INCR     SUBLIST          NO-
 0282                          05,3626  1 3632 1            TCF      +4
 0283   REF  11  LAST 1099     05,3627  54 336 0            TS       SUBLIST          SAVE A.
 0284   REF  19  LAST 1099     05,3630  3 7702 0            CA       NEGONE           SET SUBLIST TO MINUS
 0285   REF  12  LAST 1099     05,3631  56 336 1            XCH      SUBLIST          RETRIEVE A.
 0286   REF 267  LAST 1099     05,3632  24 000 1    +4      INCR     A
 0287   REF  15  LAST 1099     05,3633  54 335 0            TS       DNECADR          SAVE DNADR
 0288   REF   3  LAST 1097     05,3634  1 3515 1            TCF      SETWO +2         GO USE COMMON CODING(PROBLEMS WOULD
A0289                                                                                 OCCUR IF THE PROGRAM ENCOUNTERED A
A0290                                                                                 DNPTR NOW)

 0291                          05,3635  0 0006 1  DNTMEXIT  EXTEND                    DOWN-TELEMETRY EXIT
 0292   REF   1                05,3636  01 034 1            WRITE    DNTM1            TO SEND A + L TO CHANNELS 34 + 35
 0293   REF 128  LAST 1099     05,3637  3 0001 0            CA       L                RESPECTIVELY
 0294                          05,3640  0 0006 1  TMEXITL   EXTEND
 0295   REF   1                05,3641  01 035 0            WRITE    DNTM2
 0296   REF  45  LAST 1091     05,3642  1 5323 1  TMRESUME  TCF      RESUME           EXIT TELEMETRY PROGRAM VIA RESUME.
 0297  REF   2  LAST  393     7674              MINB12   EQUALS -1/8
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R0301   SUBROUTINE NAME- DNDUMP
R0302   FUNCTIONAL DESCRIPTION - TO SEND (DUMP) ALL 8 BANKS OF ERASABLE STORAGE TWICE.  BANKS ARE SENT ONE AT A TIME
R0304            EACH BANK IS PRECEEDED BY AN ID WORD, SYNCH BITS, ECADR AND TIME1 FOLLOWED BY THE 256D WORDS OF EACH
R0306            EBANK. EBANKS ARE DUMPED IN ORDER(I.E. EBANK 0 FIRST, THEN EBANK1 ETC.)
R0308   CALLING SEQUENCE- THE GROUND OR ASTRONAUT BY KEYING V74E CAN INITIALIZE THE DUMP.
R0310            AFTER KEYING IN V74E THE CURRENT DOWNLIST WILL BE IMMEDIATELY TERMINATED AND THE DOWNLINK ERASABLE DUMP
R0312            WILL BEGIN.
R0313            ONCE INITIATED THE DOWNLINK ERASABLE DUMP CAN BE TERMINATED (AND INTERRUPTED DOWNLIST REINSTATED) ONLY
R0315            BY THE FOLLOWING:
R0316             1. A FRESH START
R0317             2. COMPLETION OF BOTH COMPLETE DUMPS
R0320             3. AND INVOLUNTARILY BY A RESTART.
R0321   NORMAL EXIT MODE- TCF DNPHASE1
R0322   ALARM OR ABORT MODE- NONE
R0323   *SUBROUTINES CALLED- NONE.
R0324   ERASABLE INITIALIZATION REQUIRED-
R0325            NONE
R0328   DEBRIS- DUMPLOC, DUMPSW, DNTMGOTO, EBANK AND CENTRAL REGISTERS
R0329   TIMING-   TIME(IN SECS) = ((NO.DUMPS)*(NO.EBANKS)* (WDSPEREBANK + NO.IDWDS)) / NO.WDSPERSEC
R0331             TIME(IN SECS) =   (   4    )*(    8    )* (    256     +     4   )    /     100
R0333        THUS TIME(IN SECS TO SEND DUMP OF ERASABLE 4 TIMES VIA DOWNLINK) = 83.2 SECONDS

R0335   STRUCTURE OF ONE EBANK AS IT IS SENT BY DOWNLINK PROGRAM-
R0336      (REMINDER-THIS ONLY DESCRIBES ONE OF THE 8 EBANKS X 4 (DUMPS) = 32 EBANKS WHICH WILL BE SENT BY DNDUMP)
R0338           DOWNLIST                                  W
R0339            WORD   TAKEN FROM CONTENTS OF    EXAMPLE O  COMMENTS

R0340               1   ERASID                     0177X  0  DOWNLIST I.D. FOR DOWNLINK ERASABLE DUMP (X=7 CSM, 6 LM)
R0342               2   LOWIDCOD                   77340  1  DOWNLINK SYNCH BITS.(SAME ONE USED IN ALL OTHER DOWNLISTS)
R0344               3   DUMPLOC                    13400  1  (SEE NOTES ON DUMPLOC)1= 3RD ERAS DUMP, 3400=ECADR OF 5TH WD
R0346               4   TIME1                      14120  1  TIME IN CENTISECONDS
R0347               5   FIRST WORD OF EBANK X      03400  1  IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1400 (ECADR 3400)
R0349               6   2ND   WORD OF EBANK X      00142  1  IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1401 (ECADR 3401)
R0351               7   3RD   WORD OF EBANK X      00142  1  IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1402 (ECADR 3402)
R0353               .                                     1
R0354               .                                     1
R0355               .                                     1
R0356              260D 256TH WORD OF EBANK X      03777  1  IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1777 (ECADR 3777)

R0358   NOTE- DUMPLOC CONTAINS THE COUNTER AND ECADR FOR EACH WORD BEING SENT.
R0359         THE BIT STRUCTURE OF DUMPLOC IS FOLLOWS---
R0360                                           X = NOT USED
R0361             X ABC EEE RRRRRRRR          ABC = ERASABLE DUMP COUNTER(I.E. ABC = 0,1,2 OR 3 WHICH MEANS THAT
R0363                                               COMPLETE ERASABLE DUMP NUMBER  1,2,3 OR 4 RESPECTIVELY IS IN PROGRESS)
R0365                                         EEE = EBANK BITS
R0366                                    RRRRRRRR = RELATIVE ADDRESS WITHIN AN EBANK.

  0368  REF 205  LAST 1098  05,3643  3 4772 1  DNDUMPI  CA     ZERO            INITIALIZE DOWNLINK
  0369  REF   1             05,3644  54 335 0           TS     DUMPLOC         ERASABLE DUMP
  0370  REF   2  LAST 1097  05,3645  0 3706 0   +2      TC     SENDID          GO SEND ID AND SYNCH BITS
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0371   REF   1                05,3646  3 3655 1              CA      LDNDUMP1          SET DNTMGOTO
0372   REF   6  LAST 1097     05,3647  54 334 1              TS      DNTMGOTO          TO LOCATION FOR NEXT PASS
0373   REF  22  LAST 1091     05,3650  3 0025 0              CA      TIME1             PLACE TIME1
0374   REF 129  LAST 1099     05,3651  56 001 0              XCH     L                 INTO L
0375   REF   2  LAST 1101     05,3652  3 0335 1              CA      DUMPLOC           AND ECADR OF THIS EBANK INTO A
0376   REF   4  LAST 1099     05,3653  1 3635 0              TCF     DNTMEXIT          SEND DUMPLOC AND TIME1

0377   REF   1                05,3654   03656 1  LDNDUMP   ADRES   DNDUMP
0378   REF   1                05,3655   03670 0  LDNDUMP1  ADRES   DNDUMP1

0379   REF  47  LAST 1087     05,3656  3 4767 0  DNDUMP    CA      TWO               INCREMENT ECADR IN DUMPLOC
0380   REF   3  LAST 1102     05,3657  26 335 0            ADS     DUMPLOC           TO NEXT DP WORD TO BE
0381   REF   6  LAST 1099     05,3660  7 4350 1            MASK    LOW8              DUMPED AND SAVE IT.
0382   REF 268  LAST 1099     05,3661  10 000 0            CCS     A                 IS THIS THE BEGINNING OF A NEW EBANK
0383   REF   1                05,3662  1 3672 0            TCF     DNDUMP2           NO- THEN CONTINUE DUMPING
0384   REF   4  LAST 1102     05,3663  3 0335 1            CA      DUMPLOC           YES- IS THIS THE END OF THE
0385   REF  36  LAST 1032     05,3664  7 4754 1            MASK    BIT13             SECOND COMPLETE ERASABLE DUMP?
0386                          05,3665  0 0006 1            EXTEND
0387   REF   2  LAST  271     05,3666  1 3645 1            BZF     DNDUMPI +2        NO - GO BACK AND INITIALIZE NEXT BANK
0390   REF   2  LAST  205     05,3667  1 3446 0            TCF     DNPHASE1          YES - SEND DOWNLIST AGAIN
0391   REF   1                05,3670  3 3654 0  DNDUMP1   CA      LDNDUMP           SET DNTMGOTO
0392   REF   7  LAST 1102     05,3671  54 334 1            TS      DNTMGOTO          FOR WORDS 3 TO 256D OF CURRENT EBANK

0393   REF   5  LAST 1102     05,3672  3 0335 1  DNDUMP2   CA      DUMPLOC
0394   REF  29  LAST 1099     05,3673  54 003 0            TS      EBANK             SET EBANK
0395   REF   7  LAST 1102     05,3674  7 4350 1            MASK    LOW8              ISOLATE RELATIVE ADDRESS.
0396   REF 186  LAST 1085     05,3675  54 002 1            TS      Q                 (NOTE: MASK INSTRUCTION IS USED TO PICK
0397   REF  16  LAST  744     05,3676  3 4771 1            CA      NEG0              UP ERASABLE REGISTERS SO THAT EDITING
0398   REF 130  LAST 1102     05,3677  54 001 1            TS      L                 REGISTERS 20-23 WILL NOT BE ALTERED.)
0399   REF 187  LAST 1102     05,3700  50 002 0            INDEX   Q
0400                          E3,1400                      EBANK=  1400              PICK UP LOW ORDER REGISTER OF PAIR
0401                          05,3701  7 1401 1            MASK    1401              OF ERASABLE REGISTERS.
0402   REF 131  LAST 1102     05,3702  56 001 0            XCH     L
0403   REF 188  LAST 1102     05,3703  50 002 0            INDEX   Q                 PICK UP HIGH ORDER REGISTER OF PAIR
0404                          05,3704  7 1400 0            MASK    1400              OF ERASABLE REGISTERS.
0405   REF  30  LAST 1099       0337                       EBANK=  DNTMBUFF
0406   REF   5  LAST 1102     05,3705  1 3635 0            TCF     DNTMEXIT          GO SEND THEM


0407                          05,3706  0 0006 1  SENDID    EXTEND                    **ENTRANCE USED BY ERASABLE DUMP PROG.**
0408   REF   8  LAST 1102     05,3707  22 334 0            QXCH    DNTMGOTO          SET DNTMGOTO SO NEXT TIME PROG WILL GO
0409   REF   1                05,3710  3 5041 1            CAF     ERASID            TO LOCATION FOLLOWING :TC SENDID:

0410   REF  15  LAST  278     05,3711  54 061 1     +3     TS      ITEMP1            ** ENTRANCE USED BY REGULAR DOWNLINK
A04101                                                                                                         PROGRAM  **
0411   REF   2  LAST 1097     05,3712  0 3536 1            TC      WOZERO            GO SET WORD ORDER CODE TO ZERO
0412   REF   1                05,3713  3 2000 0            CAF     LOWIDCOD          PLACE SPECIAL ID CODE INTO L
0413   REF 132  LAST 1102     05,3714  56 001 0            XCH     L                 AND ID BACK INTO A
04135  REF  16  LAST 1102     05,3715  3 0061 0            CA      ITEMP1
0414   REF   6  LAST 1102     05,3716  1 3635 0            TCF     DNTMEXIT          SEND DOWNLIST ID CODE(S).
```

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L        INTER-BANK COMMUNICATION                                                           USER'S PAGE NO.   1        E  S3

R0001              THE FOLLOWING ROUTINE CAN BE USED TO CALL A SUBROUTINE IN ANOTHER BANK. IN THE BANKCALL VERSION, THE
R0003    CADR OF THE SUBROUTINE IMMEDIATELY FOLLOWS THE  TC BANKCALL  INSTRUCTION, WITH C(A) AND C(L) PRESERVED.

 00045   REF   3  LAST  432        4000                         SETLOC FFTAG1
 0005                              4636                         BANK

 00055   REF   1                                                COUNT* $$/BANK
 0006    REF   4  LAST  424        4636  52 134 0   BANKCALL DXCH   BUF2                  SAVE INCOMING A,L.
 0007    REF 189  LAST 1102        4637  50 002 0               INDEX  Q                     PICK UP CADR.
 0008                              4640  3 0000 1               CA     0
 0009    REF 190  LAST 1104        4641  24 002 0      -1       INCR   Q                     SO WE RETURN TO THE LOC. AFTER THE CADR.

R0010              SWCALL IS IDENTICAL TO BANKCALL, EXCEPT THAT THE CADR ARRIVES IN A.

 0012    REF 133  LAST 1102        4642  54 001 1   SWCALL      TS     L
 0013    REF   3  LAST  592        4643  22 004 0               LXCH   FBANK                 SWITCH BANKS, SAVING RETURN.
 0014    REF   5  LAST  424        4644  7 5041 0               MASK   LOW10                 GET SUB-ADDRESS OF CADR.
 0015    REF 191  LAST 1104        4645  56 002 0               XCH    Q                     A,L NOW CONTAINS DP RETURN.
 0016    REF   5  LAST 1104        4646  52 134 0               DXCH   BUF2                  RESTORING INPUTS IF THIS IS A BANKCALL.
 0017    REF 192  LAST 1104        4647  50 002 0               INDEX  Q
 0018                              4650  0 2000 0               TC     10000                 SETTING Q TO SWRETURN.

 0019    REF   6  LAST 1104        4651  56 134 1   SWRETURN XCH    BUF2 +1               COMES HERE TO RETURN TO CALLER. C(A,L)
 0020    REF   4  LAST 1104        4652  56 004 0               XCH    FBANK                 ARE PRESERVED FOR RETURN.
 0021    REF   7  LAST 1104        4653  56 134 1               XCH    BUF2 +1
 0022    REF   8  LAST 1104        4654  0 0133 0               TC     BUF2

R0023              THE FOLLOWING ROUTINE CAN BE USED AS A UNILATERAL JUMP WITH C(A,L) PRESERVED AND THE CADR IMMEDIATELY
R0025    FOLLOWING THE TC POSTJUMP INSTRUCTION.

 0026    REF 193  LAST 1104        4655  56 002 0   POSTJUMP XCH    Q                     SAVE INCOMING C(A).
 0027    REF 269  LAST 1102        4656  50 000 1               INDEX  A                     GET CADR.
 0028                              4657  3 0000 1               CA     0

R0029              BANKJUMP IS THE SAME AS POSTJUMP, EXCEPT THAT THE CADR ARRIVES IN A.

 0031    REF   5  LAST 1104        4660  54 004 1   BANKJUMP TS     FBANK
 0032    REF   6  LAST 1104        4661  7 5041 0               MASK   LOW10
 0033    REF 194  LAST 1104        4662  56 002 0               XCH    Q                     RESTORING INPUT C(A) IF THIS WAS A
 0034    REF 195  LAST 1104        4663  50 002 0   Q+10000     INDEX  Q                     POSTJUMP.
 0035                              4664  1 2000 1   PRIO12      TCF    10000                 PRIO12 = TCF   10000 = 12000
```

```
L       INTER-BANK COMMUNICATION                                                          USER'S PAGE NO.   2        E0 53

P0036             THE FOLLOWING ROUTINE GETS THE RETURN CADR SAVED BY SWCALL OR BANKCALL AND LEAVES IT IN A.

 0038    REF   7  LAST 1104        4665  3 5041 1  MAKECADR CAF     LOW10
 0039    REF   9  LAST 1104        4666  7 0133 1           MASK    BUF2
 0040    REF  10  LAST 1105        4667  6 0134 1           AD      BUF2 +1
 0041    REF 196  LAST 1104        4670  0 0002 0           TC      Q


 00465   REF   3  LAST  386        4671  54 135 1  SUPDACAL TS      MPTEMP
 0047    REF   6  LAST 1104        4672  56 004 0           XCH     FBANK           SET FBANK FOR DATA.
 00475                             4673  0 0006 1           EXTEND
 0048    REF   9  LAST  589        4674  04 007 1           ROR     SUPERBNK        SAVE FBANK IN BITS 15-11, AND
 00485   REF   4  LAST 1105        4675  56 135 0           XCH     MPTEMP           SUPERBANK IN BITS  7-5.
 0049    REF   8  LAST 1105        4676  7 5041 0           MASK    LOW10
 00495   REF 134  LAST 1104        4677  56 001 0           XCH     L               SAVE REL. ADR. IN BANK, FETCH SUPERBITS.
 0050                              4700  0 0004 0           INHINT                  BECAUSE RUPT DOES NOT SAVE SUPERBANK.
 00505                             4701  0 0006 1           EXTEND
 0051    REF  10  LAST 1105        4702  01 007 1           WRITE   SUPERBNK        SET SUPERBANK FOR DATA.
 0052    REF 135  LAST 1105        4703  50 001 0           INDEX   L
 00525                             4704  3 2000 0           CA      10000           PINBALL (FIX MEM DISP) PREVENTS DCA HERE
 0053    REF   5  LAST 1105        4705  56 135 0           XCH     MPTEMP          SAVE 1ST WD, FETCH OLD FBANK AND SBANK.
 00534                             4706  0 0006 1           EXTEND
 00535   REF  11  LAST 1105        4707  01 007 1           WRITE   SUPERBNK        RESTORE SUPERBANK.
 0054                              4710  0 0003 1           RELINT
 00545   REF   7  LAST 1105        4711  54 004 1           TS      FBANK           RESTORE FBANK.
 0055    REF   6  LAST 1105        4712  3 0135 0           CA      MPTEMP          RECOVER FIRST WORD OF DATA.
 00555                             4713  0 0002 0           RETURN                  24 WDS. DATACALL 516 MU, SUPDACAL 432 MU
```

```
L         INTER-BANK COMMUNICATION                                                           USER'S PAGE NO.   3      EU 53

P0056              THE FOLLOWING ROUTINES ARE IDENTICAL TO BANKCALL AND SWCALL EXCEPT THAT THEY ARE USED IN INTERRUPT.

 0058    REF   2  LAST  426          4714  52 073 1  IBNKCALL DXCH    RUPTREG3           USES RUPTREG3,4 FOR DP RETURN ADDRESS.
 0059    REF 197  LAST 1105          4715  50 002 0           INDEX   Q
 0060                                4716  3 0000 1           CAF     0
 0061    REF 198  LAST 1106          4717  24 002 0           INCR    Q

 0062    REF 136  LAST 1105          4720  54 001 1  ISWCALL  TS      L
 0063    REF   8  LAST 1105          4721  22 004 0           LXCH    FBANK
 0064    REF   9  LAST 1105          4722  7 5041 0           MASK    LOW10
 0065    REF 199  LAST 1106          4723  56 002 0           XCH     Q
 0066    REF   3  LAST 1106          4724  52 073 1           DXCH    RUPTREG3
 0067    REF 200  LAST 1106          4725  50 002 0           INDEX   Q
 0068                                4726  0 2000 0           TC      10000

 0069    REF   3  LAST   69          4727  56 073 0  ISWRETRN XCH     RUPTREG4
 0070    REF   9  LAST 1106          4730  56 004 0           XCH     FBANK
 0071    REF   4  LAST 1106          4731  56 073 0           XCH     RUPTREG4
 0072    REF   4  LAST 1106          4732  0 0072 1           TC      RUPTREG3

R0090    2. USPRCADR ACCESSES INTERPRETIVE CODING IN OTHER THAN THE USER'S FBANK. THE CALLING SEQUENCE IS AS FOLLOWS:

A0092                                                L        TC      USPRCADR
A0093                                                L+1      CADR    INTPRETX           INTPRETX IS THE INTERPRETIVE CODING
A0094                                                                                    RETURN IS TO L+2

 0103    REF   4  LAST  426          4733  54 164 0  USPRCADR TS      LOC                SAVE A
 0104    REF  26  LAST  961          4734  3 4761 0           CA      BIT8
 0105    REF   7  LAST  379          4735  54 023 1           TS      EDOP               EXIT INSTRUCTION TO EDOP
 0106    REF  12  LAST  424          4736  3 0006 1           CA      BBANK
 0107    REF   1                     4737  54 165 1           TS      BANKSET            USER'S BBANK TO BANKSET
 0108    REF 201  LAST 1106          4740  50 002 0           INDEX   Q
 0109                                4741  3 0000 1           CA      0
 0110    REF  10  LAST 1106          4742  54 004 1           TS      FBANK              INTERPRETIVE BANK TO FBANK
 0111    REF  10  LAST 1106          4743  7 5041 0           MASK    LOW10              YIELDS INTERPRETIVE RELATIVE ADDRESS
 0112    REF 202  LAST 1106          4744  56 002 0           XCH     Q                  INTERPRETIVE ADDRESS TO Q, FETCHING L+1
 0113    REF   5  LAST 1106          4745  56 164 1           XCH     LOC                L+1 TO LOC, RETRIEVING ORIGINAL A
 0114    REF   1                     4746  1 4663 1           TCF     Q+1 000
```

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R0117   THERE ARE FOUR POSSIBLE SETTINGS FOR CHANNEL 07. (CHANNEL 07 CONTAINS THE SUPERBANK SETTING.)
R0119                                                 PSEUDO-FIXED      OCTAL PSEUDO
R0120   SUPERBANK       SETTING      S-REG. VALUE     BANK NUMBERS      ADDRESSES
R0121   ----------      -------      ------------     ------------      ------------

R0122   SUPERBANK 3       0XX        2000 - 3777        30 - 37         70000 - 107777    (WHERE XX CAN BE ANYTHING AND
R0124                                                                                     WILL USUALLY BE SEEN AS 11)
R0126   SUPERBANK 4       100        2000 - 3777        40 - 47         110000 - 127777  (AS FAR AS IT CAN BE SEEN,
R0128                                                                                     ONLY BANKS 40-43 WILL EVER BE
R0130                                                                                     AND ARE PRESENTLY AVAILABLE)
R0132   SUPERBANK 5       101        2000 - 3777        50 - 57         130000 - 147777  (PRESENTLY NOT AVAILABLE TO
R0134                                                                                     THE USER)
R0136   SUPERBANK 6       110        2000 - 3777        60 - 67         150000 - 167777  (PRESENTLY NOT AVAILABLE TO
R0138                                                                                     THE USER)
```

```
L         INTERPRETER                                                                              USER'S PAGE NO.  1      EO S3

R0001     SECTION 1  DISPATCHER

R0002                ENTRY TO THE INTERPRETER. INTPRET SETS LOC TO THE FIRST  INSTRUCTION, BANKSET TO THE BBANK OF THE
R0004     OBJECT INTERPRETIVE PROGRAM, AND INTBIT15 TO THE BIT15 CONTENTS OF FBANK. INTERPRETIVE PROGRAMS MAY BE IN
R0006     VIRTUALLY ALL BANKS PRESENT UNDER ANY SUPER-BANK SETTING, WITH THE RESTRICTION THAT PROGRAMS IN HIGH BANKS
R0008     (BIT15 OF FBANK = 1) DO NOT REFER TO LOWBANKS, AND VICE-VERSA. THE INTERPRETER DOES NOT SWITCH SUPERBANKS.
R0010     E-BANK SWITCHING OCCURS WHENEVER GENERAL ERASABLE (100 - 3777) IS ADDRESSED.


  0012    REF   1                    6000                       SETLOC INTERF3
  00125                              6006                       BANK

  0013    REF   1                                               COUNT* $$/INTER
  00135                              6006  0 0003 1  INTPRET    RELINT
  0014                               6007  0 0006 1             EXTEND                   SET LOC TO THE WORD FOLLOWING THE TC.
  0015    REF   6  LAST 1106         6010  22 164 1    +2       QXCH    LOC

  0016    REF  13  LAST 1106         6011  3 0006 1    +3       CA      BBANK            INTERPRETIVE BRANCHES FINISH HERE.
  0017    REF   2  LAST 1106         6012  54 165 1             TS      BANKSET
  0018    REF  39  LAST 1015         6013  7 4752 1             MASK    BIT15            GET 15TH BIT FOR INDEXABLE ADDRESSES.
  0019    REF   4  LAST   70         6014  54 115 0             TS      INTBIT15

  0020    REF   8  LAST 1106         6015  54 023 1             TS      EDOP             MAKE SURE NO INSTRUCTIONS LEFT OVER

  0021    REF   1                    6016  1 6037 1             TCF     NEWOPS           PICK UP OP CODE PAIR AND BEGIN.


  0022    REF  14  LAST 1108         6017  22 006 1  INTRSM     LXCH    BBANK            RESUME SUSPENDED INTERPRETIVE JOB
  0023    REF 226  LAST  940         6020  1 6011 0             TCF     INTPRET +3
R0024                    DLOAD LOADS MPAC, MPAC +1, LEAVING ZERO IN MPAC +2.

  0025                               6021  0 0006 1  DLOAD      EXTEND
  0026    REF   1                    6022  5 0116 1             INDEX   ADDRWD
  0027                               6023  3 0001 0             DCA     0                LOAD DP C(C(ADDRWD)) INTO MPAC,MPAX +1
  0028    REF 288  LAST  917         6024  52 155 1  SLOAD2     DXCH    MPAC
  0029    REF 206  LAST 1101         6025  3 4772 1             CAF     ZERO             ZERO MPAC +2
```

```
P0030             AT THE END OF MOST INSTRUCTIONS, CONTROL IS GIVEN TO DANZIG TO DISPATCH THE NEXT OPERATION.

 0032   REF 289  LAST 1108      6026  54 156 1    +2        TS      MPAC +2        AND DECLARE DP MODE
 0033   REF   4  LAST  543      6027  54 163 1  NEWMODE     TS      MODE           PROLOGUE FOR MODE-CHANGING INSTRUCTIONS.

 0034   REF   3  LAST 1108      6030   3 0165 0  DANZIG     CA      BANKSET        SET BBANK BEFORE TESTING NEWJOB SO THAT
 0035   REF  15  LAST 1108      6031  54 006 0              TS      BBANK          IT MAY BE SAVED DIRECTLY BY CHANJOB.

 0036   REF   9  LAST 1108      6032  10 023 1  NOIBNKSW    CCS     EDOP           SEE IF AN ORDER CODE IS LEFT OVER FROM
 0037   REF   1                 6033   1 6046 1             TCF     OPJUMP         THE LAST PAIR RETRIEVED. IF SO, EXECUTE.
A0038                                                                              EDOP IS SET TO ZERO ON ITS RE-EDITING.

 0039   REF   6  LAST  882      6034  10 067 1              CCS     NEWJOB         SEE IF A JOB OF HIGHER PRIORITY IS
 0040   REF   1                 6035   1 5156 1             TCF     CHANG2         PRESENT, AND IF SO, CHANGE JOBS.

 0041   REF   7  LAST 1108      6036  24 164 1              INCR    LOC            ADVANCE THE LOCATION COUNTER.
R0042            ITRACE (1) REFERS TO "NEWOPS".
 0043   REF   8  LAST 1109      6037  50 164 1  NEWOPS      INDEX   LOC            ENTRY TO BEGIN BY PICKING OP CODE PAIR.
 0044                           6040   3 0000 1             CA      0              MAY BE AN OPCODE PAIR OR A STORE CODE.
 0045   REF 270  LAST 1104      6041  10 000 0              CCS     A              TEST SIGN AND GET DABS(A).
 0046   REF   1                 6042   1 6331 1             TCF     DOSTORE        PROCESS STORE CODE.

 0047                           6043    00177 0  LOW7       OCT     177

 0048   REF  10  LAST 1109      6044  54 023 1              TS      EDOP           OP CODE PAIR. LEAVE THE OTHER IN EDOP
 0049   REF   6  LAST  379      6045   7 6043 1             MASK    LOW7           WHERE  CCS EDOP  WILL HONOR IT NEXT.

 0050   REF   7  LAST  384      6046  54 020 1  OPJUMP      TS      CYR            LOWWD ENTERS HERE IF A RIGHT-HAND OP
 0051   REF   8  LAST 1109      6047  10 020 1              CCS     CYR            CODE IS TO BE PROCESSED. TEST PREFICES.
 0052   REF   1                 6050   1 6216 0             TCF     OPJUMP2        TEST SECOND PREFIX BIT.

 0053   REF   1                 6051   1 6712 1             TCF     EXIT           +0 OP CODE IS EXIT.
```

```
L         INTERPRETER                                                                          USER'S PAGE NO.   3      E0 S3

P0054                PROCESS ADDRESSES WHICH MAY BE DIRECT, INDEXED, OR REFERENCE THE PUSHDOWN LIST.

  0056     REF  60  LAST 1089        6052  7 4770 1  ADDRESS  MASK    BIT1             SEE IF ADDRESS IS INDEXED. CYR CONTAINED
  0057     REF 271  LAST 1109        6053  10 000 0           CCS     A                400XX, SO BIT 1 IS NOW AS IT WAS IN CYR.
  0058     REF   1                   6054  1 6115 0           TCF     INDEX            FORM INDEXED ADDRESS.

  0059     REF   9  LAST 1109        6055  50 164 1  DIRADRES INDEX   LOC              LOOK AHEAD TO NEXT WORD TO SEE IF
  0060                               6056  4 0001 1  OCT40001 CS      1                ADDRESS IS GIVEN.
  0061     REF 272  LAST 1110        6057  10 000 0           CCS     A
  0062     REF   1                   6060  1 6164 0           TCF     PUSHUP           IF NOT.

  0063                               6061   77773 1  NEG4     DEC     -4

  0064     REF  10  LAST 1110        6062  24 164 1           INCR    LOC              IF SO, TO SHOW WE PICKED UP A WORD.
  0065     REF   2  LAST 1108        6063  54 116 0           TS      ADDRWD
```

```
P0066              FINAL DIGESTION OF DIRECT ADDRESSES OF OP CODES WITH 01 PREFIX IS DONE HERE. IN EACH CASE, THE
R0068        REQUIRED 12-BIT SUB-ADDRESS IS LEFT IN ADDRWD, WITH ANY REQUIRED E OR F BANK SWITCHING DONE. ADDRESSES LESS
R0070        THAN 45D ARE TAKEN TO BE RELATIVE TO THE WORK AREA. THE OP CODE IS NOW IN BITS 1-5 OF CYR WITH BIT 14 = 1.


  0072   REF   1                 6064  6 6220 1              AD      -ENDVAC         SEE IF ADDRESS RELATIVE TO WORK AREA.
  0073   REF 273  LAST 1110      6065  10 000 0              CCS     A
  0074   REF   1                 6066  6 7676 1              AD      -ENDERAS        IF NOT, SEE IF IN GENERAL ERASABLE.
  0075   REF   1                 6067  1 6074 0              TCF     IERASTST

  0076   REF  16  LAST  894      6070  3 0120 1  NETZERO     CA      FIXLOC          IF SO, LEAVE THE MODIFIED ADDRESS IN
  0077   REF   3  LAST 1110      6071  26 116 0              ADS     ADDRWD          ADDRWD AND DISPATCH.
  0078   REF   9  LAST 1109      6072  50 020 0  ITR15       INDEX   CYR             THIS INDEX MAKES THE NEXT INSTRUCTION
  0079   REF   1                 6073  7 6242 1              7       INDJUMP -1      TCF INDJUMP + OP, EDITING CYR.

  0080                           6074  0 0006 1  IERASTST    EXTEND
  0081   REF   1                 6075  6 6105 0              BZMF    GEADDR          GO PROCESS GENERAL-ERASABLE ADDRESS.

  0082   REF  11  LAST 1106      6076  7 5041 0              MASK    LOW10           FIXED BANK ADDRESS. RESTORE AND ADD B15.
  0083   REF  12  LAST 1111      6077  6 5041 1              AD      LOW10           SWITCH BANKS AND LEAVE SUBADDRESS IN
  0084   REF   4  LAST 1111      6100  56 116 1              XCH     ADDRWD          ADDRWD FOR OPERAND RETRIEVAL. (THIS
  0085   REF   5  LAST 1108      6101  6 0115 1              AD      INTBIT15        METHOD PRECLUDES USE OF THE LAST
  0086   REF  11  LAST 1106      6102  54 004 1              TS      FBANK           LOCATION IN EACH FBANK.)
  0087   REF  10  LAST 1111      6103  50 020 0  ITR12       INDEX   CYR
  0088   REF   2  LAST 1111      6104  7 6242 1              7       INDJUMP -1

  0089   REF   8  LAST 1102      6105  7 4350 1  GEADDR      MASK    LOW8
  0090   REF   4  LAST  384      6106  6 5024 1              AD      OCT1400
  0091   REF   5  LAST 1111      6107  56 116 1              XCH     ADDRWD
  0092   REF  30  LAST 1102      6110  54 003 0              TS      EBANK
  0093   REF  11  LAST 1111      6111  50 020 0  ITR10       INDEX   CYR
  0094   REF   3  LAST 1111      6112  7 6242 1              7       INDJUMP -1
```

```
R0095            THE FOLLOWING ROUTINE PROCESSES INTERPRETIVE INDEXED ADDRESSES. AN INTERPRETER INDEX REGISTER MAY
R0097     CONTAIN THE ADDRESS OF ANY ERASABLE REGISTER (0-42 BEING RELATIVE TO THE VAC AREA) OR ANY INTERPRETIVE PROGRAM
R0099     BANK, OR ANY INTEGER IN THAT RANGE.

 0100     REF   1                    6113  3 7666 0  DODLOAD* CAF     CLOAD*           STODL* COMES HERE TO PROCESS LOAD ADR.
 0101     REF  12  LAST 1111         6114  54 020 1    +1     TS      CYR              (STOVL* ENTERS HERE).
 0102     REF  17  LAST 1111         6115  3 0120 1  INDEX    CA      FIXLOC           SET UP INDEX LOCATION.
 0103     REF   1                    6116  54 130 1           TS      INDEXLOC
 0104     REF  11  LAST 1110         6117  24 164 1           INCR    LOC              (ADDRESS ALWAYS GIVEN).
 0105     REF  12  LAST 1112         6120  50 164 1           INDEX   LOC
 0106                                6121  4 0000 0           CS      0
 0107     REF 274  LAST 1111         6122  10 000 0           CCS     A                INDEX 2 IF ADDRESS STORED COMPLEMENTED.
 0108     REF   2  LAST 1112         6123  24 130 0           INCR    INDEXLOC
 0109                                6124  16 125 0           NOOP

 0110     REF   6  LAST 1111         6125  54 116 0           TS      ADDRWD           14 BIT ADDRESS TO ADDRWD.
 0111     REF   2  LAST  141         6126  7 7675 0           MASK    HIGH4            IF ADDRESS GREATER THAN 2K, ADD INTBIT15
 0112                                6127  0 0006 1           EXTEND
 0113     REF   1                    6130  1 6133 1           BZF     INDEX2
 0114     REF   6  LAST 1111         6131  3 0115 1           CA      INTBIT15
 0115     REF   7  LAST 1112         6132  26 116 0           ADS     ADDRWD

 0116     REF   3  LAST 1112         6133  50 130 0  INDEX2   INDEX   INDEXLOC
 0117     REF  46  LAST  936         6134  4 0046 1           CS      X1
 0118     REF   8  LAST 1112         6135  26 116 0           ADS     ADDRWD           DO AUGMENT, IGNORING AND CORRECTING OVF.

 0119     REF   4  LAST  787         6136  7 7677 1           MASK    HIGH9            SEE IF ADDRESS IS IN WORK AREA.
 0120                                6137  0 0006 1           EXTEND
 0121     REF   1                    6140  1 6153 1           BZF     INDWORK
 0122     REF   3  LAST 1112         6141  7 7675 0           MASK    HIGH4            SEE IF IN FIXED BANK.
 0123                                6142  0 0006 1           EXTEND
 0124     REF   1                    6143  1 6155 1           BZF     INDERASE

 0125     REF   9  LAST 1112         6144  3 0116 1           CA      ADDRWD           IN FIXED - SWITCH BANKS AND CREATE
 0126     REF  12  LAST 1111         6145  54 004 1           TS      FBANK            SUB-ADDRESS.
 0127     REF  13  LAST 1111         6146  7 5041 0           MASK    LOW10
 0128     REF   1                    6147  6 4756 1           AD      2K
 0129     REF  10  LAST 1112         6150  54 116 0           TS      ADDRWD
 0130     REF  13  LAST 1112         6151  50 020 0  ITR11    INDEX   CYR
 0131     REF   4  LAST 1111         6152  3 6242 0           3       INDJUMP -1

 0132     REF  18  LAST 1112         6153  3 0120 1  INDWORK  CA      FIXLOC           MAKE ADDRWD RELATIVE TO WORK AREA.
 0133     REF   1                    6154  1 6161 0           TCF     ITR13 -1

 0134     REF   5  LAST 1111         6155  3 5024 1  INDERASE CA      OCT1400
 0135     REF  11  LAST 1112         6156  56 116 1           XCH     ADDRWD
 0136     REF  31  LAST 1111         6157  54 003 0           TS      EBANK
 0137     REF   9  LAST 1111         6160  7 4350 1           MASK    LOW8
 0138     REF  12  LAST 1112         6161  26 116 0    -1     ADS     ADDRWD
 0139     REF  14  LAST 1112         6162  50 020 0  ITR13    INDEX   CYR
```

```
L        INTERPRETER                                                                    USER'S PAGE NO.  6       E0 S3
 0140    REF    5  LAST 1112        6163  3 6242 0            3        INDJUMP -1
```

```
R0141            PUSH-UP ROUTINES. WHEN NO OPERAND ADDRESS IS GIVEN, THE APPROPRIATE OPERAND IS TAKEN FROM THE PUSH-DOWN
R0143    LIST. IN MOST CASES THE MODE OF THE RESULT (VECTOR OR SCALAR) OF THE LAST ARITHMETIC OPERATION PERFORMED
R0145    IS THE SAME AS THE TYPE OF OPERAND DESIRED (ALL ADD/SUBTRACT ETC.). EXCEPTIONS TO THIS GENERAL RULE ARE LISTED
R0147    BELOW (NOTE THAT IN EVERY CASE THE MODE REGISTER IS LEFT INTACT):

R0148            1.  VXSC AND V/SC WANT THE OPPOSITE TYPE OF OPERAND, E.G., IF THE LAST OPERATION YIELDED A VECTOR
R0150    RESULT, VXSC WANTS A SCALAR.

R0151            2.  THE LOAD CODES SHOULD LOAD THE ACCUMULATOR INDEPENDENT OF THE RESULT OF THE LAST OPERATION. THIS
R0153    INCLUDES VLOAD, DLOAD, TLOAD, PDDL, AND PDVL (NO PUSHUP WITH SLOAD).

R0154            3.  SOME ARITHMETIC OPERATIONS REQUIRE A STANDARD TYPE OF OPERAND REGARDLESS OF THE PREVIOUS OPERATION.
R0156    THIS INCLUDES SIGN WANTING DP AND TAD REQUIRING TP.

 0157    REF   1                6164  3 4351 1  PUSHUP   CAF     OCT23              IF THE LOW 5 BITS OF CYR ARE LESS THAN
 0158    REF  15  LAST 1112     6165  7 0020 1           MASK    CYR                20, THIS OP REQUIRES SPECIAL ATTENTION.
 0159    REF   3  LAST  638     6166  6 6171 0           AD      -OCT10             (NO -0).
 0160    REF 275  LAST 1112     6167  10 000 0           CCS     A
 0161    REF   1                6170  1 6202 0           TCF     REGUP              FOR ALL CODES GREATER THAN OCT 7.

 0162                           6171   77767 1  -OCT10   OCT     -10

 0163    REF   2  LAST 1048     6172  6 6061 0           AD      NEG4               WE NOW HAVE 7 - OP CODE(MOD4). SEE IF
 0164    REF 276  LAST 1114     6173  10 000 0           CCS     A                  THE OP CODE (MOD4) IS THREE (REVERSE).
 0165    REF 277  LAST 1114     6174  50 000 1           INDEX   A                  NO - THE MODE IS DEFINITE. PICK UP THE
 0166    REF   1                6175  4 6213 0           CS      NO.WDS
 0167    REF   2  LAST 1114     6176  1 6204 0           TCF     REGUP +2

 0168    REF   5  LAST 1109     6177  50 163 0           INDEX   MODE               FOR VXSC AND V/SC WE WANT THE REQUIRED
 0169    REF   2  LAST  547     6200  4 6211 1           CS      REVCNT             PUSHLOC DECREMENT WITHOUT CHANGING THE
 0170    REF   3  LAST 1114     6201  1 6204 0           TCF     REGUP +2           MODE AT THIS TIME.

 0171    REF   6  LAST 1114     6202  50 163 0  REGUP    INDEX   MODE               MOST ALL OP CODES PUSHUP HERE.
 0172    REF   2  LAST 1114     6203  4 6213 0           CS      NO.WDS
 0173    REF   1                6204  26 166 1   +2      ADS     PUSHLOC
 0174    REF  13  LAST 1112     6205  54 116 0           TS      ADDRWD
 0175    REF  16  LAST 1114     6206  50 020 0  ITR14    INDEX   CYR
 0176    REF   6  LAST 1113     6207  7 6242 1           7       INDJUMP -1         (THE INDEX MAKES THIS A TCF.)

 0177                           6210   00002 0           OCT     2                  REVERSE PUSHUP DECREMENT. VECTOR TAKES 2
 0178                           6211   00006 1  REVCNT   OCT     6                  WORDS, SCALAR TAKES 6.
 0179                           6212   00006 1           OCT     6
 0180                           6213   00002 0  NO.WDS   OCT     2                  CONVENTIONAL DECREMENT IS 6 WORDS VECTOR
 0181                           6214   00003 1  OCTAL3   OCT     3                  2 IN DP, AND 3 IN TP.
 0182                           6215   00006 1           OCT     6
```

```
P0183              TEST THE SECOND PREFIX BIT TO SEE IF THIS IS A MISCELLANEOUS OR A UNARY/SHORT SHIFT OPERATION.

 0185   REF  17  LAST 1114        6216  10 020 1  OPJUMP2  CCS     CYR                TEST SECOND PREFIX BIT.
 0186   REF   1                   6217  1 6232 0           TCF     OPJUMP3            TEST THIRD BIT TO SEE IF UNARY OR SHIFT.

 0187                             6220   77722 0  -ENDVAC  DEC     -45

R0188              THE FOLLOWING ROUTINE PROCESSES ADDRESSES OF SUFFIX CLASS 10. THEY ARE BASICALLY WORK AREA ADDRESSES
R0190   IN THE RANGE 0 - 52, ERASABLE ECADR CONSTANTS FROM 100 - 3777, AND FCADRS ABOVE THAT. ALL 15 BITS ARE AVAILABLE
R0192   IN CONTRAST TO SUFFIX 1, IN WHICH ONLY THE LOW ORDER 14 ARE AVAILABLE.

 0193   REF  13  LAST 1112        6221  24 164 1  15BITADR INCR    LOC                (ENTRY HERE FROM STCALL).
 0194   REF  14  LAST 1115        6222  50 164 1           INDEX   LOC                PICK UP ADDRESS WORD.
 0195                             6223  3 0000 1           CA      0
 0196   REF   5  LAST   70        6224  54 117 1           TS      POLISH             WE MAY NEED A SUBADDRESS LATER.

 0197   REF   1                   6225  3 5042 1           CAF     LOW7+2K            THESE INSTRUCTIONS ARE IN BANK 1.
 0198   REF  13  LAST 1112        6226  54 004 1           TS      FBANK
 0199   REF  18  LAST 1115        6227  7 0020 1           MASK    CYR
 0200   REF 278  LAST 1114        6230  50 000 1  ITR7     INDEX   A
 0201   REF   1                   6231  1 6303 0           TCF     MISCJUMP
```

```
P0202               COMPLETE THE DISPATCHING OF UNARY AND SHORT SHIFT OPERATIONS.

 0203   REF  14  LAST 1115     6232  54 004 1  OPJUMP3  TS      FBANK             CALL IN BANK 0 (BITS 11-15 OF A ARE 0.)
R0204                 ITRACE (6) REFERS TO "OPJUMP3".
 0205   REF  19  LAST 1115     6233  10 020 1           CCS     CYR               TEST THIRD PREFIX BIT.
 0206   REF 279  LAST 1115     6234  50 000 1           INDEX   A                 THE DECREMENTED UNARY CODE IS IN BITS
 0207   REF   1                6235  1 2000 1           TCF     UNAJUMP           1-4 OF A (ZERO, EXIT, HAS BEEN DETECTED)

 0208   REF   7  LAST 1114     6236  10 163 1           CCS     MODE              ITS A SHORT SHIFT CODE. SEE IF PRESENT
 0209   REF   1                6237  1 2017 1           TCF     SHORTT            SCALAR OR VECTOR.
 0210   REF   2  LAST 1116     6240  1 2017 1           TCF     SHORTT
 0211   REF   1                6241  1 2121 0           TCF     SHORTV            CALLS THE APPROPRIATE ROUTINE.


 0212   REF   1                4344            FBANKMSK EQUALS  BANKMASK
 0213   REF  21  LAST  315     6242   00122 0  LVBUF    ADRES   VBUF
```

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L         INTERPRETER                                                                          USER'S PAGE NO.  10        EQ S3

P0214              THE FOLLOWING IS THE JUMP TABLE FOR OP CODES WHICH MAY HAVE INDEXABLE ADDRESSES OR MAY PUSH UP.

 0216   REF   1                      6243  1 6454 0  INDJUMP   TCF      VLOAD           00 - LOAD MPAC WITH A VECTOR.
 0217   REF   1                      6244  1 7040 0            TCF      TAD             01 - TRIPLE PRECISION ADD TO MPAC.
 0218   REF   1                      6245  1 7611 1            TCF      SIGN            02 - COMPLEMENT MPAC (V OR SC) IF X NEG.
 0219   REF   1                      6246  1 7335 1            TCF      VXSC            03 - VECTOR TIMES SCALAR.
 0220   REF   1                      6247  1 6652 1            TCF      CGOTO           04 - COMPUTED GO TO.
 0221   REF   2  LAST   409          6250  1 6437 0            TCF      TLOAD           05 - LOAD MPAC WITH TRIPLE PRECISION.
 0222   REF   1                      6251  1 6021 0            TCF      DLOAD           06 - LOAD MPAC WITH A DP SCALAR.
 0223   REF   1                      6252  1 7560 1            TCF      V/SC            07 - VECTOR DIVIDED BY SCALAR.

 0224   REF   1                      6253  1 6450 1            TCF      SLOAD           10 - LOAD MPAC IN SINGLE PRECISION.
 0225   REF   1                      6254  1 6567 1            TCF      SSP             11 - SET SINGLE PRECISION INTO X.
 0226   REF   1                      6255  1 6472 1            TCF      PDDL            12 - PUSH DOWN MPAC AND RE-LOAD IN DP.
 0227   REF   1                      6256  1 7270 1            TCF      MXV             13 - MATRIX POST-MULTIPLIED BY VECTOR.
 0228   REF   1                      6257  1 6526 1            TCF      PDVL            14 - PUSH DOWN AND VECTOR LOAD.
 0229   REF   1                      6260  1 6575 1            TCF      CCALL           15 - COMPUTED CALL.
 0230   REF   1                      6261  1 7273 1            TCF      VXM             16 - MATRIX PRE-MULTIPLIED BY VECTOR.
 0231   REF   1                      6262  1 7552 0            TCF      TSLC            17 - NORMALIZE MPAC (SCALAR ONLY).

 0232   REF   1                      6263  1 7530 1            TCF      DMPR            20 - DP MULTIPLY AND ROUND.
 0233   REF   1                      6264  1 7533 1            TCF      DDV             21 - DP DIVIDE BY.
 0234   REF   1                      6265  1 7537 0            TCF      BDDV            22 - DP DIVIDE INTO.
 0235   REF   1                      6266  1 7555 1            TCF      GSHIFT          23 - GENERAL SHIFT INSTRUCTION.
 0236   REF   1                      6267  1 6720 0            TCF      VAD             24 - VECTOR ADD.
 0237   REF   1                      6270  1 6716 0            TCF      VSU             25 - VECTOR SUBTRACT.
 0238   REF   1                      6271  1 7005 1            TCF      BVSU            26 - VECTOR SUBTRACT FROM.
 0239   REF   1                      6272  1 7265 0            TCF      DOT             27 - VECTOR DOT PRODUCT.

 0240   REF   1                      6273  1 7414 0            TCF      VXV             30 - VECTOR CROSS PRODUCT.
 0241   REF   1                      6274  1 7361 0            TCF      VPROJ           31 - VECTOR PROJECTION.
 0242   REF   1                      6275  1 6754 0            TCF      DSU             32 - DP SUBTRACT.
 0243   REF   1                      6276  1 7031 0            TCF      BDSU            33 - DP SUBTRACT FROM.
 0244   REF   1                      6277  1 6744 1            TCF      DAD             34 - DP ADD.
 0245                                6300  1 6300 0            TCF                      35 - AVAILABLE
 0246   REF   1                      6301  1 7526 0            TCF      DMP1            36 - DP MULTIPLY.
 0247   REF   1                      6302  1 7547 1            TCF      SETPD           37 - SET PUSH DOWN POINTER (DIRECT ONLY)

 R0248   CODES 10 AND 14 MUST NOT PUSH UP. CODE 04 MAY BE USED FOR VECTOR DECLARE BEFORE PUSHUP IF DESIRED.
```

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L        INTERPRETER                                                                USER'S PAGE NO. 11      E0 S3

P0250            THE FOLLOWING JUMP TABLE APPLIES TO INDEX, BRANCH, AND MISCELLANEOUS INSTRUCTIONS.

 0252    REF   1                      6303  1 2341 1  MISCJUMP TCF     AXT                 00 - ADDRESS TO INDEX TRUE.
 0253    REF   1                      6304  1 2346 0           TCF     AXC                 01 - ADDRESS TO INDEX COMPLEMENTED.
 0254    REF   1                      6305  1 2351 0           TCF     LXA                 02 - LOAD INDEX FROM ERASABLE.
 0255    REF   1                      6306  1 2355 1           TCF     LXC                 03 - LOAD INDEX FROM COMPLEMENT OF ERAS.
 0256    REF   1                      6307  1 2361 0           TCF     SXA                 04 - STORE INDEX IN ERASABLE.
 0257    REF   1                      6310  1 2367 0           TCF     XCHX                05 - EXCHANGE INDEX WITH ERASABLE.
 0258    REF   1                      6311  1 2403 0           TCF     INCR                06 - INCREMENT INDEX REGISTER.
 0259    REF   1                      6312  1 2412 0           TCF     TIX                 07 - TRANSFER ON INDEX.

 0260    REF   1                      6313  1 2375 0           TCF     XAD                 10 - INDEX REGISTER ADD FROM ERASABLE.
 0261    REF   1                      6314  1 2406 0           TCF     XSU                 11 - INDEX SUBTRACT FROM ERASABLE.
 0262    REF   1                      6315  1 2464 1           TCF     BZE/GOTO            12 - BRANCH ZERO AND GOTO.
 0263    REF   1                      6316  1 2471 0           TCF     BPL/BMN             13 - BRANCH PLUS AND BRANCH MINUS.
 0264    REF   1                      6317  1 2444 0           TCF     RTB/BHIZ            14 - RETURN TO BASIC AND BRANCH HI ZERO.
 0265    REF   1                      6320  1 2504 0           TCF     CALL/ITA            15 - CALL AND STORE QPRET.
 0266    REF   1                      6321  1 2513 0           TCF     SW/                 16 - SWITCH INSTRUCTIONS AND AVAILABLE.
 0267    REF   1                      6322  1 2454 1           TCF     BOV(B)              17 - BRANCH ON OVERFLOW TO BASIC OR INT.
```

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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971  ZEUS     046  PAGE 1119

L        INTERPRETER                                                                         USER'S PAGE NO.  12        E0 S3

P0268              THE FOLLOWING JUMP TABLE APPIES TO UNARY INSTRUCTIONS.

 0269    REF    1                 00,2000                         SETLOC  INTERBO
 02695                            00,2000                         BANK

 0270    REF    1                                                 COUNT*  $$/INTER
 0271    REF    1                 00,2000  1 3206 1  UNAJUMP      TCF     SQRT          01 - SQUARE ROOT.
 0272    REF    1                 00,2001  1 3525 1               TCF     SINE          02 - SIN.
 0273    REF    1                 00,2002  1 3514 0               TCF     COSINE        03 - COS.
 0274    REF    1                 00,2003  1 3605 0               TCF     ARCSIN        04 - ARC SIN.
 0275    REF    1                 00,2004  1 3607 1               TCF     ARCCOS        05 - ARC COS.
 0276    REF    1                 00,2005  1 3173 0               TCF     DSQ           06 - DP SQUARE.
 0277    REF    1                 00,2006  1 2116 1               TCF     ROUND         07 - ROUND TO DP.

 0278    REF    1                 00,2007  1 7624 1               TCF     COMP          10 - COMPLEMENT VECTOR OR SCALAR.
 0279    REF    1                 00,2010  1 3231 0               TCF     VDEF          11 - VECTOR DEFINE.
 0280    REF    1                 00,2011  1 3022 0               TCF     UNIT          12 - UNIT VECTOR.
 0281    REF    1                 00,2012  1 3175 0               TCF     ABVALABS      13 - LENGTH OF VECTOR OR MAG OF SCALAR.
 0282    REF    1                 00,2013  1 3244 1               TCF     VSQ           14 - SQUARE OF LENGTH OF VECTOR.
 0283    REF    1                 00,2014  1 6323 1               TCF     STADR         15 - PUSH UP ON STORE CODE.
 0284    REF    1                 00,2015  1 3273 0               TCF     RVQ           16 - RETURN VIA QPRET.
 0285    REF    1                 00,2016  1 3246 0               TCF     PUSH          17 - PUSH MPAC DOWN.
```

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L          INTERPRETER                                                                 USER'S PAGE NO.  13       EU S3

P0286   SECTION 2  LOAD AND STORE PACKAGE.

R0287              A SET OF EIGHT STORE CODES IS PROVIDED AS THE PRIMARY METHOD OF STORING THE MULTI-PURPOSE
R0289   ACCUMULATOR (MPAC). IF IN THE DANZIG SECTION LOC REFERS TO AN ALGEBRAICALLY POSITIVE WORD, IT IS TAKEN AS A
R0291   STORE CODE WITH A CORRESPONDING ERASABLE ADDRESS. MOST OF THESE CODES ARE TWO ADDRESS, SPECIFYING THAT THE WORD
R0293   FOLLOWING THE STORE CODE IS TO BE USED AS AN ADDRESS FROM WHICH TO RE-LOAD MPAC. FOUR OPTIONS ARE AVAILABLE:

R0295              1. STORE                  STORE MPAC. THE E ADDRESS MAY BE INDEXED.
R0297              2. STODL                  STORE MPAC AND RE-LOAD IT IN DP WITH THE NEXT ADDRESS (THE LOAD MAY BE INDEXED).
R0299              3. STOVL                  STORE MPAC AND RE-LOAD A VECTOR (AS ABOVE).
R0301              4. STCALL                 STORE AND DO A CALL (BOTH ADDRESSES MUST BE DIRECT HERE).

R0303              STODL AND STOVL WILL TAKE FROM THE PUSH-DOWN LIST IF NO LOAD ADDRESS IS GIVEN.

 0305    REF   2  LAST 1108       6000                          SETLOC INTERF3
 03055                            6323                          BANK

 0306    REF   2 LAST 1108 TO 1119:    205   205*               COUNT* $$/INTER
 0307    REF   4  LAST 1109       6323  3 0165 0  STADR         CA     BANKSET          THE STADR CODE (PUSHUP UP ON STORE
 0308    REF  15  LAST 1116       6324  54 004 1                TS     FBANK            ADDRESS) ENTERS HERE.
 0309    REF  15  LAST 1115       6325  24 164 1                INCR   LOC
 0310    REF  16  LAST 1120       6326  50 164 1  ITR1          INDEX  LOC              THE STORECODE WAS STORED COMPLEMENTED TO
 0311                             6327  4 0000 0                CS     0                MAKE IT LOOK LIKE AN OPCODE PAIR.
 0312    REF  20  LAST 1099       6330  6 7702 0                AD     NEGONE           (YUL CANT REMOVE 1 BECAUSE OF EARLY CCS)

 0313    REF  14  LAST 1114       6331  54 116 0  DOSTORE       TS     ADDRWD
 0314    REF   6  LAST  357       6332  7 4347 1                MASK   LOW11            ENTRY FROM DISPATCHER. SAVE THE ERASABLE
 0315    REF  15  LAST 1120       6333  56 116 1                XCH    ADDRWD           ADDRESS AND JUMP ON THE STORE CODE NO.
 0316    REF   1                  6334  7 7656 1                MASK   B12T14
 0317                             6335  0 0006 1                EXTEND
 0318    REF  30  LAST 1041       6336  7 4764 1                MP     BIT5             EACH TRANSFER VECTOR ENTRY IS TWO WORDS.
 0319    REF 280  LAST 1116       6337  50 000 1  ITR0          INDEX  A
 0320    REF   1                  6340  1 6341 0                TCF    STORJUMP
```

```
P0321           STORE CODE JUMP TABLE. CALLS THE APPROPRIATE STORING ROUTINE AND EXITS TO DANZIG OR TO ADDRESS WITH
R0323   A SUPPLIED OPERATION CODE.

R03231          STORE STORE,1 AND STORE,2 RETURN TO DANZIG, THUS RESETTING THE EBANK TO ITS STATE AT INTPRET.

 0324   REF   1                6341  0 6371 1  STORJUMP TC      STORE          STORE.
 0325   REF  10  LAST  804     6342  1 6030 0           TCF     DANZIG         PICK UP NEW OP CODE(S).
 0326   REF   1                6343  0 6363 1           TC      STORE,1
 0327   REF  11  LAST 1121     6344  1 6030 0           TCF     DANZIG
 0328   REF   1                6345  0 6366 1           TC      STORE,2
 0329   REF  12  LAST 1121     6346  1 6030 0           TCF     DANZIG

 0330   REF   2  LAST 1121     6347  0 6371 1           TC      STORE          STODL.
 0331   REF   1                6350  1 6427 1           TCF     DODLOAD

 0332   REF   3  LAST 1121     6351  0 6371 1           TC      STORE          STODL WITH INDEXED LOAD ADDRESS.
 0333   REF   1                6352  1 6113 0           TCF     DODLOAD*

 0334   REF   4  LAST 1121     6353  0 6371 1           TC      STORE          STOVL.
 0335   REF   1                6354  1 6432 0           TCF     DOVLOAD

 0336   REF   5  LAST 1121     6355  0 6371 1           TC      STORE          STOVL WITH INDEXED LOAD ADDRESS.
 0337   REF   1                6356  1 6435 1           TCF     DOVLOAD*
 0338   REF   6  LAST 1121     6357  0 6371 1           TC      STORE          STOTC.
 0339   REF   1                6360  3 5002 0           CAF     CALLCODE
 0340   REF  20  LAST 1116     6361  54 020 1           TS      CYR
 0341   REF   1                6362  1 6221 1           TCF     15BITADR       GET A 15 BIT ADDRESS.
```

```
P0342           STORE CODE ADDRESS PROCESSOR.

 0343    REF  19  LAST 1112        6363  50 120 1  STORE,1  INDEX   FIXLOC
 0344    REF  47  LAST 1112        6364  4 0046 1           CS      X1
 0345    REF   1                   6365  1 6370 1           TCF     PRESTORE

 0346    REF  20  LAST 1122        6366  50 120 1  STORE,2  INDEX   FIXLOC
 0347    REF  29  LAST  940        6367  4 0047 0           CS      X2
 0348    REF  16  LAST 1120        6370  26 116 0  PRESTORE ADS     ADDRWD          RESULTANT ADDRESS IS IN ERASABLE.

 0349    REF  17  LAST 1122        6371  4 0116 0  STORE    CS      ADDRWD
 0350    REF   2  LAST 1028        6372  6 5006 1           AD      DEC45
 0351    REF 281  LAST 1120        6373  10 000 0           CCS     A               DOES THE ADDRESS POINT TO THE WORK AREA?
 0352    REF  21  LAST 1122        6374  3 0120 1           CA      FIXLOC          YES.
 0353    REF   1                   6375  1 6402 0           TCF     AHEAD5
 0354    REF   6  LAST 1112        6376  3 5024 1           CA      LCT1400         NO.  SET EBANK & MAKE UP SUBADDRESS.
 0355    REF  18  LAST 1122        6377  56 116 1           XCH     ADDRWD
 0356    REF  32  LAST 1112        6400  54 003 0           TS      EBANK
 0357    REF  10  LAST 1112        6401  7 4350 1           MASK    LOW8
 0358    REF  19  LAST 1122        6402  26 116 0  AHEAD5   ADS     ADDRWD
```

```
L        INTERPRETER                                                                                   USER'S PAGE NO.  16        P. 55

P0359                STORING ROUTINES. STORE DP, TP, OR VECTOR AS INDICATED BY MODE.

 0360                                  6403  0 0006 1  STARTSTO EXTEND                          MPAC,+1 MUST BE STORED IN ANY EVENT
R0361                ITRACE (5) REFERS TO "STARTSTO".
 0362    REF 290  LAST 1109            6404  3 0155 0           DCA     MPAC
 0363    REF  20  LAST 1122            6405  50 116 1           INDEX   ADDRWD
 0364                                  6406  52 001 1           DXCH    0

 0365    REF   8  LAST 1116            6407  10 163 1           CCS     MODE
 0366    REF   1                       6410  1 6423 0           TCF     TSTORE
 0367    REF 203  LAST 1106            6411  0 0002 0           TC      Q

 0368                                  6412  0 0006 1  VSTORE   EXTEND
 0369    REF 291  LAST 1123            6413  3 0160 0           DCA     MPAC +3
 0370    REF  21  LAST 1123            6414  50 116 1           INDEX   ADDRWD
 0371                                  6415  52 003 0           DXCH    2

 0372                                  6416  0 0006 1           EXTEND
 0373    REF 292  LAST 1123            6417  3 0162 1           DCA     MPAC +5
 0374    REF  22  LAST 1123            6420  50 116 1           INDEX   ADDRWD
 0375                                  6421  52 005 0           DXCH    4
 0376    REF 204  LAST 1123            6422  0 0002 0           TC      Q

 0377    REF 293  LAST 1123            6423  3 0156 0  TSTORE   CA      MPAC +2
 0378    REF  23  LAST 1123            6424  50 116 1           INDEX   ADDRWD
 0379                                  6425  54 002 1           TS      2
 0380    REF 205  LAST 1123            6426  0 0002 0           TC      Q
```

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L        INTERPRETER                                                                        USER'S PAGE NO. 17      EQ S3

P0381              ROUTINES TO BEGIN PROCESSING OF THE SECOND ADDRESS ASSOCIATED WITH ALL STORE-TYPE CODES EXCEPT STORE
R0383    ITSELF.

 0384    REF   1                     6427  3 7665 0  DODLOAD   CAF     DLOADCOD
 0385    REF  21  LAST 1121          6430  54 0020 1           TS      CYR
 0386    REF   1                     6431  1 6055 0            TCF     DIRADRES          GO GET A DIRECT ADDRESS.

 0387    REF   1                     6432  3 4752 0  DOVLOAD   CAF     VLOADCOD
 0388    REF  22  LAST 1124          6433  54 0020 1           TS      CYR
 0389    REF   2  LAST 1124          6434  1 6055 0            TCF     DIRADRES

 0390    REF   1                     6435  3 6056 1  DOVLOAD*  CAF     VLOAD*
 0391    REF   2  LAST 1121          6436  1 6114 1            TCF     DODLOAD* +1       PROLOGUE TO INDEX ROUTINE.
```

```
L        INTERPRETER                                                                       USER'S PAGE NO. 18        EQ S3

P0392              THE FOLLOWING LOAD INSTRUCTIONS ARE PROVIDED FOR LOADING THE MULTI-PURPOSE ACCUMULATOR MPAC.

 0394    REF  24  LAST 1123     6437  50 116 1  TLOAD    INDEX  ADDRWD
 0395                           6440  3 0002 0           CA     2                LOAD A TRIPLE PRECISION ARGUMENT INTO
 0396    REF 294  LAST 1123     6441  54 156 1           TS     MPAC +2          THE FIRST THREE MPAC REGISTERS, WITH THE
 0397                           6442  0 0006 1           EXTEND                  CONTENTS OF THE OTHER FOUR IRRELEVANT.
 0398    REF  25  LAST 1125     6443  5 0116 1           INDEX  ADDRWD
 0399                           6444  3 0001 0           DCA    0
 0400    REF 295  LAST 1125     6445  52 155 1           DXCH   MPAC
 0401    REF 126  LAST 1088     6446  3 4770 0  TMODE    CAF    ONE
 0402    REF   1                6447  1 6027 0           TCF    NEWMODE          DECLARE TRIPLE PRECISION MODE.

 0403                           6450  22 007 0  SLOAD    ZL                      LOAD A SINGLE PRECISION NUMBER INTO
 0404    REF  26  LAST 1125     6451  50 116 1           INDEX  ADDRWD           MPAC, SETTING MPAC+1,2 TO ZERO. THE
 0405                           6452  3 0000 1           CA     0                CONTENTS OF THE REMAINING MPAC REGISTERS
 0406    REF   1                6453  1 6024 0           TCF    SLOAD2           ARE IRRELEVANT.

 0407                           6454  0 0006 1  VLOAD    EXTEND                  LOAD A DOUBLE PRECISION VECTOR INTO
 0408    REF  27  LAST 1125     6455  5 0116 1           INDEX  ADDRWD           MPAC,+1, MPAC+3,4, AND MPAC+5,6. THE
 0409                           6456  3 0001 0           DCA    0                CONTENTS OF MPAC +2 ARE IRRELEVANT.
 0410    REF 296  LAST 1125     6457  52 155 1           DXCH   MPAC

 0411                           6460  0 0006 1  ENDVLOAD EXTEND                  PDVL COMES HERE TO FINISH UP FOR DP, TP.
 0412    REF  28  LAST 1125     6461  5 0116 1           INDEX  ADDRWD
 0413                           6462  3 0003 1           DCA    2
 0414    REF 297  LAST 1125     6463  52 160 1           DXCH   MPAC +3

 0415                           6464  0 0006 1   +4      EXTEND                  TPDVL FINISHES HERE.
 0416    REF  29  LAST 1125     6465  5 0116 1           INDEX  ADDRWD
 0417                           6466  3 0005 1           DCA    4
 0418    REF 298  LAST 1125     6467  52 162 0           DXCH   MPAC +5

 0419    REF 127  LAST 1125     6470  4 4770 1  VMODE    CS     ONE              DECLARE VECTOR MODE.
 0420    REF   2  LAST 1125     6471  1 6027 0           TCF    NEWMODE
```

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L        INTERPRETER                                                                                 USER'S PAGE NO.  19       E0 53

P0421              THE FOLLOWING INSTRUCTIONS ARE PROVIDED FOR STORING OPERANDS IN THE PUSHDOWN LIST:

R0423              1.  PUSH                   PUSHDOWN AND NO LOAD.
R0424              2.  PDDL                   PUSHDOWN AND DOUBLE PRECISION LOAD.
R0425              3.  PDVL                   PUSHDOWN AND VECTOR LOAD.

 0426                                6472  0 0006 1  PDDL      EXTEND
 0427   REF  30  LAST 1125           6473  5 0116 1            INDEX   ADDRWD          LOAD MPAC,+1, PUSHING THE FORMER
 0428                                6474  3 0001 0            DCA     0               CONTENTS DOWN.
 0429   REF 299  LAST 1125           6475  52 155 1            DXCH    MPAC
 0430   REF   2  LAST 1114           6476  50 166 0            INDEX   PUSHLOC
 0431                                6477  52 001 1            DXCH    0

 0432   REF   9  LAST 1123           6500  50 163 0            INDEX   MODE            ADVANCE THE PUSHDOWN POINTER APPRO-
 0433   REF   3  LAST 1114           6501  3 6213 1            CAF     NO.WDS          PRIATELY.
 0434   REF   3  LAST 1126           6502  26 166 1            ADS     PUSHLOC

 0435   REF  10  LAST 1126           6503  10 163 1            CCS     MODE
 0436   REF   1                      6504  1 6521 0            TCF     ENDTPUSH
 0437   REF   1                      6505  1 6517 0            TCF     ENDDPUSH

 0438   REF  11  LAST 1126           6506  54 163 1            TS      MODE            NOW DP.
 0439   REF 300  LAST 1126           6507  54 156 1  ENDVPUSH  TS      MPAC +2
 0440   REF 301  LAST 1126           6510  52 160 1            DXCH    MPAC +3         PUSH DOWN THE REST OF THE VECTOR HERE.
 0441   REF   4  LAST 1126           6511  50 166 0            INDEX   PUSHLOC
 0442                                6512  51'775 0            DXCH    0 -4

 0443   REF 302  LAST 1126           6513  52 162 0            DXCH    MPAC +5
 0444   REF   5  LAST 1126           6514  50 166 0            INDEX   PUSHLOC
 0445                                6515  51'777 1            DXCH    0 -2

 0446   REF  13  LAST 1121           6516  1 6030 0            TCF     DANZIG

 0447   REF 303  LAST 1126           6517  54 156 1  ENDDPUSH  TS      MPAC +2         SET MPAC +2 TO ZERO AND EXIT ON DP.
 0448   REF  14  LAST 1126           6520  1 6030 0            TCF     DANZIG

 0449   REF  12  LAST 1126           6521  54 163 1  ENDTPUSH  TS      MODE
 0450   REF 304  LAST 1126           6522  56 156 0            XCH     MPAC +2         ON TRIPLE, SET MPAC +2 TO ZERO, PUSHING
 0451   REF   6  LAST 1126           6523  50 166 0    +2      INDEX   PUSHLOC         DOWN THE OLD CONTENTS
 0452                                6524  53'777 0            TS      0 -1
 0453   REF  15  LAST 1126           6525  1 6030 0            TCF     DANZIG
```

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P0454             PDVL - PUSHDOWN AND VECTOR LOAD.

 0455                                6526  0 0006 1   PDVL      EXTEND                     RELOAD MPAC AND PUSH DOWN ITS CONTENTS.
 0456   REF  31  LAST 1126           6527  5 0116 1             INDEX   ADDRWD
 0457                                6530  3 0001 0             DCA     0
 0458   REF 305  LAST 1126           6531  52 155 1             DXCH    MPAC
 0459   REF   7  LAST 1126           6532  50 166 0             INDEX   PUSHLOC
 0460                                6533  52 001 1             DXCH    0

 0461   REF  13  LAST 1126           6534  50 163 0             INDEX   MODE               ADVANCE THE PUSHDOWN POINTER.
 0462   REF   4  LAST 1126           6535  3 6213 1             CAF     NO.WDS
 0463   REF   8  LAST 1127           6536  26 166 1             ADS     PUSHLOC

 0464   REF  14  LAST 1127           6537  10 163 1             CCS     MODE               TEST PAST MODE.
 0465   REF   1                      6540  1 6557 1             TCF     TPDVL
 0466   REF   1                      6541  1 6460 1             TCF     ENDVLOAD           JUST LOAD LAST FOUR REGISTERS ON UP.

 0467                                6542  0 0006 1   VPDVL     EXTEND                     PUSHDOWN AND RE-LOAD LAST TWO COMPONENTS
 0468   REF  32  LAST 1127           6543  5 0116 1             INDEX   ADDRWD
 0469                                6544  3 0003 1             DCA     2
 0470   REF 306  LAST 1127           6545  52 160 1             DXCH    MPAC +3
 0471   REF   9  LAST 1127           6546  50 166 0             INDEX   PUSHLOC
 0472                                6547  51'775 0             DXCH    0 -4

 0473                                6550  0 0006 1             EXTEND
 0474   REF  33  LAST 1127           6551  5 0116 1             INDEX   ADDRWD
 0475                                6552  3 0005 1             DCA     4
 0476   REF 307  LAST 1127           6553  52 162 0             DXCH    MPAC +5
 0477   REF  10  LAST 1127           6554  50 166 0             INDEX   PUSHLOC
 0478                                6555  51'777 1             DXCH    0 -2

 0479   REF  16  LAST 1126           6556  1 6030 0             TCF     DANZIG

 0480                                6557  0 0006 1   TPDVL     EXTEND                     ON TP, WE MUST LOAD THE Y COMPONENT
 0481   REF  34  LAST 1127           6560  5 0116 1             INDEX   ADDRWD             BEFORE STORING MPAC +2 INCASE THIS IS A
 0482                                6561  3 0003 1             DCA     2                  PUSHUP.
 0483   REF 308  LAST 1127           6562  52 160 1             DXCH    MPAC +3

 0484   REF 309  LAST 1127           6563  3 0156 0             CA      MPAC +2
 0485   REF  11  LAST 1127           6564  50 166 0             INDEX   PUSHLOC            IN UP.
 0486                                6565  53'777 0             TS      0 -1
 0487   REF   2  LAST 1127           6566  1 6464 0             TCF     ENDVLOAD +4

R0488             SSP (STORE SINGLE PRECISION) IS EXECUTED HERE.

 0489   REF  17  LAST 1120           6567  24 164 1   SSP       INCR    LOC                PICK UP THE WORD FOLLOWING THE GIVEN
 0490   REF  18  LAST 1127           6570  50 164 1             INDEX   LOC                ADDRESS AND STORE IT AT X.
 0491                                6571  3 0000 1             CA      0
 0492   REF  35  LAST 1127           6572  50 116 1   STORE1    INDEX   ADDRWD             SOME INDEX AND MISCELLANEOUS OPS END
 0493                                6573  54 000 0             TS      0                  HERE.
 0454  REF  17  LAST 1127      6574  1 6030 0         TCF    DANZIG
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L        INTERPRETER                                                                            USER'S PAGE NO. 22        E0 53

P0495    SEQUENCE CHANGING AND SUBROUTINE CALLING OPTIONS.

R0496              THE FOLLOWING OPERATIONS ARE AVAILABLE FOR SEQUENCING CHANGING, BRANCHING, AND CALLING SUBROUTINES:

R0498              1.  GOTO                  GO TO.
R0499              2.  CALL                  CALL SUBROUTINE SETTING QPRET.
R0500              3.  CGOTO                 COMPUTED GO TO.
R0501              4.  CCALL                 COMPUTED CALL.
R0502              7.  BPL                   BRANCH IF MPAC POSITIVE OR ZERO.
R0503              8.  BZE                   BRANCH IF MPAC ZERO.
R0504              9.  BMN                   BRANCH IF MPAC NEGATIVE NON-ZERO.

 0505    REF  19  LAST 1127      6575  24 164 1  CCALL     INCR    LOC               MAINTAIN LOC FOR QPRET COMPUTATION.
 0506    REF  20  LAST 1129      6576  50 164 1            INDEX   LOC
 0507                            6577  3 0000 1            CAF     0                 GET BASE ADDRESS OF CADR LIST.
 0508    REF  36  LAST 1127      6600  50 116 1            INDEX   ADDRWD
 0509                            6601  6 0000 1            AD      0                 ADD INCREMENT.
 0510    REF  16  LAST 1120      6602  54 004 1            TS      FBANK             SELECT DESIRED CADR.
 0511    REF  14  LAST 1112      6603  7 5041 0            MASK    LOW10
 0512    REF 282  LAST 1122      6604  50 000 1            INDEX   A
 0513                            6605  3 2000 0            CAF     10000
 0514    REF   6  LAST 1115      6606  54 117 1            TS      POLISH

 0515    REF   5  LAST 1120      6607  3 0165 0  CALL      CA      BANKSET           FOR ANY OF THE CALL OPTIONS, MAKE UP THE
 0516    REF   2  LAST 1116      6610  7 4344 1            MASK    BANKMASK          ADDRESS OF THE NEXT OP-CODE PAIR/STORE
 0517    REF   3  LAST 1129      6611  6 4344 0            AD      BANKMASK          CODE AND LEAVE IT IN QPRET.  NOTE THAT
 0518    REF  21  LAST 1129      6612  6 0164 1            AD      LOC               BANKMASK = -(2000 - 1).
 0519    REF  22  LAST 1122      6613  50 120 1            INDEX   FIXLOC
 0520    REF   5  LAST  797      6614  54 052 1            TS      QPRET

 0521    REF   7  LAST 1129      6615  3 0117 0  GOTO      CA      POLISH            BASIC BRANCHING SEQUENCE.
 0522    REF   4  LAST 1112      6616  7 7675 0   +1       MASK    HIGH4
 0523                            6617  0 0006 1            EXTEND
 0524    REF   1                 6620  1 6631 1            BZF     GOTOERS           SEE IF ADDRESS POINTS TO FIXED OR ERAS.
 0525    REF   6  LAST 1129      6621  3 0165 0   +4       CA      BANKSET           SET EBANK PART OF BBANK. NEXT, SET UP
 0526    REF  16  LAST 1109      6622  54 006 0            TS      BBANK             FBANK. THE COMBINATION IS PICKED UP &
 0527    REF   8  LAST 1129      6623  3 0117 0            CA      POLISH            PUT INTO BANKSET AT INTPRET +2.
 0528    REF  17  LAST 1129      6624  54 004 1            TS      FBANK
 0529    REF  15  LAST 1129      6625  7 5041 0            MASK    LOW10
 0530    REF   2  LAST 1112      6626  6 4756 1            AD      2K
 0531    REF  22  LAST 1129      6627  54 164 0            TS      LOC
 0532    REF 227  LAST 1108      6630  1 6011 0            TCF     INTPRET +3

 0533                       E3,1400                        EBANK=  1400              SO YUL DOESN'T CUSS THE "CA 1400" BELOW.

 0534    REF   9  LAST 1129      6631  3 0117 0  GOTOERS   CA      POLISH            THE GIVEN ADDRESS IS IN ERASABLE - SEE
 0535    REF   2  LAST 1111      6632  6 6220 1            AD      -ENDVAC           IF RELATIVE TO THE WORK AREA.
 0536    REF 283  LAST 1129      6633  10 000 0            CCS     A
 0537    REF  10  LAST 1129      6634  3 0117 0            CA      POLISH            GENERAL ERASABLE.
 0538    REF   1                 6635  1 6644 0            TCF     GOTOGE
```

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L         INTERPRETER                                                                                USER'S PAGE NO. 23       E3 S3

 0539     REF  23  LAST 1129       6636  3 0120 1            CA       FIXLOC              WORK AREA.
 0540     REF  11  LAST 1129       6637  6 0117 0            AD       POLISH
 0541     REF 284  LAST 1129       6640  50 000 1            INDEX    A                   USE THE GIVEN ADDRESS AS THE ADDRESS OF
 0542                              6641  3 0000 1            CA       0                   THE BRANCH ADDRESS.
 0543     REF  12  LAST 1130       6642  54 117 1            TS       POLISH
 0544     REF   1                  6643  1 6616 1            TCF      GOTO +1             ALLOWS ARBITRARY INDIRECTNESS LEVELS.

 0545     REF  33  LAST 1122       6644  54 003 0  GOTOGE    TS       EBANK
 0546     REF  11  LAST 1122       6645  7 4350 1            MASK     LOW8
 0547     REF 285  LAST 1130       6646  50 000 1            INDEX    A                   USE THE GIVEN ADDRESS AS THE ADDRESS OF
 0548                              6647  3 1400 1            CA       1400                THE BRANCH ADDRESS.
 0549     REF  13  LAST 1130       6650  54 117 1            TS       POLISH
 0550     REF   2  LAST 1130       6651  1 6616 1            TCF      GOTO +1

 0551     REF  23  LAST 1129       6652  50 164 1  CGOTO     INDEX    LOC                 COMPUTED GO TO. PICK UP ADDRESS OF CADR
 0552                              6653  3 0001 0            CA       1                   LIST.
 0553     REF  37  LAST 1129       6654  50 116 1            INDEX    ADDRWD              ADD MODIFIER.
 0554                              6655  6 0000 1            AD       0
 0555     REF  18  LAST 1129       6656  54 004 1            TS       FBANK               SELECT GOTO ADDRESS.
 0556     REF  16  LAST 1129       6657  7 5041 0            MASK     LOW10
 0557     REF 286  LAST 1130       6660  50 000 1            INDEX    A
 0558                              6661  3 2000 0            CA       10000
 0559     REF  14  LAST 1130       6662  54 117 1            TS       POLISH
 0560     REF   3  LAST 1130       6663  1 6616 1            TCF      GOTO +1             WITH ADDRESS IN A.

 0561     REF   7  LAST 1129       6664  3 0165 0  SWBRANCH  CA       BANKSET             SWITCH INSTRUCTIONS WHICH ELECT TO
 0562     REF  19  LAST 1130       6665  54 004 1            TS       FBANK               BRANCH COME HERE TO DO SO.
 0563     REF  24  LAST 1130       6666  50 164 1            INDEX    LOC
 0564                              6667  3 0001 0            CA       1
 0565     REF  15  LAST 1130       6670  54 117 1            TS       POLISH
 0566     REF   4  LAST 1130       6671  1 6616 1            TCF      GOTO +1
```

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P0567               TRIPLE PRECISION BRANCHING ROUTINE. IF CALLING TC IS AT L, RETURN IS AS FOLLOWS:

R0569               L+1  IF MPAC IS GREATER THAN ZERO.
R0570               L+2  IF MPAC IS EQUAL TO +0 OR -0.
R0571               L+3  IF MPAC IS LESS THAN ZERO.


  0572   REF 310  LAST 1127       6672  10 154 0  BRANCH   CCS     MPAC
  0573   REF 206  LAST 1123       6673  0 0002 0           TC      Q
  0574                            6674  1 6676 1           TCF     +2                  ON ZERO.
  0575   REF   1                  6675  1 6710 0           TCF     NEG

  0576   REF 311  LAST 1131       6676  10 155 1           CCS     MPAC +1
  0577   REF 207  LAST 1131       6677  0 0002 0           TC      Q
  0578                            6700  1 6702 0           TCF     +2
  0579   REF   2  LAST 1131       6701  1 6710 0           TCF     NEG

  0580   REF 312  LAST 1131       6702  10 156 1           CCS     MPAC +2
  0581   REF 208  LAST 1131       6703  0 0002 0           TC      Q
  0582                            6704  1 6706 1           TCF     +2
  0583   REF   3  LAST 1131       6705  1 6710 0           TCF     NEG

  0584   REF 209  LAST 1131       6706  50 002 0  Q+1      INDEX   Q
  0585                            6707  0 0001 0           TC      1

  0586   REF 210  LAST 1131       6710  50 002 0  NEG      INDEX   Q                   IF FIRST NON-ZERO REGISTER WAS NEGATIVE.
  0587                            6711  0 0002 0  TCQ      TC      2


  0588   REF   4  LAST 1131       6710            Q+2      =       NEG

R0589               ITRACE (3) REFERS TO "EXIT".
  0590   REF   8  LAST 1130       6712  3 0165 0  EXIT     CA      BANKSET             RESTORE USER'S BANK SETTING, AND LEAVE
  0591   REF  17  LAST 1129       6713  54 006 0           TS      BBANK               INTERPRETIVE MODE.
  0592   REF  25  LAST 1130       6714  50 164 1           INDEX   LOC
  0593                            6715  0 0001 0           TC      1
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L       INTERPRETER                                                                         USER'S PAGE NO.  25      E3 S3

P0594   SECTION 3 - ADD/SUBTRACT PACKAGE.

R0595           THE FOLLOWING OPERATIONS ARE PROVIDED FOR ADDING TO AND SUBTRACTING FROM THE MULTI-PURPOSE ACCUMULATOR
R0597   MPAC:

R0598               1.  DAD                 DOUBLE PRECISION ADD.
R0599               2.  DSU                 DOUBLE PRECISION SUBTRACT.
R0600               3.  BDSU                DOUBLE PRECISION SUBTRACT FROM.

R0601               4.  TAD                 TRIPLE PRECISION ADD.

R0602               5.  VAD                 VECTOR ADD.
R0603               6.  VSU                 VECTOR SUBTRACT.
R0604               7.  BVSU                VECTOR SUBTRACT FROM.

R0605   THE INTERPRETIVE OVERFLOW INDICATOR OVFIND IS SET NON-ZERO IF OVERFLOW OCCURS IN ANY OF THE ABOVE.

  0607  REF  40  LAST 1108      6716  3 4752 0  VSU       CAF     BIT15              CHANGES 0 TO DCS.
  0608                          6717  1 6721 1            TCF     +2

  0609  REF   9  LAST  988      6720  3 4346 1  VAD       CAF     PRIO30             CHANGES 0 TO DCA.
  0610  REF  38  LAST 1130      6721  26 116 0            ADS     ADDRWD
  0611                          6722  0 0006 1            EXTEND
  0612  REF  39  LAST 1132      6723  5 0116 1            INDEX   ADDRWD
  0613  REF   2  LAST  432      6724  00 003 1            READ    HISCALAR           DCA  2   OR   DCS  2
  0614  REF 313  LAST 1131      6725  20 160 1            DAS     MPAC +3
  0615                          6726  0 0006 1            EXTEND                     CHECK OVERFLOW.
  0616                          6727  1 6731 0            BZF     +2
  0617  REF   1                 6730  0 6763 0            TC      OVERFLWY

  0618                          6731  0 0006 1            EXTEND
  0619  REF  40  LAST 1132      6732  5 0116 1            INDEX   ADDRWD
  0620  REF   8  LAST 1061      6733  00 005 1            READ    CHAN5              DCA  4  OR  DCS  4
  0621  REF 314  LAST 1132      6734  20 162 0            DAS     MPAC +5
  0622                          6735  0 0006 1            EXTEND
  0623                          6736  1 6740 0            BZF     +2
  0624  REF   1                 6737  0 6760 0            TC      OVERFLWZ

  0625                          6740  0 0006 1            EXTEND
  0626  REF  41  LAST 1132      6741  5 0116 1            INDEX   ADDRWD
  0627  REF  15  LAST 1079      6742  00 001 0            READ    LCHAN              DCA  0  OR  DCS  0
  0628  REF   1                 6743  1 6747 1            TCF     ENDVXV

  0629                          6744  0 0006 1  DAD       EXTEND
  0630  REF  42  LAST 1132      6745  5 0116 1            INDEX   ADDRWD
  0631                          6746  3 0001 0            DCA     0
  0632  REF 315  LAST 1132      6747  20 155 1  ENDVXV    DAS     MPAC               VXV FINISHES HERE.
  0633                          6750  0 0006 1            EXTEND
  0634  REF  18  LAST 1128      6751  1 6030 0            BZF     DANZIG
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L        INTERPRETER                                                     USER'S PAGE NO.  26      E3 S3

 0635    REF   1                  6752  0 6766 0   SETOVF    TC       OVERFLOW
 0636    REF  19  LAST 1132       6753  1 6030 0             TCF      DANZIG
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  0637                                 6754  0 0006 1  DSU      EXTEND
  0638    REF  43  LAST 1132           6755  5 0116 1           INDEX   ADDRWD
  0639                                 6756  4 0001 1           DCS     0
  0640    REF   2  LAST 1132           6757  1 6747 1           TCF     ENDVXV

  0641    REF 137  LAST 1106           6760  54 001 1  OVERFLWZ TS      L                ENTRY FOR THIRD COMPONENT.
  0642    REF  25  LAST 1068           6761  3 4773 0           CAF     FIVE
  0643                                 6762  1 6765 1           TCF     +3

  0644    REF 138  LAST 1134           6763  54 001 1  OVERFLWY TS      L                ENTRY FOR SECOND COMPONENT.
  0645    REF  42  LAST 1090           6764  3 6214 0           CAF     THREE
  0646    REF 139  LAST 1134           6765  56 001 0           XCH     L

  0647    REF 287  LAST 1130           6766  50 000 1  OVERFLOW INDEX   A                ENTRY FOR 1ST COMP OR DP (L=0).
  0648    REF   5  LAST 1065           6767  4 4751 1           CS      LIMITS           PICK UP POSMAX OR NEGMAX.
  0649    REF  44  LAST  382           6770  54 130 1           TS      BUF
  0650                                 6771  0 0006 1           EXTEND
  0651    REF 288  LAST 1134           6772  24 000 1           AUG     A                FORCE OVERFLOW.
  0652    REF 140  LAST 1134           6773  50 001 0           INDEX   L
  0653    REF 316  LAST 1132           6774  26 155 1           ADS     MPAC +1
  0654                                 6775  54 007 1           TS      7
  0655    REF 207  LAST 1108           6776  3 4772 1           CAF     ZERO
  0656    REF  45  LAST 1134           6777  6 0130 0           AD      BUF
  0657    REF 141  LAST 1134           7000  50 001 0           INDEX   L
  0658    REF 317  LAST 1134           7001  26 154 0           ADS     MPAC
  0659                                 7002  54 007 1           TS      7
  0660    REF 211  LAST 1131           7003  0 0002 0           TC      Q                NO OVERFLOW EXIT.
  0661    REF   1                      7004  1 7121 0           TCF     SETOVF2          SET OVFIND AND EXIT.

  0662                                 7005  0 0006 1  EVSU     EXTEND
  0663    REF  44  LAST 1134           7006  5 0116 1           INDEX   ADDRWD
  0664                                 7007  3 0003 1           DCA     2
  0665    REF 318  LAST 1134           7010  52 160 1           DXCH    MPAC +3
  0666                                 7011  0 0006 1           EXTEND
  0667                                 7012  4 0001 1           DCOM
  0668    REF 319  LAST 1134           7013  20 160 1           DAS     MPAC +3
  0669                                 7014  0 0006 1           EXTEND
  0670                                 7015  1 7017 1           BZF     +2
  0671    REF   2  LAST 1132           7016  0 6763 0           TC      OVERFLWY

  0672                                 7017  0 0006 1           EXTEND
  0673    REF  45  LAST 1134           7020  5 0116 1           INDEX   ADDRWD
  0674                                 7021  3 0005 1           DCA     4
  0675    REF 320  LAST 1134           7022  52 162 0           DXCH    MPAC +5
  0676                                 7023  0 0006 1           EXTEND
  0677                                 7024  4 0001 1           DCOM
  0678    REF 321  LAST 1134           7025  20 162 0           DAS     MPAC +5
  0679                                 7026  0 0006 1           EXTEND
  0680                                 7027  1 7031 0           BZF     +2
  0681    REF   2  LAST 1132           7030  0 6760 0           TC      OVERFLWZ
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L         INTERPRETER                                                                USER'S PAGE NO. 28       E3 S3

 0682                              7031  0 0006 1  BDSU       EXTEND
 0683   REF  46  LAST 1134         7032  5 0116 1             INDEX    ADDRWD
 0684                              7033  3 0001 0             DCA      0
 0685   REF 322  LAST 1134         7034  52 155 1             DXCH     MPAC
 0686                              7035  0 0006 1             EXTEND
 0687                              7036  4 0001 1             DCOM
 0688   REF   3  LAST 1134         7037  1 6747 1             TCF      ENDVXV
```

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P0689              TRIPLE PRECISION ADD ROUTINE.

 0690                               7040  0 0006 1   TAD       EXTEND
 0691   REF  47  LAST 1135          7041  5 0116 1             INDEX   ADDRWD
 0692                               7042  3 0002 0             DCA     1                 ADD MINOR PARTS FIRST.
 0693   REF 323  LAST 1135          7043  20 156 1             DAS     MPAC +1
 0694   REF  48  LAST 1136          7044  50 116 1             INDEX   ADDRWD
 0695                               7045  6 0000 1             AD      0
 0696   REF 324  LAST 1136          7046  6 0154 1             AD      MPAC
 0697   REF 325  LAST 1136          7047  54 154 0             TS      MPAC
 0698   REF  20  LAST 1133          7050  1 6030 0             TCF     DANZIG

 0699   REF   1                     7051  1 6752 0             TCF     SETOVF            SET OVFIND IF SUCH OCCURS.
```

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P0700   ARITHMETIC SUBROUTINES REQUIRED IN FIXED-FIXED.

R0701           1.  DMPSUB      DOUBLE PRECISION MULTIPLY. MULTIPLY THE CONTENTS OF MPAC,+1 BY THE DP WORD WHOSE ADDRESS
R0703                           IS IN ADDRWD AND LEAVE A TRIPLE PRECISION RESULT IN MPAC.
R0705           2.  ROUNDSUB    ROUND THE TRIPLE PRECISON CONTENTS OF MPAC TO DOUBLE PRECISION.
R0707           3.  DOTSUB      TAKE THE DOT PRODUCT OF THE VECTOR IN MPAC AND THE VECTOR WHOSE ADDRESS IS IN ADDRWD
R0709                           AND LEAVE THE TRIPLE PRECISION RESULT IN MPAC.
R0710           4.  POLY        USING THE CONTENTS OF MPAC AS A DP ARGUMENT, EVALUATE THE POLYNOMIAL WHOSE DEGREE AND
R0712                           COEFFICIENTS IMMEDIATELY FOLLOW THE TC POLY INSTRUCTION (SEE ROUTINE FOR DETAILS.)


 0714   REF 212  LAST 1134      7052  50 002 0  DMP       INDEX  Q                   BASIC SUBROUTINE FOR USE BY PINBALL, ETC
 0715                           7053  3 0000 1            CAF    0                   ADRES OF ARGUMENT FOLLOWS  TC DMP  .
 0716   REF 213  LAST 1137      7054  24 002 0            INCR   Q
 0717   REF  49  LAST 1136      7055  54 116 0    -1      TS     ADDRWD              (PROLOGUE FOR SETTING ADDRWD.)

 0718   REF  50  LAST 1137      7056  50 116 1  DMPSUB    INDEX  ADDRWD              GET MINOR PART OF OPERAND AT C(ADDRWD).
 0719                           7057  3 0001 0            CA     1
 0720   REF 326  LAST 1136      7060  54 156 1            TS     MPAC +2             THIS WORKS FOR SQUARING MPAC AS WELL.
 0721   REF 208  LAST 1134      7061  3 4772 1            CAF    ZERO                SET MPAC +1 TO ZERO SO WE CAN ACCUMULATE
 0722   REF 327  LAST 1137      7062  56 155 0            XCH    MPAC +1             THE PARTIAL PRODUCTS WITH DAS
 0723   REF   7  LAST 1105      7063  54 135 1            TS     MPTEMP              INSTRUCTIONS.
 0724                           7064  0 0006 1            EXTEND
 0725   REF 328  LAST 1137      7065  7 0156 1            MP     MPAC +2             MINOR OF MPAC X MINOR OF C(ADDRWD).

 0726   REF 329  LAST 1137      7066  56 156 0            XCH    MPAC +2             DISCARD MINOR PART OF ABOVE RESULT AND
 0727                           7067  0 0006 1            EXTEND                     FORM MAJOR OF MPAC X MINOR OF C(ADDRWD).
 0728   REF 330  LAST 1137      7070  7 0154 0            MP     MPAC
 0729   REF 331  LAST 1137      7071  20 156 1            DAS    MPAC +1             GUARANTEED NO OVERFLOW.

 0730   REF  51  LAST 1137      7072  50 116 1            INDEX  ADDRWD              GET MAJOR PART OF ARGUMENT AT C(ADDRWD).
 0731                           7073  3 0000 1            CA     0
 0732   REF   8  LAST 1137      7074  56 135 0            XCH    MPTEMP              SAVE AND BRING OUT MINOR OF MPAC.
 0733                           7075  0 0006 1  DMPSUB2   EXTEND
 0734   REF   9  LAST 1137      7076  7 0135 1            MP     MPTEMP              MAJOR OF C(ADDRWD) X MINOR OF MPAC.
 0735   REF 332  LAST 1137      7077  20 156 1            DAS    MPAC +1             ACCUMULATE, SETTING A TO NET OVERFLOW.

 0736   REF 333  LAST 1137      7100  56 154 1            XCH    MPAC                SETTING MPAC TO 0 OR +-1.
 0737                           7101  0 0006 1            EXTEND
 0738   REF  10  LAST 1137      7102  7 0135 1            MP     MPTEMP              MAJOR OF MPAC X MAJOR OF C(ADDRWD).
 0739   REF 334  LAST 1137      7103  20 155 1            DAS    MPAC                GUARANTEED NO OVERFLOW.
 0740   REF 214  LAST 1137      7104  0 0002 0            TC     Q                   49 MCT = .573 MS. INCLUDING RETURN.
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P0741            ROUND MPAC TO DOUBLE PRECISION, SETTING OVFIND ON THE RARE EVENT OF OVERFLOW.

 0743   REF 209  LAST 1137       7105  3 4772 1  ROUNDSUB CAF     ZERO              SET MPAC +2 = 0 FOR SCALARS AND CHANGE
 0744   REF  15  LAST 1127       7106  54 163 1   +1      TS      MODE              MODE TO DP.

 0745   REF 335  LAST 1137       7107  56 156 0  VROUND   XCH     MPAC +2           BUT WE NEEDNT TAKE THE TIME FOR VECTORS.
 0746                            7110  6 0000 1           DOUBLE
 0747   REF 142  LAST 1134       7111  54 001 1           TS      L
 0748   REF 215  LAST 1137       7112  0 0002 0           TC      Q

 0749   REF 336  LAST 1138       7113  6 0155 0           AD      MPAC +1           ADD ROUNDING BIT IF MPAC +2 WAS GREATER
 0750   REF 337  LAST 1138       7114  54 155 1           TS      MPAC +1           THAN .5 IN MAGNITUDE.
 0751   REF 216  LAST 1138       7115  0 0002 0           TC      Q

 0752   REF 338  LAST 1138       7116  6 0154 1           AD      MPAC              PROPAGATE INTERFLOW.
 0753   REF 339  LAST 1138       7117  54 154 0           TS      MPAC
 0754   REF 217  LAST 1138       7120  0 0002 0           TC      Q

 0755   REF   2  LAST  898       7121  54 121 1  SETOVF2  TS      OVFIND            (RARE).
 0756   REF 218  LAST 1138       7122  0 0002 0           TC      Q
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P0757            THE DOT PRODUCT SUBROUTINE USUALLY FORMS THE DOT PRODUCT OF THE VECTOR IN MPAC WITH A STANDARD SIX
R0759    REGISTER VECTOR WHOSE ADDRESS IS IN ADDRWD. IN THIS CASE C(DOTINC) ARE SET TO 2. VXM, HOWEVER, SETS C(DOTINC) TO
R0761    6 SO THAT DOTSUB DOTS MPAC WITH A COLUMN VECTOR OF THE MATRIX IN QUESTION IN THIS CASE.


 0763    REF  48  LAST 1102        7123  3 4767 0  PREDOT    CAF     TWO               PROLOGUE TO SET DOTINC TO 2.
 0764    REF   4  LAST   71        7124  54 136 1            TS      DOTINC

 0765                              7125  0 0006 1  DOTSUB    EXTEND
 0766    REF   5  LAST   71        7126  22 137 1            QXCH    DOTRET            SAVE RETURN.
 0767    REF   1                   7127  0 7056 0            TC      DMPSUB            DOT X COMPONENTS.
 0768    REF 340  LAST 1138        7130  52 160 1            DXCH    MPAC +3           POSITION Y COMPONENT OF MPAC FOR
 0769    REF 341  LAST 1139        7131  52 155 1            DXCH    MPAC              MULTIPLICATION WHILE SAVING RESULT IN
 0770    REF  46  LAST 1134        7132  52 131 0            DXCH    BUF               THREE WORD BUFFER, BUF.
 0771    REF 342  LAST 1139        7133  3 0156 0            CA      MPAC +2
 0772    REF  47  LAST 1139        7134  54 132 0            TS      BUF +2

 0773    REF   5  LAST 1139        7135  3 0136 0            CA      DOTINC            ADVANCE ADDRWD TO Y COMPONENT OF
 0774    REF  52  LAST 1137        7136  26 116 0            ADS     ADDRWD            OTHER ARGUMENT.
 0775    REF   2  LAST 1139        7137  0 7056 0            TC      DMPSUB
 0776    REF 343  LAST 1139        7140  52 156 1            DXCH    MPAC +1           ACCUMULATE PARTIAL PRODUCTS.
 0777    REF  48  LAST 1139        7141  20 132 0            DAS     BUF +1
 0778    REF 344  LAST 1139        7142  6 0154 1            AD      MPAC
 0779    REF  49  LAST 1139        7143  6 0130 0            AD      BUF
 0780    REF  50  LAST 1139        7144  54 130 1            TS      BUF
 0781                              7145  1 7147 0            TCF     +2
 0782    REF   3  LAST 1138        7146  54 121 1            TS      OVFIND            IF OVERFLOW OCCURS.

 0783    REF 345  LAST 1139        7147  52 162 0            DXCH    MPAC +5           MULTIPLY Z COMPONENTS.
 0784    REF 346  LAST 1139        7150  52 155 1            DXCH    MPAC
 0785    REF   6  LAST 1139        7151  3 0136 0            CA      DOTINC
 0786    REF  53  LAST 1139        7152  26 116 0            ADS     ADDRWD
 0787    REF   3  LAST 1139        7153  0 7056 0            TC      DMPSUB
 0788    REF  51  LAST 1139        7154  52 132 0  ENDDOT    DXCH    BUF +1            LEAVE FINAL ACCUMULATION IN MPAC.
 0789    REF 347  LAST 1139        7155  20 156 1            DAS     MPAC +1
 0790    REF 348  LAST 1139        7156  6 0154 1            AD      MPAC
 0791    REF  52  LAST 1139        7157  6 0130 0            AD      BUF
 0792    REF 349  LAST 1139        7160  54 154 0            TS      MPAC
 0793    REF   6  LAST 1139        7161  0 0137 1            TC      DOTRET

 0794    REF   2  LAST 1133        7162  0 6766 0            TC      OVERFLOW          ON OVERFLOW HERE.
 0795    REF   7  LAST 1139        7163  0 0137 1            TC      DOTRET
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P0796   DOUBLE PRECISION POLYNOMIAL EVALUATOR

R0797                                       N        N-1
R0798             THIS ROUTINE EVALUATES A X  + A    X    + ... + A X + A  LEAVING THE DP RESULT IN MPAC ON EXIT.
R0800                                     N      N-1               1     0

R0801   THE ROUTINE HAS TWO ENTRIES

R0802             1. ENTRY THRU POWRSERS. THE COEFFICIENTS MAY BE EITHER IN FIXED OR ERASABLE, THE CALL IS BY
R0804                TC POWRSERS, AND THE RETURN IS TO LOC(TC POWRSERS)+1. THE ENTERING DATA MUST BE AS FOLLOWS

A0806                                            A        SP     LOC-3            ADDRESS FOR REFERENCING COEF TABLE
A0807                                            L        SP     N-1              N IS THE DEGREE OF THE POWER SERIES
A0808                                            MPAC     DP     X                ARGUMENT

A0809                                            LOC-2N   DP     A(0)
A0810                                                     ...
A0811                                            LOC      DP     A(N)

R0812             2. ENTRY THRU POLY. THE CALL TO POLY AND THE ENTERING DATA MUST BE AS FOLLOWS

A0814                                            MPAC     DP     X                ARGUMENT

A0815                                            LOC      TC     POLY
A0816                                            LOC+1    SP     N-1
A0817                                            LOC+2    DP     A(0)
A0818                                                     ...
A0819                                            LOC+2N+2 DP     A(N)             RETURN IS TO LOC+2N+4

 0820                            7164  0 0006 1  POWRSERS EXTEND
 0821   REF    1                 7165  22 141 0           QXCH   POLYRET          RETURN ADDRESS
 0822   REF   16  LAST 1130      7166  54 117 1           TS     POLISH           POWER SERIES ADDRESS
 0823   REF    1                 7167  22 140 1           LXCH   POLYCNT          N-1 TO COUNTER
 0824   REF    1                 7170  1 7201 1           TCF    POLYCOM          SKIP SET UP BY POLY

 0825   REF  219  LAST 1138      7171  50 002 0  POLY     INDEX  Q
 0826                            7172  3 0000 1           CAF    0
 0827   REF    2  LAST 1140      7173  54 140 0           TS     POLYCNT          N-1 TO COUNTER
 0828                            7174  6 0000 1           DOUBLE
 0829   REF  220  LAST 1140      7175  6 0002 0           AD     Q
 0830   REF   17  LAST 1140      7176  54 117 1           TS     POLISH           L(A(N))-3 TO POLISH
 0831   REF   26  LAST 1134      7177  6 4773 0           AD     FIVE
 0832   REF    2  LAST 1140      7200  54 141 1           TS     POLYRET          STORE RETURN ADDRESS

 0833   REF    1                 7201  3 6242 0  POLYCOM  CAF    LVBUF            INCOMING X WILL BE MOVED TO VBUF, SO
 0834   REF   54  LAST 1139      7202  54 116 0           TS     ADDRWD           SET ADDRWD SO DMPSUB WILL MPY BY VBUF.

 0835                            7203  0 0006 1           EXTEND
 0836   REF   18  LAST 1140      7204  5 0117 0           INDEX  POLISH
 0837                            7205  3 0004 0           DCA    3
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0838  REF 350  LAST 1139   7206  52 155 1             DXCH    MPAC           LOAD A(N) INTO MPAC,
0839  REF  22  LAST 1116   7207  52 123 0             DXCH    VBUF           SAVING X IN VBUF
0840  REF   1              7210   1 7214 0            TCF     POLY2

0841  REF   3  LAST 1140   7211  54 140 0   POLYLOOP  TS      POLYCNT        SAVE DECREMENTED LOOP COUNTER
0842  REF  49  LAST 1139   7212   4 4767 1            CS      TWO
0843  REF  19  LAST 1140   7213  26 117 1             ADS     POLISH         REGRESS COEFFICIENT POINTER

0844  REF   4  LAST 1139   7214   0 7056 0  POLY2     TC      DMPSUB         MULTIPLY BY X
0845                       7215   0 0006 1            EXTEND
0846  REF  20  LAST 1141   7216   5 0117 0            INDEX   POLISH
0847                       7217   3 0002 0            DCA     1              ADD IN NEXT COEFFICIENT
0848  REF 351  LAST 1141   7220  20 155 1             DAS     MPAC           USERS RESPONSIBILITY TO ASSURE NO OVFLOW

0849  REF   4  LAST 1141   7221  10 140 0             CCS     POLYCNT
0850  REF   1              7222   1 7211 0            TCF     POLYLOOP
0851  REF   3  LAST 1140   7223   0 0141 0            TC      POLYRET        RETURN CALLER
```

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P0852                  MISCELLANEOUS MULTI-PRECISION ROUTINES REQUIRED IN FIXED-FIXED BUT NOT USED BY THE INTERPRETER.

085398 REF 210  LAST 1138       7224  3 4772 1  DPAGREE   CAF      ZERO                DOUBLE PRECISION ENTRY -
085399 REF 352  LAST 1141       7225  54 156 1  BUFAGREE  TS       MPAC +2
0854   REF 221  LAST 1140       7226  22 002 0  TPAGREE   LXCH     Q                   FORCE SIGN AGREEMENT AMONG THE TRIPLE
0855   REF   1                  7227  0 6672 1            TC       BRANCH              PRECISION CONTENTS OF MPAC.  RETURNING
0856   REF   1                  7230  1 7234 1            TCF      ARG+                WITH SIGNUM OF THE INPUT IN A.
0857   REF   1                  7231  1 7254 1            TCF      ARGZERO

0858   REF  27  LAST 1072       7232  4 4750 0            CS       POSMAX              IF NEGATIVE.
0859                            7233  1 7235 0            TCF      +2

0860   REF  28  LAST 1142       7234  3 4750 1  ARG+      CAF      POSMAX
0861   REF 222  LAST 1142       7235  54 002 1            TS       Q
0862                            7236  0 0006 1            EXTEND
0863   REF 289  LAST 1134       7237  24 000 1            AUG      A                   FORMS +-1.0.
0864   REF 353  LAST 1142       7240  6 0156 0            AD       MPAC +2
0865   REF 354  LAST 1142       7241  54 156 1            TS       MPAC +2
0866   REF 211  LAST 1142       7242  3 4772 1            CAF      ZERO
0867   REF 223  LAST 1142       7243  6 0002 0            AD       Q
0868   REF 355  LAST 1142       7244  6 0155 0            AD       MPAC +1
0869   REF 356  LAST 1142       7245  54 155 1            TS       MPAC +1
0870   REF 212  LAST 1142       7246  3 4772 1            CAF      ZERO
0871   REF 224  LAST 1142       7247  6 0002 0            AD       Q                   Q STILL HAS POSMAX OR NEGMAX IN IT.
0872   REF 357  LAST 1142       7250  6 0154 1            AD       MPAC
0873   REF 358  LAST 1142       7251  54 154 0  ARGZERO2  TS       MPAC                ALWAYS SKIPPING UNLESS ARGZERO.
0874   REF 359  LAST 1142       7252  54 155 1            TS       MPAC +1
0875   REF 143  LAST 1138       7253  0 0001 0            TC       L                   RETURN VIA L.

0876   REF 360  LAST 1142       7254  54 156 1  ARGZERO   TS       MPAC +2             SET ALL THREE MPAC REGISTERS TO ZERO.
0877   REF   1                  7255  1 7251 1            TCF      ARGZERO2

R0878                  SHORTMP MULTIPLIES THE TP CONTENTS OF MPAC BY THE SINGLE PRECISION NUMBER ARRIVING IN A.

0880   REF  11  LAST 1137       7256  54 135 1  SHORTMP   TS       MPTEMP
0881                            7257  0 0006 1    +1      EXTEND
0882   REF 361  LAST 1142       7260  7 0156 1            MP       MPAC +2
0883   REF 362  LAST 1142       7261  54 156 1            TS       MPAC +2
0884   REF 213  LAST 1142       7262  3 4772 1  SHORTMP2  CAF      ZERO                SO SUBSEQUENT DAS WILL WORK.
0885   REF 363  LAST 1142       7263  56 155 0            XCH      MPAC +1
0886   REF   1                  7264  1 7075 0            TCF      DMPSUB2
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P0904   MISCELLANEOUS VECTOR OPERATIONS. INCLUDED HERE ARE THE FOLLOWING:

R0905             1.  DOT                 DP VECTOR DOT PRODUCT.
R0906             2.  VXV                 DP VECTOR CROSS PRODUCT.
R0907             3.  VXSC                DP VECTOR TIMES SCALAR.
R0908             4.  V/SC                DP VECTOR DIVIDED BY SCALAR.
R0909             5.  VPROJ               DP VECTOR PROJECTION. ( (MPAC.X)MPAC ).
R0910             6.  VXM                 DP VECTOR POST-MULTIPLIED BY MATRIX.
R0911             7.  MXV                 DP VECTOR PRE-MULTIPLIED BY MATRIX.


 0912   REF   1                 7265  0 7123 0  DOT      TC      PREDOT          DO THE DOT PRODUCT AND EXIT, CHANGING
 0913   REF 214  LAST 1142      7266  3 4772 1  DMODE    CAF     ZERO            THE MODE TO DP SCALAR.
 0914   REF   3  LAST 1125      7267  1 6027 0           TCF     NEWMODE

 0915   REF  50  LAST 1141      7270  3 4767 0  MXV      CAF     TWO             SET UP MATINC AND DOTINC FOR ROW
 0916   REF   5  LAST   71      7271  54 140 0           TS      MATINC          VECTORS.
 0917   REF   1                 7272  1 7276 1           TCF     VXM/MXV         GO TO COMMON PORTION.

 0918   REF   9  LAST 1069      7273  4 4355 1  VXM      CS      TEN             SET MATINC AND DOTINC TO REFER TO MATRIX
 0919   REF   6  LAST 1143      7274  54 140 0           TS      MATINC          AS THREE COLUMN VECTORS.
 0920   REF  29  LAST 1056      7275  3 6211 0           CAF     SIX
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P0921              COMMCN PORTION OF MXV AND VXM.

 0922   REF   7  LAST 1139      7276  54 136 1  VXM/MXV  TS      DOTINC
R0923               ITRACE (2) REFERS TO "VXM/MXV".
 0924   REF   1                 7277  0 7466 1           TC      MPACVBUF         SAVE VECTOR IN MPAC FOR FURTHER USE.

 0925   REF   1                 7300  0 7125 0           TC      DOTSUB           GO DOT TO GET X COMPONENT OF ANSWER.
 0926                           7301  0 0006 1           EXTEND
 0927   REF  23  LAST 1141      7302  3 0123 1           DCA     VBUF             MOVE MPAC VECTOR BACK INTO MPAC, SAVING
 0928   REF 364  LAST 1142      7303  52 155 1           DXCH    MPAC             NEW X COMPONENT IN BUF2.
 0929   REF  11  LAST 1105      7304  52 134 0           DXCH    BUF2
 0930                           7305  0 0006 1           EXTEND
 0931   REF  24  LAST 1144      7306  3 0125 1           DCA     VBUF +2
 0932   REF 365  LAST 1144      7307  52 160 1           DXCH    MPAC +3
 0933                           7310  0 0006 1           EXTEND
 0934   REF  25  LAST 1144      7311  3 0127 0           DCA     VBUF +4
 0935   REF 366  LAST 1144      7312  52 162 0           DXCH    MPAC +5
 0936   REF   7  LAST 1143      7313  3 0140 1           CA      MATINC           INITIALIZE ADDRWD FOR NEXT DOT PRODUCT.
 0937   REF  55  LAST 1140      7314  26 116 0           ADS     ADDRWD           FORMS BASE ADDRESS OF NEXT COLUMN(ROW).

 0938   REF   2  LAST 1144      7315  0 7125 0           TC      DOTSUB
 0939   REF  26  LAST 1144      7316  52 123 0           DXCH    VBUF             MOVE GIVEN VECTOR BACK TO MPAC, SAVING Y
 0940   REF 367  LAST 1144      7317  52 155 1           DXCH    MPAC             COMPONENT OF ANSWER IN VBUF +2.
 0941   REF  27  LAST 1144      7320  52 125 0           DXCH    VBUF +2
 0942   REF 368  LAST 1144      7321  52 160 1           DXCH    MPAC +3
 0943   REF  28  LAST 1144      7322  52 127 1           DXCH    VBUF +4
 0944   REF 369  LAST 1144      7323  52 162 0           DXCH    MPAC +5
 0945   REF   8  LAST 1144      7324  3 0140 1           CA      MATINC           FORM ADDRESS OF LAST COLUMN OR ROW.
 0946   REF  56  LAST 1144      7325  26 116 0           ADS     ADDRWD

 0947   REF   3  LAST 1144      7326  0 7125 0           TC      DOTSUB
 0948   REF  12  LAST 1144      7327  52 134 0           DXCH    BUF2             ANSWER NOW COMPLETE. PUT COMPONENTS INTO
 0949   REF 370  LAST 1144      7330  52 155 1           DXCH    MPAC             PROPER MPAC REGISTERS.
 0950   REF 371  LAST 1144      7331  52 162 0           DXCH    MPAC +5
 0951   REF  29  LAST 1144      7332  52 125 0           DXCH    VBUF +2
 0952   REF 372  LAST 1144      7333  52 160 1           DXCH    MPAC +3
 0953   REF  21  LAST 1136      7334  1 6030 0           TCF     DANZIG           EXIT.
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P0954            VXSC - VECTOR TIMES SCALAR.

 0955   REF  16  LAST 1138      7335  10 163 1  VXSC      CCS     MODE           TEST PRESENT MODE.
 0956   REF   1                 7336   1 7364 0           TCF     DVXSC          SEPARATE ROUTINE WHEN SCALAR IS IN MPAC.
 0957   REF   2  LAST 1145      7337   1 7364 0           TCF     DVXSC

 0958   REF   5  LAST 1141      7340   0 7056 0 VVXSC     TC      DMPSUB         COMPUTE X COMPONENT
 0959   REF   1                 7341   0 7107 0           TC      VROUND         AND ROUND IT.
 0960   REF 373  LAST 1144      7342  52 160 1            DXCH    MPAC +3        PUT Y COMPONENT INTO MPAC SAVING MPAC IN
 0961   REF 374  LAST 1145      7343  52 155 1            DXCH    MPAC           MPAC +3.
 0962   REF 375  LAST 1145      7344  52 160 1            DXCH    MPAC +3

 0963   REF   6  LAST 1145      7345   0 7056 0           TC      DMPSUB         DO SAME FOR Y AND Z COMPONENTS.
 0964   REF   2  LAST 1145      7346   0 7107 0           TC      VROUND
 0965   REF 376  LAST 1145      7347  52 162 0            DXCH    MPAC +5
 0966   REF 377  LAST 1145      7350  52 155 1            DXCH    MPAC
 0967   REF 378  LAST 1145      7351  52 162 0            DXCH    MPAC +5

 0968   REF   7  LAST 1145      7352   0 7056 0           TC      DMPSUB
 0969   REF   3  LAST 1145      7353   0 7107 0           TC      VROUND
 0970   REF 379  LAST 1145      7354  52 155 1  VROTATEX  DXCH    MPAC           EXIT USED TO RESTORE MPAC AFTER THIS
 0971   REF 380  LAST 1145      7355  52 162 0            DXCH    MPAC +5        TYPE OF ROTATION. CALLED BY VECTOR SHIFT
 0972   REF 381  LAST 1145      7356  52 160 1            DXCH    MPAC +3        RIGHT, V/SC, ETC.
 0973   REF 382  LAST 1145      7357  52 155 1            DXCH    MPAC
 0974   REF  22  LAST 1144      7360   1 6030 0           TCF     DANZIG
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P0975             DP VECTOR PROJECTION ROUTINE.

 0976   REF   2  LAST 1143     7361  0 7123 0  VPROJ    TC       PREDOT              (MPAC.X)MPAC IS COMPUTED AND LEFT IN
 0977   REF  16  LAST 1058     7362  4 4766 0           CS       FOUR                MPAC. DO DOT AND FALL INTO DVXSC.
 0978   REF  57  LAST 1144     7363  26 116 0           ADS      ADDRWD

R0979             VXSC WHEN SCALAR ARRIVES IN MPAC AND VECTOR IS AT X.

 0980                          7364  0 0006 1  DVXSC    EXTEND                       SAVE SCALAR IN MPAC +3 AND GET X
 0981   REF 383  LAST 1145     7365  3 0155 0           DCA      MPAC                COMPONENT OF ANSWER.
 0982   REF 384  LAST 1146     7366  52 160 1           DXCH     MPAC +3
 0983   REF   8  LAST 1145     7367  0 7056 0           TC       DMPSUB
 0984   REF   4  LAST 1145     7370  0 7107 0           TC       VROUND

 0985   REF  51  LAST 1143     7371  3 4767 0           CAF      TWO                 ADVANCE ADDRWD TO Y COMPONENT OF X.
 0986   REF  58  LAST 1146     7372  26 116 0           ADS      ADDRWD
 0987                          7373  0 0006 1           EXTEND
 0988   REF 385  LAST 1146     7374  3 0160 0           DCA      MPAC +3             PUT SCALAR BACK INTO MPAC AND SAVE
 0989   REF 386  LAST 1146     7375  52 155 1           DXCH     MPAC                X RESULT IN MPAC +5.
 0990   REF 387  LAST 1146     7376  52 162 0           DXCH     MPAC +5
 0991   REF   9  LAST 1146     7377  0 7056 0           TC       DMPSUB
 0992   REF   5  LAST 1146     7400  0 7107 0           TC       VROUND

 0993   REF  52  LAST 1146     7401  3 4767 0           CAF      TWO
 0994   REF  59  LAST 1146     7402  26 116 0           ADS      ADDRWD              TO Z COMPONENT.
 0995   REF 388  LAST 1146     7403  52 160 1           DXCH     MPAC +3             BRING SCALAR BACK, PUTTING Y RESULT IN
 0996   REF 389  LAST 1146     7404  52 155 1           DXCH     MPAC                THE PROPER PLACE.
 0997   REF 390  LAST 1146     7405  52 160 1           DXCH     MPAC +3
 0998   REF  10  LAST 1146     7406  0 7056 0           TC       DMPSUB
 0999   REF   6  LAST 1146     7407  0 7107 0           TC       VROUND

 1000   REF 391  LAST 1146     7410  52 155 1           DXCH     MPAC                PUT Z COMPONENT IN PROPER PLACE, ALSO
 1001   REF 392  LAST 1146     7411  52 162 0           DXCH     MPAC +5             POSITIONING X.
 1002   REF 393  LAST 1146     7412  52 155 1           DXCH     MPAC

 1003   REF   1                7413  1 6470 0           TCF      VMODE               MODE HAS CHANGED TO VECTOR.
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L        INTERPRETER                                                                  USER'S PAGE NO. 40       E3 53

P1004            THE VECTOR CROSS PRODUCT ROUTINE CALCULATES (X M -X M ,X M -X M ,X M -X M ) WHERE M IS THE VECTOR IN
R1006                                                          3 2  2 3  1 3  3 1  2 1  1 2
R1008    MPAC AND X THE VECTOR AT THE GIVEN ADDRESS.


  1009                            7414  0 0006 1   VXV      EXTEND
  1010   REF 394  LAST 1146       7415  3 0162 1            DCA     MPAC +5          FORM UP M3X1, LEAVING M1 IN VBUF.
  1011   REF 395  LAST 1147       7416  52 155 1            DXCH    MPAC
  1012   REF  30  LAST 1144       7417  52 123 0            DXCH    VBUF
  1013   REF  11  LAST 1146       7420  0 7056 0            TC      DMPSUB           BY X1.

  1014                            7421  0 0006 1            EXTEND
  1015   REF 396  LAST 1147       7422  4 0160 1            DCS     MPAC +3          CALCULATE -X1M2, SAVING X1M3 IN VBUF +2.
  1016   REF 397  LAST 1147       7423  52 155 1            DXCH    MPAC
  1017   REF  31  LAST 1147       7424  52 125 0            DXCH    VBUF +2
  1018   REF  12  LAST 1147       7425  0 7056 0            TC      DMPSUB

  1019   REF  53  LAST 1146       7426  3 4767 0            CAF     TWO              ADVANCE ADDRWD TO X2.
  1020   REF  60  LAST 1146       7427  26 116 0            ADS     ADDRWD
  1021                            7430  0 0006 1            EXTEND
  1022   REF 398  LAST 1147       7431  4 0162 0            DCS     MPAC +5          PREPARE TO GET -X2M3, SAVING -X1M2 IN
  1023   REF 399  LAST 1147       7432  52 155 1            DXCH    MPAC             MPAC +5.
  1024   REF 400  LAST 1147       7433  52 162 0            DXCH    MPAC +5
  1025   REF  13  LAST 1147       7434  0 7056 0            TC      DMPSUB

  1026                            7435  0 0006 1            EXTEND
  1027   REF  32  LAST 1147       7436  3 0123 1            DCA     VBUF             GET X2M1, SAVING -X2M3 IN VBUF +4.
  1028   REF 401  LAST 1147       7437  52 155 1            DXCH    MPAC
  1029   REF  33  LAST 1147       7440  52 127 1            DXCH    VBUF +4
  1030   REF  14  LAST 1147       7441  0 7056 0            TC      DMPSUB

  1031   REF  54  LAST 1147       7442  3 4767 0            CAF     TWO              ADVANCE ADDRWD TO X3.
  1032   REF  61  LAST 1147       7443  26 116 0            ADS     ADDRWD
  1033                            7444  0 0006 1            EXTEND
  1034   REF  34  LAST 1147       7445  4 0123 0            DCS     VBUF             GET -X3M1, ADDING X2M1 TO MPAC +5 TO
  1035   REF 402  LAST 1147       7446  52 155 1            DXCH    MPAC             COMPLETE THE Z COMPONENT OF THE ANSWER.
  1036   REF 403  LAST 1147       7447  20 162 0            DAS     MPAC +5

  1037                            7450  0 0006 1            EXTEND
  1038                            7451  1 7453 0            BZF     +2
  1039   REF   3  LAST 1134       7452  0 6760 0            TC      OVERFLWZ

  1040   REF  15  LAST 1147       7453  0 7056 0            TC      DMPSUB
  1041   REF  35  LAST 1147       7454  52 125 0            DXCH    VBUF +2          MOVE X1M3 TO MPAC +3 SETTING UP FOR X3M2
  1042   REF 404  LAST 1147       7455  52 160 1            DXCH    MPAC +3          AND ADD -X3M1 TO MPAC +3 TO COMPLETE THE
  1043   REF 405  LAST 1147       7456  52 155 1            DXCH    MPAC             Y COMPONENT OF THE RESULT.
  1044   REF 406  LAST 1147       7457  20 160 1            DAS     MPAC +3

  1045                            7460  0 0006 1            EXTEND
  1046                            7461  1 7463 0            BZF     +2
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 1047   REF   3  LAST 1134      7462  0 6763 0               TC      OVERFLWY

 1048   REF  16  LAST 1147      7463  0 7056 0               TC      DMPSUB
 1049   REF  36  LAST 1147      7464  52 127 1               DXCH    VBUF +4            GO ADD -X2M3 TO X3M2 TO COMPLETE THE X
 1050   REF   4  LAST 1135      7465  1 6747 1               TCF     ENDVXV             COMPONENT (TAIL END OF DAD).

R1051                THE MPACVBUF SUBROUTINE SAVES THE VECTOR IN MPAC IN VBUF WITHOUT CLOBBERING MPAC.

 1053                           7466  0 0006 1  MPACVBUF EXTEND                         CALLED BY MXV, VXM, AND UNIT.
 1054   REF 407  LAST 1147      7467  3 0155 0               DCA     MPAC
 1055   REF  37  LAST 1148      7470  52 123 0               DXCH    VBUF
 1056                           7471  0 0006 1               EXTEND
 1057   REF 408  LAST 1148      7472  3 0160 0               DCA     MPAC +3
 1058   REF  38  LAST 1148      7473  52 125 0               DXCH    VBUF +2
 1059                           7474  0 0006 1               EXTEND
 1060   REF 409  LAST 1148      7475  3 0162 1               DCA     MPAC +5
 1061   REF  39  LAST 1148      7476  52 127 1               DXCH    VBUF +4
 1062   REF 225  LAST 1142      7477  0 0002 0               TC      Q                  RETURN TO CALLER.

R1063                DOUBLE PRECISION SIGN AGREE ROUTINE. ARRIVE WITH INPUT IN A+L. OUTPUT IS IN A + L.

 1065   REF 290  LAST 1142      7500  10 000 0  ALSIGNAG CCS     A                  TEST UPPER PART.
 1066   REF   1                 7501  1 7505 1               TCF     UPPOS              IT IS POSITIVE
 1067   REF 226  LAST 1148      7502  0 0002 0               TC      Q                  ZERO
 1068   REF   1                 7503  1 7515 0               TCF     UPNEG              NEGATIVE
 1069   REF 227  LAST 1148      7504  0 0002 0               TC      Q                  ZERO

 1070   REF 144  LAST 1142      7505  56 001 0  UPPOS    XCH     L                  SAVE DECREMENTED UPPER PART.
 1071   REF  11  LAST 1092      7506  6 4753 1               AD      HALF
 1072   REF  12  LAST 1148      7507  6 4753 1               AD      HALF
 1073   REF 291  LAST 1148      7510  54 000 0               TS      A                  SKIPS ON OVERFLOW
 1074                           7511  1 7513 0               TCF     +2
 1075   REF 145  LAST 1148      7512  24 001 0               INCR    L                  RESTORE UPPER TO ROIGINAL VALUE
 1076   REF 146  LAST 1148      7513  56 001 0               XCH     L                  SWAP A + L BACK.
 1077   REF 228  LAST 1148      7514  0 0002 0               TC      Q

 1078   REF 147  LAST 1148      7515  56 001 0  UPNEG    XCH     L                  SAVE COMPLEMENTED + DECREMENTED UPPER PT
 1079   REF  11  LAST 1061      7516  6 4752 0               AD      NEGMAX
 1080   REF  21  LAST 1120      7517  6 7702 0               AD      NEGONE
 1081   REF 292  LAST 1148      7520  54 000 0               TS      A
 1082                           7521  1 7523 0               TCF     +2                 DONT INCREMENT IF NO OVERFLOW.
 1083   REF 148  LAST 1148      7522  24 001 0               INCR    L
 1084   REF 149  LAST 1148      7523  56 001 0               XCH     L
 1085                           7524  4 0000 0               COM                        MAKE NEGATIVE AGAIN.
 1086   REF 229  LAST 1148      7525  0 0002 0               TC      Q
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P1087             INTERPRETIVE INSTRUCTIONS WHOSE EXECUTION CONSISTS OF PRINCIPALLY CALLING SUBROUTINES.

  1089   REF  17  LAST 1148      7526  0 7056 0  DMP1     TC      DMPSUB             DMP INSTRUCTION.
  1090   REF  23  LAST 1145      7527  1 6030 0           TCF     DANZIG

  1091   REF  16  LAST 1149      7530  0 7056 0  DMPR     TC      DMPSUB
  1092   REF   1                 7531  0 7106 1           TC      ROUNDSUB +1        (C(A) = +0).
  1093   REF  24  LAST 1149      7532  1 6030 0           TCF     DANZIG

  1094                           7533  0 0006 1  DDV      EXTEND
  1095   REF  62  LAST 1147      7534  5 0116 1           INDEX   ADDRWD             MOVE DIVIDEND INTO BUF.
  1096                           7535  3 0001 0           DCA     0
  1097   REF   2  LAST 1117      7536  1 7543 0           TCF     BDDV +4

  1098                           7537  0 0006 1  BDDV     EXTEND                     MOVE DIVISOR INTO MPAC SAVING MPAC, THE
  1099   REF  63  LAST 1149      7540  5 0116 1           INDEX   ADDRWD             DIVIDEND, IN BUF.
  1100                           7541  3 0001 0           DCA     0
  1101   REF 410  LAST 1148      7542  52 155 1           DXCH    MPAC
  1102   REF  53  LAST 1139      7543  52 131 0   +4      DXCH    BUF
  1103   REF 215  LAST 1143      7544  3 4772 1           CAF     ZERO               DIVIDE ROUTINES IN BANK 0.
  1104   REF  20  LAST 1130      7545  54 004 1           TS      FBANK
  1105   REF   1                 7546  1 2353 1           TCF     DDV/BDDV

  1106   REF  64  LAST 1149      7547  3 0116 1  SETPD    CA      ADDRWD             MUST SET TO WORK AREA, OR EBANK TROUBLE.
  1107   REF  12  LAST 1127      7550  54 166 1           TS      PUSHLOC
  1108   REF   1                 7551  1 6032 1           TCF     NOIBNKSW           NO FBANK SWITCH REQUIRED.

  1109   REF 216  LAST 1149      7552  3 4772 1  TSLC     CAF     ZERO               SHIFTING ROUTINES LOCATED IN BANK 00.
  1110   REF  21  LAST 1149      7553  54 004 1           TS      FBANK
  1111   REF   1                 7554  1 2172 0           TCF     TSLC2

  1112   REF   7  LAST 1109      7555  3 6043 0  GSHIFT   CAF     LOW7               USED AS MASK AT GENSHIFT. THIS PROCESSES
  1113   REF  22  LAST 1149      7556  54 004 1           TS      FBANK              ANY SHIFT INSTRUCTION (EXCEPT TSLC) WITH
  1114   REF   1                 7557  1 2214 0           TCF     GENSHIFT           AN ADDRESS (ROUTINES IN BANK 0).
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P1115           THE FOLLOWING IS THE PROLOGUE TO V/SC. IF THE PRESENT MODE IS VECTOR, IT SAVES THE SCALAR AT X IN BUF
R1117     AND CALLS THE V/SC ROUTINE IN BANK 0. IF THE PRESENT MODE IS SCALAR, IT MOVES THE VECTOR AT X INTO MPAC, SAVING
R1119     THE SCALAR IN MPAC IN BUF BEFORE CALLING THE V/SC ROUTINE IN BANK 0.


  1120    REF  17  LAST 1145       7560  10 163 1  V/SC      CCS     MODE
  1121    REF   1                  7561  1 7572 1            TCF     DV/SC               MOVE VECTOR INTO MPAC.
  1122    REF   2  LAST 1150       7562  1 7572 1            TCF     DV/SC

  1123                             7563  0 0006 1  VV/SC     EXTEND
  1124    REF  65  LAST 1149       7564  5 0116 1            INDEX   ADDRWD
  1125                             7565  3 0001 0            DCA     0
  1126    REF  54  LAST 1149       7566  52 131 0  V/SC1     DXCH    BUF                 IN BOTH CASES, VECTOR IS NOW IN MPAC AND
  1127    REF 217  LAST 1149       7567  3 4772 1            CAF     ZERO                SCALAR IN BUF.
  1128    REF  23  LAST 1149       7570  54 004 1            TS      FBANK
  1129    REF   1                  7571  1 2653 1            TCF     V/SC2

  1130                             7572  0 0006 1  DV/SC     EXTEND
  1131    REF  66  LAST 1150       7573  5 0116 1            INDEX   ADDRWD
  1132                             7574  3 0003 1            DCA     2
  1133    REF 411  LAST 1149       7575  52 160 1            DXCH    MPAC +3
  1134                             7576  0 0006 1            EXTEND
  1135    REF  67  LAST 1150       7577  5 0116 1            INDEX   ADDRWD
  1136                             7600  3 0005 1            DCA     4
  1137    REF 412  LAST 1150       7601  52 162 0            DXCH    MPAC +5

  1138    REF 128  LAST 1125       7602  4 4770 1            CS      ONE                 CHANGE MODE TO VECTOR.
  1139    REF  18  LAST 1150       7603  54 163 1            TS      MODE

  1140                             7604  0 0006 1            EXTEND
  1141    REF  68  LAST 1150       7605  5 0116 1            INDEX   ADDRWD
  1142                             7606  3 0001 0            DCA     0
  1143    REF 413  LAST 1150       7607  52 155 1            DXCH    MPAC
  1144    REF   1                  7610  1 7566 1            TCF     V/SC1               FINISH PROLOGUE AT COMMON SECTION.
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P1145            SIGN AND COMPLEMENT INSTRUCTIONS.

  1146    REF  69  LAST 1150        7611  50 116 1  SIGN      INDEX  ADDRWD          CALL COMP INSTRUCTION IF WORD AT X IS
  1147                              7612  10 000 0            CCS    0               NEGATIVE NON-ZERO.
  1148    REF  25  LAST 1149        7613  1 6030 0            TCF    DANZIG
  1149                              7614  1 7616 0            TCF    +2
  1150    REF   2  LAST 1119        7615  1 7624 1            TCF    COMP            DO THE COMPLEMENT.

  1151    REF  70  LAST 1151        7616  50 116 1            INDEX  ADDRWD
  1152                              7617  10 001 1  CCSL      CCS    L
  1153    REF  26  LAST 1151        7620  1 6030 0            TCF    DANZIG
  1154    REF  27  LAST 1151        7621  1 6030 0            TCF    DANZIG
  1155    REF   3  LAST 1151        7622  1 7624 1            TCF    COMP
  1156    REF  28  LAST 1151        7623  1 6030 0            TCF    DANZIG
  1157                              7624  0 0006 1  COMP      EXTEND                 COMPLEMENT DP MPAC IN EVERY CASE.
  1158    REF 414  LAST 1150        7625  4 0155 1            DCS    MPAC
  1159    REF 415  LAST 1151        7626  52 155 1            DXCH   MPAC

  1160    REF  19  LAST 1150        7627  10 163 1            CCS    MODE            EITHER COMPLEMENT MPAC +3 OR THE REST OF
  1161    REF   1                   7630  1 7641 1            TCF    DCOMP           THE VECTOR ACCUMULATOR.
  1162    REF   2  LAST 1151        7631  1 7641 1            TCF    DCOMP

  1163                              7632  0 0006 1            EXTEND                 VECTOR COMPLEMENT.
  1164    REF 416  LAST 1151        7633  4 0160 1            DCS    MPAC +3
  1165    REF 417  LAST 1151        7634  52 160 1            DXCH   MPAC +3
  1166                              7635  0 0006 1            EXTEND
  1167    REF 418  LAST 1151        7636  4 0162 0            DCS    MPAC +5
  1168    REF 419  LAST 1151        7637  52 162 0            DXCH   MPAC +5
  1169    REF  29  LAST 1151        7640  1 6030 0            TCF    DANZIG

  1170    REF 420  LAST 1151        7641  4 0156 1  DCOMP     CS     MPAC +2
  1171    REF 421  LAST 1151        7642  54 156 1            TS     MPAC +2
  1172    REF  30  LAST 1151        7643  1 6030 0            TCF    DANZIG
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P1173          THE FOLLOWING SHORT SHIFT CODES REQUIRE NO ADDRESS WORD:

R1174          1.  SR1 TO SR4          SCALAR SHIFT RIGHT.
R1175          2.  SR1R TO SR4R        SCALAR SHIFT RIGHT AND ROUND.
R1176          3.  SL1 TO SL4          SCALAR SHIFT LEFT.
R1177          4.  SL1R TO SL4R        SCALAR SHIFT LEFT AND ROUND.

R1178          5.  VSR1 TO VSR8        VECTOR SHIFT RIGHT (ALWAYS ROUNDS).
R1179          6.  VSL1 TO VSL8        VECTOR SHIFT LEFT (NEVER ROUNDS).

R1180          THE FOLLOWING CODES REQUIRE AN ADDRESS WHICH MAY BE INDEXED:*

R1181          1.  SR                  SCALAR SHIFT RIGHT.
R1182          2.  SRR                 SCALAR SHIFT RIGHT AND ROUND.
R1183          3.  SL                  SCALAR SHIFT LEFT.
R1184          4.  SLR                 SCALAR SHIFT LEFT AND ROUND.

R1185          5.  VSR                 VECTOR SHIFT RIGHT.
R1186          6.  VSL                 VECTOR SHIFT LEFT.

R1187   *  IF THE ADDRESS IS INDEXED, AND THE INDEX MODIFICATION RESULTS IN A NEGATIVE SHIFT COUNT, A SHIFT OF THE
R1189   ABSOLUTE VALUE OF THE COUNT IS DONE IN THE OPPOSITE DIRECTION.


 1190   REF   2  LAST 1119   00,2000                           SETLOC  INTERB0
 11905                       00,2017                           BANK

 1191   REF   2 LAST 1119 TO 1120:     15     15*              COUNT*  $$/INTER
 1192   REF  30  LAST 1143   00,2017  3 6211 0  SHORTT         CAF     SIX              SCALAR SHORT SHIFTS COME HERE. THE SHIFT
 1193   REF  23  LAST 1124   00,2020  7 0020 1                 MASK    CYR              COUNT-1 IS NOW IN BITS 2-3 OF CYR. THE
 1194   REF  17  LAST 1091   00,2021  54 021 0                 TS      SR               ROUNDING BIT IS IN BIT1 AT THIS POINT.

 1195   REF  24  LAST 1152   00,2022  10 020 1                 CCS     CYR              SEE IF RIGHT OR LEFT SHIFT DESIRED.
 1196   REF   1              00,2023  1 2101 1                 TCF     TSSL             SHIFT LEFT.

 1197                        00,2024   00024 1  SRDDV          DEC     20               MPTEMP SETTING FOR SR BEFORE DDV.

 1198   REF  18  LAST 1152   00,2025  50 021 1  TSSR           INDEX   SR               GET SHIFTING BIT.
 1199   REF  51  LAST 1038   00,2026  3 4753 1                 CAF     BIT14
 1200   REF  12  LAST 1142   00,2027  54 135 1                 TS      MPTEMP

 1201   REF  25  LAST 1152   00,2030  10 020 1                 CCS     CYR              SEE IF A ROUND IS DESIRED.
 1202   REF   1              00,2031  0 2050 0  RIGHTR         TC      MPACSRND         YES - SHIFT RIGHT AND ROUND.
 1203   REF   4  LAST 1143   00,2032  1 6027 0                 TCF     NEWMODE          SET MODE TO DP (C(A) = 0).
 1204   REF  13  LAST 1152   00,2033  3 0135 0  MPACSHR        CA      MPTEMP           DO A TRIPLE PRECISION SHIFT RIGHT.
 1205                        00,2034  0 0006 1                 EXTEND
 1206   REF 422  LAST 1151   00,2035  7 0156 1                 MP      MPAC +2
 1207   REF 423  LAST 1152   00,2036  54 156 1   +3            TS      MPAC +2          (EXIT FROM SQRT AND ABVAL).
 1208   REF  14  LAST 1152   00,2037  3 0135 0                 CA      MPTEMP
 1209                        00,2040  0 0006 1                 EXTEND
 1210   REF 424  LAST 1152   00,2041  7 0154 0            MP      MPAC          SHIFT MAJOR PART INTO A,L AND PLACE IN
 1211   REF 425  LAST 1153   00,2042  52 155 1            DXCH    MPAC          MPAC,+1.
 1212   REF  15  LAST 1152   00,2043  3 0135 0            CA      MPTEMP
 1213                        00,2044  0 0006 1            EXTEND
 1214   REF 150  LAST 1148   00,2045  7 0001 1            MP      L             ORIGINAL C(MPAC +1).
 1215   REF 426  LAST 1153   00,2046  20 156 1            DAS     MPAC +1       GUARANTEED NO OVERFLOW.
 1216   REF  31  LAST 1151   00,2047  1 6030 0            TCF     DANZIG

R1217            MPAC SHIFT RIGHT AND ROUND SUBROUTINES.

 1218   REF 427  LAST 1153   00,2050  3 0156 0  MPACSRND CA      MPAC +2       WE HAVE TO DO ALL THREE MULTIPLIES SINCE
 1219                        00,2051  0 0006 1            EXTEND                MPAC +1 AND MPAC +2 MIGHT HAVE SIGN
 1220   REF  16  LAST 1153   00,2052  7 0135 1            MP      MPTEMP        DISAGREEMENT WITH A SHIFT RIGHT OF 1.
 1221   REF 428  LAST 1153   00,2053  56 155 0            XCH     MPAC +1
 1222                        00,2054  0 0006 1            EXTEND
 1223   REF  17  LAST 1153   00,2055  7 0135 1            MP      MPTEMP
 1224   REF 429  LAST 1153   00,2056  56 155 0            XCH     MPAC +1       TRIAL MINOR PART.
 1225   REF 151  LAST 1153   00,2057  6 0001 0            AD      L

 1226                        00,2060  6 0000 1  VSHR2     DOUBLE                (FINISH VECTOR COMPONENT SHIFT RIGHT
 1227   REF 430  LAST 1153   00,2061  54 156 1            TS      MPAC +2       AND ROUND.
 1228                        00,2062  1 2064 0            TCF     +2
 1229   REF 431  LAST 1153   00,2063  26 155 1            ADS     MPAC +1       GUARANTEED NO OVERFLOW.

 1230   REF 218  LAST 1150   00,2064  3 4772 1            CAF     ZERO
 1231   REF 432  LAST 1153   00,2065  54 156 1            TS      MPAC +2
 1232   REF 433  LAST 1153   00,2066  56 154 1            XCH     MPAC          SETTING TO ZERO SO FOLLOWING DAS WORKS.
 1233                        00,2067  0 0006 1            EXTEND
 1234   REF  18  LAST 1153   00,2070  7 0135 1            MP      MPTEMP
 1235   REF 434  LAST 1153   00,2071  20 155 1            DAS     MPAC          AGAIN NO OVERFLOW.
 1236   REF 230  LAST 1148   00,2072  0 0002 0            TC      Q

 1237   REF  19  LAST 1153   00,2073  3 0135 0  VSHRRND   CA      MPTEMP        ENTRY TO SHIFT RIGHT AND ROUND MPAC WHEN
 1238                        00,2074  0 0006 1            EXTEND                MPAC CONTAINS A VECTOR COMPONENT.
 1239   REF 435  LAST 1153   00,2075  7 0155 1            MP      MPAC +1
 1240   REF 436  LAST 1153   00,2076  54 155 1            TS      MPAC +1
 1241   REF 152  LAST 1153   00,2077  56 001 0            XCH     L
 1242   REF   1              00,2100  1 2060 1            TCF     VSHR2         GO ADD ONE IF NECESSARY AND FINISH.
```

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P1243               ROUTINE FOR SHORT SCALAR SHIFT LEFT (AND MAYBE ROUND).

  1244   REF  19  LAST 1152   00,2101  3 0021 1  TSSL       CA       SR                      GET SHIFT COUNT FOR SR.
  1245   REF  20  LAST 1153   00,2102  54 135 1   +1        TS       MPTEMP

  1246                        00,2103  0 0006 1   +2        EXTEND                           ENTRY HERE FROM SL FOR SCALARS.
  1247   REF 437  LAST 1153   00,2104  3 0156 0             DCA      MPAC +1                 SHIFTING LEFT ONE PLACE AT A TIME IS
  1248   REF 438  LAST 1154   00,2105  20 156 1             DAS      MPAC +1                 FASTER THAN DOING THE WHOLE SHIFT WITH
  1249   REF 439  LAST 1154   00,2106  6 0154 1             AD       MPAC                    MULTIPLIES ASSUMING THAT FREQUENCY OF
  1250   REF 440  LAST 1154   00,2107  6 0154 1             AD       MPAC                    SHIFT COUNTS GOES DOWN RAPIDLY AS A
  1251   REF 441  LAST 1154   00,2110  54 154 0             TS       MPAC                    FUNCTION OF THEIR MAGNITUDE.
  1252                        00,2111  1 2113 1             TCF      +2
  1253   REF   4  LAST 1139   00,2112  54 121 1             TS       OVFIND                  OVERFLOW. (LEAVES OVERFLOW-CORRECTED
 A1254                                                                                       RESULT ANYWAY).
  1255   REF  21  LAST 1154   00,2113  10 135 1             CCS      MPTEMP                  LOOP ON DECREMENTED SHIFT COUNT.
  1256   REF   2  LAST 1152   00,2114  1 2102 1             TCF      TSSL +1

  1257   REF  26  LAST 1152   00,2115  10 020 1             CCS      CYR                     SEE IF ROUND WANTED.
  1258   REF   2  LAST 1149   00,2116  0 7105 1  ROUND      TC       ROUNDSUB                YES - ROUND AND EXIT.
  1259   REF  32  LAST 1153   00,2117  1 6030 0             TCF      DANZIG                  SL LEAVES A ZERO IN CYR FOR NO ROUND.
  1260   REF  33  LAST 1154   00,2120  1 6030 0             TCF      DANZIG                  NO - EXIT IMMEDIATL
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P1261    VECTOR SHIFTING ROUTINES.

 1262    REF   2  LAST  221    00,2121  3 4774 1  SHORTV    CAF     LOW3                SAVE 3 BIT SHIFT COUNT - 1 WITHOUT
 1263    REF  27  LAST 1154    00,2122  7 0020 1            MASK    CYR                 EDITING CYR.
 1264    REF  22  LAST 1154    00,2123  54 135 1            TS      MPTEMP
 1265    REF  28  LAST 1155    00,2124  10 020 1            CCS     CYR                 SEE IF LEFT OR RIGHT SHIFT.
 1266    REF   1               00,2125  1 2145 1            TCF     VSSL                VECTOR SHIFT LEFT.
 1267                          00,2126   00176 1  OCT176    OCT     176                 USED IN PROCESSED SHIFTS WITH - COUNT.

 1268    REF  23  LAST 1155    00,2127  50 135 0  VSSR      INDEX   MPTEMP              (ENTRY FROM SR). PICK UP SHIFTING BIT.
 1269    REF  52  LAST 1152    00,2130  3 4753 1            CAF     BIT14               MPTEMP CONTAINS THE SHIFT COUNT - 1.
 1270    REF  24  LAST 1155    00,2131  54 135 1            TS      MPTEMP
 1271    REF   1               00,2132  0 2073 1            TC      VSHRRND             SHIFT X COMPONENT.

 1272    REF 442  LAST 1154    00,2133  52 155 1            DXCH    MPAC                SWAP X AND Y COMPONENTS.
 1273    REF 443  LAST 1155    00,2134  52 160 1            DXCH    MPAC +3
 1274    REF 444  LAST 1155    00,2135  52 155 1            DXCH    MPAC
 1275    REF   2  LAST 1155    00,2136  0 2073 1            TC      VSHRRND             SHIFT Y COMPONENT.

 1276    REF 445  LAST 1155    00,2137  52 155 1            DXCH    MPAC                SWAP Y AND Z COMPONENTS.
 1277    REF 446  LAST 1155    00,2140  52 162 0            DXCH    MPAC +5
 1278    REF 447  LAST 1155    00,2141  52 155 1            DXCH    MPAC
 1279    REF   3  LAST 1155    00,2142  0 2073 1            TC      VSHRRND             SHIFT Z COMPONENT.

 1280    REF   1               00,2143  1 7354 0            TCF     VROTATEX            RESTORE COMPONENTS TO PROPER PLACES.
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L       INTERPRETER                                                                                USER'S PAGE NO.  49       E3 S3

P1281   VECTOR SHIFT LEFT - DONE ONE PLACE AT A TIME.

 1282   REF  25  LAST 1155   00,2144  54 135 1    -1        TS      MPTEMP            SHIFTING LOOP.

 1283                        00,2145   0 0006 1   VSSL      EXTEND
 1284   REF 448  LAST 1155   00,2146   3 0155 0             DCA     MPAC
 1285   REF 449  LAST 1156   00,2147  20 155 1              DAS     MPAC
 1286                        00,2150   0 0006 1             EXTEND
 1287                        00,2151   1 2153 0             BZF     +2
 1288   REF   3  LAST 1139   00,2152   0 6766 0             TC      OVERFLOW

 1289                        00,2153   0 0006 1             EXTEND
 1290   REF 450  LAST 1156   00,2154   3 0160 0             DCA     MPAC +3
 1291   REF 451  LAST 1156   00,2155  20 160 1              DAS     MPAC +3
 1292                        00,2156   0 0006 1             EXTEND
 1293                        00,2157   1 2161 1             BZF     +2
 1294   REF   4  LAST 1148   00,2160   0 6763 0             TC      OVERFLWY

 1295                        00,2161   0 0006 1             EXTEND
 1296   REF 452  LAST 1156   00,2162   3 0162 1             DCA     MPAC +5
 1297   REF 453  LAST 1156   00,2163  20 162 0              DAS     MPAC +5
 1298                        00,2164   0 0006 1             EXTEND
 1299                        00,2165   1 2167 1             BZF     +2
 1300   REF   4  LAST 1147   00,2166   0 6760 0             TC      OVERFLWZ

 1301   REF  26  LAST 1156   00,2167  10 135 1              CCS     MPTEMP            LOOP ON DECREMENTED SHIFT COUNTER.
 1302   REF   2  LAST 1155   00,2170   1 2144 0             TCF     VSSL -1
 1303   REF  34  LAST 1154   00,2171   1 6030 0             TCF     DANZIG            EXIT.
```

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P1304            TSLC - TRIPLE SHIFT LEFT AND COUNT. SHIFTS MPAC LEFT UNTIL GREATER THAN .5 IN MAGNITUDE, LEAVING
R1306     THE COMPLEMENT OF THE NUMBER OF SHIFTS REQUIRED IN X.

  1307    REF  27  LAST 1156    00,2172  54 135 1  TSLC2     TS       MPTEMP          START BY ZEROING SHIFT COUNT (IN A NOW).
  1308    REF   2  LAST 1142    00,2173  0 6672 1            TC       BRANCH          EXIT WITH NO SHIFTING IF ARGUMENT ZERO.
  1309                          00,2174  1 2176 1            TCF      +2
  1310    REF   1               00,2175  1 2212 0            TCF      ENDTSLC         STORES ZERO SHIFT COUNT IN THIS CASE.

  1311    REF   4  LAST  349    00,2176  0 7226 0            TC       TPAGREE         MAY CAUSE UPSHIFT OF ONE EXTRA PLACE.

  1312    REF 454  LAST 1156    00,2177  3 0154 1            CA       MPAC            BEGIN NORMALIZATION LOOP.
  1313    REF   1               00,2200  1 2207 1            TCF      TSLCTEST

  1314    REF  28  LAST 1157    00,2201  24 135 0  TSLCLOOP  INCR     MPTEMP          INCREMENT SHIFT COUNTER.
  1315                          00,2202  0 0006 1            EXTEND
  1316    REF 455  LAST 1157    00,2203  3 0156 0            DCA      MPAC +1
  1317    REF 456  LAST 1157    00,2204  20 156 1            DAS      MPAC +1
  1318    REF 457  LAST 1157    00,2205  6 0154 1            AD       MPAC
  1319    REF 458  LAST 1157    00,2206  26 154 0            ADS      MPAC
  1320                          00,2207  6 0000 1  TSLCTEST  DOUBLE                   SEE IF (ANOTHER) SHIFT IS REQUIRED.
  1321                          00,2210  54 000 0            OVSK
  1322    REF   1               00,2211  1 2201 1            TCF      TSLCLOOP        YES - INCREMENT COUNT AND SHIFT AGAIN.

  1323    REF  29  LAST 1157    00,2212  4 0135 1  ENDTSLC   CS       MPTEMP
  1324    REF   1               00,2213  1 6572 0            TCF      STORE1          STORE SHIFT COUNT AND RETURN TO DANZIG.
```

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P1325           THE FOLLOWING ROUTINES PROCESSES THE GENERAL SHIFT INSTRUCTIONS SR, SRR, SL, AND SLR.
R1327   THE GIVEN ADDRESS IS DECODED AS FOLLOWS:

R1328           BITS 1-7    SHIFT COUNT (SUBADDRESS) LESS THAN 125 DECIMAL.
R1329           BIT 8       PSEUDO SIGN BIT (DETECTS CHANGE IN SIGN IN INDEXED SHIFTS).
R1331           BIT 9       0 FOR LEFT SHIFT, AND 1 FOR RIGHT SHIFT.
R1332           BIT 10      1 FOR TERMINAL ROUND ON SCALAR SHIFTS, 0 OTHERWISE.
R1333           BITS 11-13  0.
R1334           BIT 14      1.
R1335           BIT 15      0.

R1336   THE ABOVE ENCODING IS DONE BY THE YUL SYSTEM.

  1337  REF  71  LAST 1151   00,2214  7 0116 0  GENSHIFT MASK    ADDRWD          GET SHIFT COUNT, TESTING FOR ZERO.
  1338  REF 293  LAST 1148   00,2215  10 000 0           CCS     A               (ARRIVES WITH C(A) = LOW7).
  1339  REF   1              00,2216  1 2224 0           TCF     GENSHFT2        IF NON-ZERO, PROCEED WITH DECREMENTED CT

  1340  REF  24  LAST  721   00,2217  3 4757 0           CAF     BIT10           ZERO SHIFT COUNT. NO SHIFTS NEEDED BUT
  1341  REF  72  LAST 1158   00,2220  7 0116 0           MASK    ADDRWD          WE MIGHT HAVE TO ROUND MPAC ON SLR AND
  1342  REF 294  LAST 1158   00,2221  10 000 0           CCS     A               SRR (SCALAR ONLY).
  1343  REF   3  LAST 1154   00,2222  0 7105 1           TC      ROUNDSUB
  1344  REF  35  LAST 1156   00,2223  1 6030 0           TCF     DANZIG

  1345  REF  30  LAST 1157   00,2224  54 135 1  GENSHFT2 TS      MPTEMP          DECREMENTED SHIFT COUNT TO MPTEMP.
  1346  REF  29  LAST 1106   00,2225  3 4761 0           CAF     BIT8            TEST MEANING OF LOW SEVEN BIT COUNT IN
  1347                       00,2226  0 0006 1           EXTEND                  MPTEMP NOW.
  1348  REF  73  LAST 1158   00,2227  7 0116 0           MP      ADDRWD
  1349  REF   1              00,2230  7 6214 1           MASK    LOW2            JUMPS ON SHIFT DIRECTION (BIT8) AND
  1350  REF 295  LAST 1158   00,2231  50 000 1           INDEX   A
  1351                       00,2232  1 2233 0           TCF     +1              ORIGINAL SHIFT DIRECTION (BIT 9).
  1352  REF   1              00,2233  1 2332 0           TCF     RIGHT-          NEGATIVE SHIFT COUNT FOR SL OR SLR.
  1353  REF   1              00,2234  1 2342 1           TCF     LEFT            SL OR SLR.
  1354  REF   1              00,2235  1 2336 1           TCF     LEFT-           NEGATIVE SHIFT COUNT WITH SR OR SRR.
```

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P1355              GENERAL SHIFT RIGHT.

  1356   REF  20  LAST 1151   00,2236  10 163 1  RIGHT     CCS     MODE              SEE IF VECTOR OR SCALAR.
  1357   REF   1              00,2237  1 2277 0            TCF     GENSCR
  1358   REF   2  LAST 1159   00,2240  1 2277 0            TCF     GENSCR

  1359   REF  31  LAST 1158   00,2241  3 0135 0            CA      MPTEMP            SEE IF SHIFT COUNT LESS THAN 14D.
  1360   REF   1              00,2242  6 3726 1  VRIGHT2   AD      NEG12
  1361                        00,2243  0 0006 1            EXTEND
  1362   REF   1              00,2244  6 2127 1            BZMF    VSSR              IF SO, BRANCH AND SHIFT IMMEDIATELY.

  1363   REF  22  LAST 1148   00,2245  6 7702 0            AD      NEGONE            IF NOT, REDUCE MPTEMP BY A TOTAL OF 14,
  1364   REF  32  LAST 1159   00,2246  54 135 1            TS      MPTEMP            AND DO A SHIFT RIGHT AND ROUND BY 14.
  1365   REF 219  LAST 1153   00,2247  3 4772 1            CAF     ZERO              THE ROUND AT THIS STAGE MAY INTRODUCE A
  1366   REF 153  LAST 1153   00,2250  54 001 1            TS      L                 ONE BIT ERROR IN A SHIFT RIGHT 15D.
  1367   REF 459  LAST 1157   00,2251  56 154 1            XCH     MPAC
  1368   REF 460  LAST 1159   00,2252  56 155 0            XCH     MPAC +1
  1369   REF   1              00,2253  0 2272 1            TC      SETROUND          X COMPONENT NOW SHIFTED, SO MAKE UP THE
  1370   REF 461  LAST 1159   00,2254  20 155 1            DAS     MPAC              ROUNDING QUANTITY (0 IN A AND 0 OR +-1
A1371                                                                                IN L).
  1372   REF 462  LAST 1159   00,2255  56 157 1            XCH     MPAC +3           REPEAT THE ABOVE PROCESS FOR Y AND Z.
  1373   REF 463  LAST 1159   00,2256  56 160 0            XCH     MPAC +4
  1374   REF   2  LAST 1159   00,2257  0 2272 1            TC      SETROUND
  1375   REF 464  LAST 1159   00,2260  20 160 1            DAS     MPAC +3           NO OVERFLOW ON THESE ADDS.

  1376   REF 465  LAST 1159   00,2261  56 161 1            XCH     MPAC +5
  1377   REF 466  LAST 1159   00,2262  56 162 1            XCH     MPAC +6
  1378   REF   3  LAST 1159   00,2263  0 2272 1            TC      SETROUND
  1379   REF 467  LAST 1159   00,2264  20 162 0            DAS     MPAC +5

  1380   REF  33  LAST 1159   00,2265  10 135 1            CCS     MPTEMP            SEE IF DONE, DOING FINAL DECREMENT.
  1381   REF  34  LAST 1159   00,2266  54 135 1            TS      MPTEMP
  1382   REF   1              00,2267  1 2242 0            TCF     VRIGHT2
  1383                        00,2270   04604 1  BIASLO    DEC     .2974 B-1         SQRT CONSTANT

  1384   REF  36  LAST 1158   00,2271  1 6030 0            TCF     DANZIG

  1385                        00,2272  6 0000 1  SETROUND DOUBLE                     MAKES UP ROUNDING QUANTITY FROM ARRIVING
  1386   REF 468  LAST 1159   00,2273  54 156 1            TS      MPAC +2           C(A). L IS ZERO INITIALLY.
  1387   REF 220  LAST 1159   00,2274  3 4772 1            CAF     ZERO
  1388   REF 154  LAST 1159   00,2275  56 001 0            XCH     L
  1389   REF 231  LAST 1153   00,2276  0 0002 0            TC      Q                 RETURN AND DO THE DAS, RESETTING L TO 0.
```

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P1390                 PROCESS SR AND SRR FOR SCALARS.

  1391   REF  35  LAST 1159    00,2277  3 0135 0  GENSCR    CA      MPTEMP             SEE IF THE ORIGINAL SHIFT COUNT WAS LESS
  1392   REF   2  LAST 1159    00,2300  6 3726 1   +1       AD      NEG12              THAN 14D.
  1393                         00,2301  0 0006 1            EXTEND
  1394   REF   1               00,2302  6 2322 0            BZMF    DOSSHFT            DO THE SHIFT IMMEDIATELY IF SO.

  1395   REF  23  LAST 1159    00,2303  6 7702 0   +4       AD      NEGONE             IF NOT, DECREMENT SHIFT COUNT BY 14D AND
  1396   REF  36  LAST 1160    00,2304  54 135 1            TS      MPTEMP             SHIFT MPAC RIGHT 14 PLACES.
  1397   REF 221  LAST 1159    00,2305  3 4772 1            CAF     ZERO
  1398   REF 469  LAST 1159    00,2306  56 154 1            XCH     MPAC
  1399   REF 470  LAST 1160    00,2307  56 155 0            XCH     MPAC +1
  1400   REF 471  LAST 1160    00,2310  54 156 1            TS      MPAC +2
  1401   REF  37  LAST 1160    00,2311  10 135 1            CCS     MPTEMP             SEE IF FINISHED, DO FINAL DECREMENT.
  1402   REF  38  LAST 1160    00,2312  54 135 1            TS      MPTEMP
  1403   REF   3  LAST 1159    00,2313  0 2300 0            TC      GENSCR +1
  1404                         00,2314   22650 1  SLOPEHI   DEC     .5884              SQRT CONSTANT.
  1405   REF  25  LAST 1158    00,2315  3 4757 0            CAF     BIT10              FINISHED WITH SHIFT. SEE IF ROUND
  1406   REF  74  LAST 1158    00,2316  7 0116 0            MASK    ADDRWD             WANTED.
  1407   REF 296  LAST 1158    00,2317  10 000 0            CCS     A
  1408   REF   4  LAST 1158    00,2320  0 7105 1            TC      ROUNDSUB
  1409   REF  37  LAST 1159    00,2321  1 6030 0            TCF     DANZIG             DO SO AND/OR EXIT.

  1410   REF  39  LAST 1160    00,2322  50 135 0  DOSSHFT   INDEX   MPTEMP             PICK UP SHIFTING BIT.
  1411   REF  53  LAST 1155    00,2323  3 4753 1            CAF     BIT14
  1412   REF  40  LAST 1160    00,2324  54 135 1            TS      MPTEMP
  1413   REF  26  LAST 1160    00,2325  3 4757 0            CAF     BIT10              SEE IF TERMINAL ROUND DESIRED.
  1414   REF  75  LAST 1160    00,2326  7 0116 0            MASK    ADDRWD
  1415   REF 297  LAST 1160    00,2327  10 000 0            CCS     A
  1416   REF   1               00,2330  1 2031 0            TCF     RIGHTR             YES.
  1417   REF   1               00,2331  1 2033 1            TCF     MPACSHR            JUST SHIFT RIGHT.
```

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P1418          PROCESS THE RIGHT- (SL(R) WITH A NEGATIVE COUNT), LEFT-, AND LEFT OPTIONS.

  1420  REF  41  LAST 1160   00,2332  4 0135 1  RIGHT-   CS      MPTEMP        GET ABSOLUTE VALUE - 1 OF SHIFT COUNT
  1421  REF   1              00,2333  6 2126 0           AD      OCT176        UNDERSTANDING THAT BIT8 (PSEUDO-SIGN)
  1422  REF  42  LAST 1161   00,2334  54 135 1           TS      MPTEMP        WAS 1 INITIALLY.
  1423  REF   1              00,2335  1 2236 0           TCF     RIGHT         DO NORMAL SHIFT RIGHT.

  1424  REF   2  LAST 1161   00,2336  4 2126 1  LEFT-    CS      OCT176        SAME PROLOGUE TO LEFT FOR INDEXED RIGHT
  1425  REF  43  LAST 1161   00,2337  6 0135 0           AD      MPTEMP        SHIFTS WHOSE NET SHIFT COUNT IS NEGATIVE
  1426                       00,2340  4 0000 0           COM
  1427  REF  44  LAST 1161   00,2341  54 135 1           TS      MPTEMP

  1428  REF  21  LAST 1159   00,2342  10 163 1  LEFT     CCS     MODE          SINCE LEFT SHIFTING IS SONE ONE PLACE AT
  1429  REF   1              00,2343  1 2346 0           TCF     GENSCL        A TIME, NO COMPARISON WITH 14 NEED BE
  1430  REF   2  LAST 1161   00,2344  1 2346 0           TCF     GENSCL        DONE. FOR SCALARS, SEE IF TERMINAL ROUND
  1431  REF   3  LAST 1156   00,2345  1 2145 1           TCF     VSSL          DESIRED. FOR VECTORS, SHIFT IMMEDIATELY.

  1432  REF  76  LAST 1160   00,2346  4 0116 0  GENSCL   CS      ADDRWD        PUT ROUNDING BIT (BIT 10 OF ADDRWD)INTO
  1433                       00,2347  0 0006 1           EXTEND                BIT 15 OF CYR WHERE THE ROUNDING BIT OF
  1434  REF  32  LAST 1010   00,2350  7 4763 0           MP      BIT6          A SHORT SHIFT LEFT WOULD BE
  1435  REF  29  LAST 1155   00,2351  54 020 1           TS      CYR
  1436  REF   3  LAST 1154   00,2352  1 2103 0           TCF     TSSL +2       DO THE SHIFT.
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P1437            SCALAR DIVISION INSTRUCTIONS, DDV AND BDDV, ARE EXECUTED HERE. AT THIS POINT, THE DIVIDEND IS IN MPAC
R1439      AND THE DIVISOR IN BUF.

 1440   REF 129  LAST 1150   00,2353  4 4770 1  DDV/BDDV CS      ONE              INITIALIZATION.
 1441   REF   1              00,2354  54 136 1           TS      DVSIGN           +-1 FOR POSITIVE QUOTIENT - -0 FOR NEG.
 1442   REF   1              00,2355  54 137 0           TS      DVNORMCT         DIVIDEND NORMALIZATION COUNT.
 1443   REF   1              00,2356  54 140 0           TS      MAXDVSW          NEAR-ONE DIVIDE FLAG.

 1444   REF  55  LAST 1150   00,2357  10 130 1           CCS     BUF              FORCE BUF POSITIVE WITH THE MAJOR PART
 1445   REF   1              00,2360  1 2515 0           TCF     BUFPOS           NON-ZERO.
 1446                        00,2361  1 2363 1           TCF     +2
 1447   REF   1              00,2362  1 2530 1           TCF     BUFNEG

 1449   REF   1              00,2363  0 7225 0  BUFZERO  TC      BUFAGREE
 1450   REF 472  LAST 1160   00,2364  10 154 0           CCS     MPAC             TEST TO SEE IF MPAC NON-ZERO.  (TOO BIG)
 1451   REF   1              00,2365  1 2413 1           TCF     OVF+             MAJOR PART OF DIVIDEND IS POSITIVE NON-0
 1452                        00,2366  1 2370 0           TCF     +2
 1453   REF   2  LAST 1162   00,2367  1 2412 0           TCF     OVF+   -1        MAJOR PART OF DIVIDEND IS NEG. NON-ZERO

 1454   REF  56  LAST 1162   00,2370  56 131 1           XCH     BUF +1           SHIFT DIVIDEND AND DIVISOR LEFT 14.
 1455   REF  57  LAST 1162   00,2371  56 130 0           XCH     BUF
 1456   REF 473  LAST 1162   00,2372  56 155 0           XCH     MPAC +1
 1457   REF 474  LAST 1162   00,2373  56 154 1           XCH     MPAC
 1458   REF  58  LAST 1162   00,2374  10 130 1           CCS     BUF              TRY AGAIN ON FORMER MINOR PART.
 1459   REF   1              00,2375  1 2421 0           TCF     BUF+
 1460                        00,2376  1 2400 0           TCF     +2               OVERFLOW ON ZERO DIVISOR.
 1461   REF   1              00,2377  1 2415 1           TCF     BUF-

 1462   REF 475  LAST 1162   00,2400  4 0154 0           CS      MPAC             SIGN OF MPAC DETERMINES SIGN OF RESULT.
 1463                        00,2401  0 0006 1  SGNDVOVF EXTEND
 1464                        00,2402  6 2404 0           BZMF    +2
 1465   REF   2  LAST 1162   00,2403  24 136 0           INCR    DVSIGN           NEGMAX IN MPAC PERHAPS.
 1466   REF  29  LAST 1142   00,2404  3 4750 1  DVOVF    CAF     POSMAX           ON DIVISION OVERFLOW OF ANY SORT, SET
 1467   REF 476  LAST 1162   00,2405  54 154 0           TS      MPAC             SET UP MPAC TO +-POSMAX.
 1468   REF   1              00,2406  0 2627 0           TC      FINALDV +3
 1469   REF 130  LAST 1162   00,2407  3 4770 0           CAF     ONE              SET OVERFLOW INDICATOR AND EXIT.
 1470   REF   5  LAST 1154   00,2410  54 121 1           TS      OVFIND
 1471   REF  38  LAST 1160   00,2411  0 6030 1           TC      DANZIG

 1472   REF   3  LAST 1162   00,2412  24 136 0  -1       INCR    DVSIGN
 1473   REF  59  LAST 1162   00,2413  4 0131 0  OVF+     CS      BUF +1           LOAD LOWER ORDER PART OF DIVISOR.
 1474   REF   1              00,2414  1 2401 1           TCF     SGNDVOVF         GET SIGN OF RESULT.

 1475                        00,2415  0 0006 1  BUF-     EXTEND                   IF BUF IS NEGATIVE, COMPLEMENT IT AND
 1476   REF  60  LAST 1162   00,2416  4 0131 0           DCS     BUF              MAINTAIN DVSIGN FOR FINAL QUOTIENT SIGN.
 1477   REF  61  LAST 1162   00,2417  52 131 0           DXCH    BUF
 1478   REF   4  LAST 1162   00,2420  24 136 0           INCR    DVSIGN           NOW -0.

 1479   REF 477  LAST 1162   00,2421  10 154 0  BUF+     CCS     MPAC             FORCE MPAC POSITIVE, CHECKING FOR ZERO
 1480   REF   1                00,2422  1 2436 0            TCF     MPAC+             DIVIDEND IN THE PROCESS.
 1481                          00,2423  1 2425 1            TCF     +2
 1482   REF   1                00,2424  1 2432 1            TCF     MPAC-
 1483   REF 478  LAST 1162     00,2425  10 155 1            CCS     MPAC +1
 1484   REF   2  LAST 1163     00,2426  1 2436 0            TCF     MPAC+
 1485   REF  39  LAST 1162     00,2427  1 6030 0            TCF     DANZIG            EXIT IMMEDIATELY ON ZERO DIVIDEND.
 1486   REF   2  LAST 1163     00,2430  1 2432 1            TCF     MPAC-
 1487   REF  40  LAST 1163     00,2431  1 6030 0            TCF     DANZIG

 1488                          00,2432  0 0006 1  MPAC-     EXTEND                    FORCE MPAC POSITIVE AS BUF IN BUF-.
 1489   REF 479  LAST 1163     00,2433  4 0155 1            DCS     MPAC
 1490   REF 480  LAST 1163     00,2434  52 155 1            DXCH    MPAC
 1491   REF   5  LAST 1162     00,2435  24 136 0            INCR    DVSIGN            NOW +1 OR -0.
 1492   REF 481  LAST 1163   00,2436   4 0154 0   MPAC+     CS       MPAC               CHECK FOR DIVISION OVERFLOW. IF THE
 1493   REF  24  LAST 1160   00,2437   6 7702 0             AD       NEGONE             MAJOR PART OF THE DIVIDEND IS LESS THAN
 1494   REF  62  LAST 1162   00,2440   6 0130 0             AD       BUF                THE MAJOR PART OF THE DIVISOR BY AT
 1495   REF 298  LAST 1160   00,2441  10 000 0              CCS      A                  LEAST TWO, WE CAN PROCEED IMMEDIATELY
 1496   REF   1              00,2442   1 2504 0             TCF      DVNORM             WITHOUT NORMALIZATION PRODUCING A DVMAX.
 1497                        00,2443    60001 0   -1/2+2    OCT      60001              USED IN SQRTSUB.

 1498                        00,2444   1 2445 1             TCF      +1                 IF THE ABOVE DOES NOT HOLD, FORCE SIGN
 1499   REF  13  LAST 1140   00,2445   3 4753 1             CAF      HALF               AGREEMENT IN NUMERATOR AND DENOMINATOR
 1500                        00,2446   6 0000 1             DOUBLE                      TO FACILITATE OVERFLOW AND NEAR-ONE
 1501   REF 482  LAST 1164   00,2447   6 0155 0             AD       MPAC +1            CHECKING.
 1502   REF 483  LAST 1164   00,2450  54 155 1              TS       MPAC +1
 1503   REF 222  LAST 1160   00,2451   3 4772 1             CAF      ZERO
 1504   REF  30  LAST 1162   00,2452   6 4750 1             AD       POSMAX
 1505   REF 484  LAST 1164   00,2453  26 154 0              ADS      MPAC

 1506   REF  14  LAST 1164   00,2454   3 4753 1             CAF      HALF               SAME FOR BUF.
 1507                        00,2455   6 0000 1             DOUBLE
 1508   REF  63  LAST 1164   00,2456   6 0131 1             AD       BUF +1
 1509   REF  64  LAST 1164   00,2457  54 131 0              TS       BUF +1
 1510   REF 223  LAST 1164   00,2460   3 4772 1             CAF      ZERO
 1511   REF  31  LAST 1164   00,2461   6 4750 1             AD       POSMAX
 1512   REF  65  LAST 1164   00,2462  26 130 1              ADS      BUF

 1513   REF 485  LAST 1164   00,2463   4 0154 0             CS       MPAC               CHECK MAGNITUDE OF SIGN-CORRECTED
 1514   REF  66  LAST 1164   00,2464   6 0130 0             AD       BUF                OPERANDS.
 1515   REF 299  LAST 1164   00,2465  10 000 0              CCS      A
 1516   REF   2  LAST 1164   00,2466   1 2504 0             TCF      DVNORM             DIVIDE OK - WILL NOT BECOME MAXDV CASE.
 1517   REF  13  LAST 1144   00,2467    00133 0   LBUF2     ADRES    BUF2
 1518   REF   1              00,2470   1 2404 1             TCF      DVOVF              DIVISOR NOT LESS THAN DIVIDEND - OVF.

 1519   REF   2  LAST 1162   00,2471  54 140 0              TS       MAXDVSW            IF THE MAJOR PARTS OF THE DIVIDEND AND
 1520   REF 486  LAST 1164   00,2472   4 0155 1             CS       MPAC +1            DIVISOR ARE EQUAL, A SPECIAL APPROXIMA-
 1521   REF  67  LAST 1164   00,2473   6 0131 1             AD       BUF +1             TION IS USED (PROVIDED THE DIVISION IS
 1522                        00,2474   0 0006 1             EXTEND                      POSSIBLE, OF COURSE).
 1523   REF   2  LAST 1164   00,2475   6 2404 0             BZMF     DVOVF
 1524   REF   3  LAST 1164   00,2476   1 2504 0             TCF      DVNORM             IF NO OVERFLOW.
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1525                         00,2477  0 0006 1  BUFNORM  EXTEND               ADD -1 TO AUGMENT SHIFT COUNT AND SHIFT
1526  REF   2  LAST 1162     00,2500  24 137 1           AUG     DVNORMCT     LEFT ONE PLACE.
1527                         00,2501  0 0006 1           EXTEND
1528  REF  68  LAST 1164     00,2502  3 0131 1           DCA     BUF
1529  REF  69  LAST 1165     00,2503  20 131 0           DAS     BUF

1530  REF  70  LAST 1165     00,2504  3 0130 0  DVNORM   CA      BUF          SEE IF DIVISOR NORMALIZED YET.
1531                         00,2505  6 0000 1           DOUBLE
1532                         00,2506  54 000 0           OVSK
1533  REF   1                00,2507  1 2477 0           TCF     BUFNORM      NO - SHIFT LEFT ONE AND TRY AGAIN.

1534  REF 487  LAST 1164     00,2510  52 155 1           DXCH    MPAC         CALL DIVIDEND NORMALIZATION SEQUENCE
1535  REF   3  LAST 1165     00,2511  50 137 1           INDEX   DVNORMCT     PRIOR TO DOING THE DIVIDE.
1536  REF   1                00,2512  0 2564 1           TC      MAXTEST

1537  REF 488  LAST 1165     00,2513  54 156 1           TS      MPAC +2      RETURNS WITH DIVISION DONE AND C(A) = 0.
1538  REF  41  LAST 1163     00,2514  1 6030 0           TCF     DANZIG

1539  REF 300  LAST 1164     00,2515  10 000 0  BUFPOS   CCS     A
1540  REF   2  LAST 1162     00,2516  1 2421 0           TCF     BUF+         TO BUF+ IF BUF IS GREATER THAN +1.

1541  REF  71  LAST 1165     00,2517  4 0131 0           CS      BUF +1       IF BUF IS +1, FORCING SIGN AGREEMENT
1542                         00,2520  0 0006 1           EXTEND               MAY CAUSE BUF TO BECOME ZERO.
1543  REF   3  LAST 1165     00,2521  6 2421 1           BZMF    BUF+         BRANCH IF SIGNS AGREE.

1544  REF  15  LAST 1164     00,2522  3 4753 1           CA      HALF         SIGNS DISAGREE.  FORCE AGREEMENT.
1545                         00,2523  6 0000 1  +6       DOUBLE
1546  REF  72  LAST 1165     00,2524  26 131 0           ADS     BUF +1
1547  REF 224  LAST 1164     00,2525  3 4772 1           CA      ZERO
1548  REF  73  LAST 1165     00,2526  54 130 1           TS      BUF
1549  REF   1                00,2527  1 2363 1           TCF     BUFZERO


1550  REF 301  LAST 1165     00,2530  10 000 0  BUFNEG   CCS     A
1551  REF   2  LAST 1162     00,2531  1 2415 1           TCF     BUF-         TO BUF- IF BUF IS LESS THAN -1.

1552  REF  74  LAST 1165     00,2532  3 0131 1           CA      BUF +1       IF BUF IS -1, FORCING SIGN AGREEMENT
1553                         00,2533  0 0006 1           EXTEND               MAY CAUSE BUF TO BECOME ZERO.
1554  REF   3  LAST 1165     00,2534  6 2415 0           BZMF    BUF-         BRANCH IF SIGNS AGREE.

1555  REF  16  LAST 1165     00,2535  4 4753 0           CS      HALF         SIGNS DISAGREE.  FORCE AGREEMENT.
1556  REF   2  LAST 1162     00,2536  1 2523 0           TCF     BUFPOS +6
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P1557           THE FOLLOWING ARE PROLOGUES TO SHIFT THE DIVIDEND ARRIVING IN A AND L BEFORE THE DIVIDE.

  1559   REF  20  LAST 1154   00,2537  22 021 1    -210     LXCH    SR                SPECIAL PROLOGUE FOR UNIT WHEN THE
  1560                        00,2540   0 0006 1            EXTEND                    LENGTH OF THE ARGUMENT WAS NOT LESS THAN
  1561   REF  17  LAST 1165   00,2541   7 4753 0            MP      HALF              .5. IN THIS CASE, EACH COMPONENT MUST BE
  1562   REF 155  LAST 1159   00,2542  56 001 0             XCH     L                 SHIFTED RIGHT ONE TO PRODUCE A HALF-UNIT
  1563   REF  21  LAST 1166   00,2543   6 0021 1            AD      SR                VECTOR.
  1564   REF 156  LAST 1166   00,2544  56 001 0             XCH     L
  1565   REF   1              00,2545   1 2570 0            TCF     GENDDV +1         WITH DP DIVIDEND IN A,L.

  1566                        00,2546  20 001 1             DDOUBL                    PROLOGUE WHICH NORMALIZES THE DIVIDEND
  1567                        00,2547  20 001 1             DDOUBL                    WHEN IT IS KNOWN THAT NO DIVISION
  1568                        00,2550  20 001 1             DDOUBL                    OVERFLOW WILL OCCUR.
  1569                        00,2551  20 001 1             DDOUBL
  1570                        00,2552  20 001 1             DDOUBL
  1571                        00,2553  20 001 1             DDOUBL
  1572                        00,2554  20 001 1             DDOUBL
  1573                        00,2555  20 001 1             DDOUBL
  1574                        00,2556  20 001 1             DDOUBL
  1575                        00,2557  20 001 1             DDOUBL
  1576                        00,2560  20 001 1             DDOUBL
  1577                        00,2561  20 001 1             DDOUBL
  1578                        00,2562  20 001 1             DDOUBL
  1579   REF 489  LAST 1165   00,2563  52 155 1     -1      DXCH    MPAC
  1580   REF   3  LAST 1164   00,2564  10 140 0   MAXTEST   CCS     MAXDVSW           0 IF MAJORS MIGHT BE =, -1 OTHERWISE.
  1581                        00,2565   06552 0   BIASHI    DEC     .4192 B-1         SQRT CONSTANTS

  1582   REF   1              00,2566   1 2641 1            TCF     MAXDV             CHECK TO SEE IF THEY ARE NOW EQUAL.
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P 1583           THE FOLLOWING IS A GENERAL PURPOSE DOUBLE PRECISION DIVISION ROUTINE. IT DIVIDES MPAC BY BUF AND LEAVES
R 1585   THE RESULT IN MPAC. THE FOLLOWING CONDITIONS MUST BE SATISFIED:

R 1586           1.  THE DIVISOR (BUF) MUST BE POSITIVE AND NOT LESS THAN .5.

R 1587           2.  THE DIVIDEND (MPAC) MUST BE POSITIVE WITH THE MAJOR PART OF MPAC STRICTLY LESS THAN THAT OF BUF
R 1589   (A SPECIAL APPROXIMATION, MAXDV, IS USED WHEN THE MAJOR PARTS ARE EQUAL).

R 1591           UNDERSTANDING THAT A/B = Q + S(R/B) WHERE S = 2(-14) AND Q AND R ARE QUOTIENT AND REMAINDER, RESPEC-
R 1593   TIVELY, THE FOLLOWING APPROXIMATION IS OBTAINED BY MULTIPLYING ABOVE AND BELOW BY C - SD AND NEGLECTING TERMS OF
R 1595   ORDER S-SQUARED (POSSIBLY INTRODUCING ERROR INTO THE LOW TWO BITS OF THE RESULT). SIGN AGREEMENT IS UNNECESSARY.

R 1597           A + SB .     (R - QD)                                                  A + SB
R 1599           ------ = Q + S(------) WHERE Q AND R ARE QUOTIENT AND REMAINDER OF ------ RESPECTIVELY.
R 1601           C + SD       (  C   )                                                    C


  1603  REF 490  LAST 1166   00,2567  52 155 1  GENDDV   DXCH    MPAC           WE NEED A AND B ONLY FOR FIRST DV.
  1604                       00,2570  0 0006 1   +1      EXTEND                 (SPECIAL UNIT PROLOGUE ENTERS HERE).
  1605  REF  75  LAST 1165   00,2571  10 130 1           DV      BUF            A NOW CONTAINS Q AND C, R.
  1606  REF 491  LAST 1167   00,2572  52 155 1           DXCH    MPAC

  1607  REF 492  LAST 1167   00,2573  4 0154 0           CS      MPAC           FORM DIVIDEND FOR MINOR PART OF RESULT.
  1608                       00,2574  0 0006 1           EXTEND
  1609  REF  76  LAST 1167   00,2575  7 0131 0           MP      BUF +1
  1610  REF 493  LAST 1167   00,2576  6 0155 0           AD      MPAC +1        OVERFLOW AT THIS POINT IS POSITIVE SINCE
  1611                       00,2577  54 000 0           OVSK                   R IS POSITIVE IN EVERY CASE.
  1612                       00,2600  1 2605 1           TCF     +5

  1613                       00,2601  0 0006 1           EXTEND                 OVERFLOW CAN BE REMOVED BY SUBTRACTING C
  1614  REF  77  LAST 1167   00,2602  60 130 0           SU      BUF            (BUF) ONCE SINCE R IS ALWAYS LESS THAN C
  1615  REF 494  LAST 1167   00,2603  24 154 1           INCR    MPAC           IN THIS CASE. INCR COMPENSATES SUBTRACT.
  1616  REF   1              00,2604  1 2607 0           TCF     +DOWN          (SINCE C(A) IS STILL POSITIVE).

  1617                       00,2605  0 0006 1   +5      EXTEND                 C(A) CAN BE MADE LESS THAN C IN MAGNI-
  1618  REF   1              00,2606  6 2617 0           BZMF    -UP            TUDE BY DIMINISHING IT BY C (SINCE C IS
 A 1619                                                                         NOT LESS THAN .5) UNLESS C(A) = 0.
 1620                        00,2607  0 0006 1  +DOWN     EXTEND
 1621  REF  78  LAST 1167    00,2610  60 130 0            SU      BUF            IF POSITIVE, REDUCE ONLY IF NECESSARY
 1622                        00,2611  0 0006 1            EXTEND                 SINCE THE COMPENSATING INCR MIGHT CAUSE
 1623                        00,2612  1 2615 0            BZF     +3             OVERFLOW.
 1624                        00,2613  0 0006 1            EXTEND                 DONT SUBTRACT UNLESS RESULT IS POSITIVE
 1625  REF   1               00,2614  6 2623 1            BZMF    ENDMAXDV       OR ZERO.

 1626  REF 495  LAST 1167    00,2615  24 154 1   +3       INCR    MPAC           KEEP SUBTRACT HERE AND COMPENSATE.
 1627  REF   2  LAST 1162    00,2616  1 2624 1            TCF     FINALDV

 1628                        00,2617  0 0006 1  -UP       EXTEND                 IF ZERO, SET MINOR PART OF RESULT TO
 1629  REF   3  LAST 1168    00,2620  1 2627 1            BZF     FINALDV +3     ZERO.

 1630                        00,2621  0 0006 1            EXTEND                 IF NEGATIVE, ADD C TO A, SUBTRACTING ONE
 1631  REF 496  LAST 1168    00,2622  26 154 0            DIM     MPAC           TO COMPENSATE. DIM IS OK HERE SINCE THE
 1632  REF  79  LAST 1168    00,2623  6 0130 0  ENDMAXDV  AD      BUF            MAJOR PART NEVER GOES NEGATIVE.
 1633                              00,2624  22 007 0  FINALDV  ZL                         DO DV TO OBTAIN MINOR PART OF RESULT.
 1634                              00,2625  0 0006 1           EXTEND
 1635   REF  80  LAST 1168         00,2626  10 130 1           DV       BUF
 1636   REF 497  LAST 1168         00,2627  54 155 1   +3      TS       MPAC +1

 1637   REF   6  LAST 1163         00,2630  10 136 1           CCS      DVSIGN            LEAVE RESULT POSITIVE UNLESS C(DVSIGN)=
 1638   REF 232  LAST 1159         00,2631  0 0002 0           TC       Q                 -0.
 1639   REF 233  LAST 1169         00,2632  0 0002 0           TC       Q
 1640   REF 234  LAST 1169         00,2633  0 0002 0           TC       Q

 1641                              00,2634  0 0006 1           EXTEND
 1642   REF 498  LAST 1169         00,2635  4 0155 1           DCS      MPAC
 1643   REF 499  LAST 1169         00,2636  52 155 1           DXCH     MPAC
 1644   REF 225  LAST 1165         00,2637  3 4772 1           CAF      ZERO              SO WE ALWAYS RETURN WITH C(A) = 0.
 1645   REF 235  LAST 1169         00,2640  0 0002 0           TC       Q
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R1646           IF THE MAJOR PARTS OF THE DIVISOR AND DIVIDEND ARE EQUAL, BUT THE MINOR PARTS ARE SUCH THAT THE
R1648   DIVIDEND IS STRICTLY LESS THAN THE DIVISOR IN MAGNITUDE, THE FOLLOWING APPROXIMATION IS USED. THE ASSUMPTIONS
R1650   ARE THE SAME AS THE GENERAL ROUTINE WITH THE ADDITION THAT SIGN AGREEMENT IS NECESSARY (B, C, & D POSITIVE).

R1652                   C + SB ,          (C + B - D)
R1653                   ------ = 37777 + S(---------)
R1654                   C + SD            (    C    )

R1655           THE DIVISION MAY BE PERFORMED IMMEDIATELY SINCE B IS STRICTLY LESS THAN D AND C IS NOT LESS THAN .5.


 1657   REF 500  LAST 1169   00,2641  4 0154 0  MAXDV     CS       MPAC               SEE IF MAXDV CASE STILL HOLDS AFTER
 1658   REF  81  LAST 1169   00,2642  6 0130 0            AD       BUF                NORMALIZATION.
 1659                        00,2643  0 0006 1            EXTEND
 1660                        00,2644  1 2646 0            BZF      +2
 1661   REF   2  LAST 1166   00,2645  1 2567 0            TCF      GENDDV             MPAC NOW LESS THAN BUF - DIVIDE AS USUAL

 1662   REF  32  LAST 1164   00,2646  3 4750 1   +2       CAF      POSMAX             SET MAJOR PART OF RESULT.
 1663   REF 501  LAST 1170   00,2647  54 154 0            TS       MPAC

 1664   REF  82  LAST 1170   00,2650  4 0131 0            CS       BUF +1             FORM DIVIDEND OF MINOR PART OF RESULT.
 1665   REF 502  LAST 1170   00,2651  6 0155 0            AD       MPAC +1
 1666   REF   2  LAST 1168   00,2652  1 2623 0            TCF      ENDMAXDV           GO ADD C AND DO DIVIDE, ATTACHING SIGN
A1667                                                                                 BEFORE EXITING.
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P1668              VECTOR DIVIDED BY SCALAR, V/SC, IS EXECUTED HERE. THE VECTOR IS NOW IN MPAC WITH SCALAR IN BUF.

  1670   REF 131  LAST 1162   00,2653  4 4770 1  V/SC2      CS      ONE              INITIALIZE DIVIDEND NORMALIZATION COUNT
  1671   REF   4  LAST 1165   00,2654  54 137 0             TS      DVNORMCT         AND DIVISION SIGN REGISTER.
  1672   REF  40  LAST 1148   00,2655  54 127 1             TS      VBUF +5

  1673   REF   1              00,2656  0 3007 0             TC      VECAGREE         FORCE SIGN AGREEMENT IN VECTOR

  1674   REF  83  LAST 1170   00,2657  52 131 0             DXCH    BUF
  1675   REF   1              00,2660  0 7500 0             TC      ALSIGNAG         SIGN AGREE BUF
  1676   REF  84  LAST 1171   00,2661  52 131 0             DXCH    BUF
  1677   REF  85  LAST 1171   00,2662  10 130 1             CCS     BUF              FORCE DIVISOR POSITIVE WITH MAJOR PART
  1678   REF   1              00,2663  1 2720 1             TCF     /BUF+            NON-ZERO (IF POSSIBLE).
  1679                        00,2664  1 2666 1             TCF     +2
  1680   REF   1              00,2665  1 2714 0             TCF     /BUF-

  1681   REF  86  LAST 1171   00,2666  56 131 1             XCH     BUF +1           SHIFT VECTOR AND SCALAR LEFT 14.
  1682   REF  87  LAST 1171   00,2667  56 130 0             XCH     BUF
  1683   REF 503  LAST 1170   00,2670  56 155 0             XCH     MPAC +1
  1684   REF 504  LAST 1171   00,2671  56 154 1             XCH     MPAC
  1685                        00,2672  0 0006 1             EXTEND                   CHECK FOR OVERFLOW IN EACH CASE.
  1686                        00,2673  1 2675 0             BZF     +2
  1687   REF   3  LAST 1164   00,2674  1 2404 1             TCF     DVOVF

  1688   REF 505  LAST 1171   00,2675  56 160 0             XCH     MPAC +4
  1689   REF 506  LAST 1171   00,2676  56 157 1             XCH     MPAC +3
  1690                        00,2677  0 0006 1             EXTEND
  1691                        00,2700  1 2702 1             BZF     +2
  1692   REF   4  LAST 1171   00,2701  1 2404 1             TCF     DVOVF

  1693   REF 507  LAST 1171   00,2702  56 162 1             XCH     MPAC +6
  1694   REF 508  LAST 1171   00,2703  56 161 1             XCH     MPAC +5
  1695                        00,2704  0 0006 1             EXTEND
  1696                        00,2705  1 2707 1             BZF     +2
  1697   REF   5  LAST 1171   00,2706  1 2404 1             TCF     DVOVF

  1698   REF  88  LAST 1171   00,2707  10 130 1             CCS     BUF
  1699   REF   2  LAST 1171   00,2710  1 2720 1             TCF     /BUF+
  1700   REF   6  LAST 1171   00,2711  1 2404 1             TCF     DVOVF            ZERO DIVISOR - OVERFLOW.
  1701   REF   2  LAST 1171   00,2712  1 2714 0             TCF     /BUF-
  1702   REF   7  LAST 1171   00,2713  1 2404 1             TCF     DVOVF

  1703                        00,2714  0 0006 1  /BUF-      EXTEND                   ON NEGATIVE, COMPLEMENT BUF AND MAINTAIN
  1704   REF  89  LAST 1171   00,2715  4 0131 0             DCS     BUF              DVSIGN IN VBUF +5.
  1705   REF  90  LAST 1171   00,2716  52 131 0             DXCH    BUF
  1706   REF  41  LAST 1171   00,2717  24 127 0             INCR    VBUF +5
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 1707                          00,2720  0 0006 1  /BUF+    EXTEND
 1708    REF  91  LAST 1171    00,2721  3 0131 1           DCA      BUF             LEAVE ABS(ORIG DIVISOR) IN BUF2
 1709    REF  14  LAST 1164    00,2722  52 134 0           DXCH     BUF2            FOR OVERFLOW TESTING
 1710    REF   1               00,2723  1 2731 1           TCF      /NORM           NORMALIZE DIVISOR IN BUF.

 1711                          00,2724  0 0006 1  /NORM2   EXTEND                   IF LESS THAN .5, AUGMENT DVNORMCT AND
 1712    REF   5  LAST 1171    00,2725  24 137 1           AUG      DVNORMCT        DOUBLE DIVISOR.
 1713                          00,2726  0 0006 1           EXTEND
 1714    REF  92  LAST 1172    00,2727  3 0131 1           DCA      BUF
 1715    REF  93  LAST 1172    00,2730  20 131 0           DAS      BUF

 1716    REF  94  LAST 1172    00,2731  3 0130 0  /NORM    CA       BUF             SEE IF DIVISOR NORMALIZED.
 1717                          00,2732  6 0000 1           DOUBLE
 1718                          00,2733  54 000 0           OVSK
 1719    REF   1               00,2734  1 2724 0           TCF      /NORM2          DOUBLE AND TRY AGAIN IF NOT.

 1720    REF   1               00,2735  0 2747 1           TC       V/SCDV          DO X COMPONENT DIVIDE.
 1721    REF 509  LAST 1171    00,2736  52 160 1           DXCH     MPAC +3         SUPPLY ARGUMENTS IN USUAL SEQUENCE.
 1722    REF 510  LAST 1172    00,2737  52 155 1           DXCH     MPAC
 1723    REF 511  LAST 1172    00,2740  52 160 1           DXCH     MPAC +3

 1724    REF   2  LAST 1172    00,2741  0 2747 1           TC       V/SCDV          Y COMPONENT.
 1725    REF 512  LAST 1172    00,2742  52 162 0           DXCH     MPAC +5
 1726    REF 513  LAST 1172    00,2743  52 155 1           DXCH     MPAC
 1727    REF 514  LAST 1172    00,2744  52 162 0           DXCH     MPAC +5

 1728    REF   3  LAST 1172    00,2745  0 2747 1           TC       V/SCDV          Z COMPONENT.
 1729    REF   2  LAST 1155    00,2746  1 7354 0           TCF      VROTATEX        GO RE-ARRANGE COMPONENTS BEFORE EXIT.
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P1730           SUBROUTINE USED BY V/SC TO DIVIDE VECTOR COMPONENT IN MPAC,+1 BY THE SCALAR GIVEN IN BUF.

 1732   REF  42  LAST 1171   00,2747  3 0127 0  V/SCDV    CA      VBUF +5          REFLECTS SIGN OF SCALAR.
 1733   REF   7  LAST 1169   00,2750  54 136 1            TS      DVSIGN

 1734   REF 515  LAST 1172   00,2751  10 154 0            CCS     MPAC             FORCE MPAC POSITIVE, EXITING ON ZERO.
 1735   REF   1              00,2752  1 2766 0            TCF     /MPAC+
 1736                        00,2753  1 2755 0            TCF     +2
 1737   REF   1              00,2754  1 2762 1            TCF     /MPAC-

 1738   REF 516  LAST 1173   00,2755  10 155 1            CCS     MPAC +1
 1739   REF   2  LAST 1173   00,2756  1 2766 0            TCF     /MPAC+
 1740   REF 236  LAST 1169   00,2757  0 0002 0            TC      Q
 1741   REF   2  LAST 1173   00,2760  1 2762 1            TCF     /MPAC-
 1742   REF 237  LAST 1173   00,2761  0 0002 0            TC      Q

 1743                        00,2762  0 0006 1  /MPAC-    EXTEND                   USUAL COMPLEMENTING AND SETTING OF SIGN.
 1744   REF 517  LAST 1173   00,2763  4 0155 1            DCS     MPAC
 1745   REF 518  LAST 1173   00,2764  52 155 1            DXCH    MPAC
 1746   REF   8  LAST 1173   00,2765  24 136 0            INCR    DVSIGN

 1747   REF 132  LAST 1171   00,2766  4 4770 1  /MPAC+    CS      ONE              INITIALIZE NEAR-ONE SWITCH.
 1748   REF   4  LAST 1166   00,2767  54 140 0            TS      MAXDVSW

 1749   REF 519  LAST 1173   00,2770  4 0154 0            CS      MPAC             CHECK POSSIBLE OVERFLOW.
 1750   REF  15  LAST 1172   00,2771  6 0133 0            AD      BUF2             UNNORMALIZED INPUT DIVISOR.
 1751   REF 302  LAST 1165   00,2772  10 000 0            CCS     A
 1752   REF   1              00,2773  1 3003 0            TCF     DDVCALL          NOT NEAR-ONE
 1753                        00,2774  1 2776 1            TCF     +2               +0 IS JUST POSSIBLE
 1754   REF   8  LAST 1171   00,2775  1 2404 1            TCF     DVOVF            NO HOPE
 1755   REF   5  LAST 1173   00,2776  54 140 0            TS      MAXDVSW          SIGNAL POSSIBLE NEAR-ONE CASE
 1756   REF 520  LAST 1173   00,2777  4 0155 1            CS      MPAC +1          SEE IF DIVISION CAN BE DONE
 1757   REF  16  LAST 1173   00,3000  6 0134 1            AD      BUF2 +1
 1758                        00,3001  0 0006 1            EXTEND
 1759   REF   9  LAST 1173   00,3002  6 2404 0            BZMF    DVOVF

 1760   REF 521  LAST 1173   00,3003  52 155 1  DDVCALL   DXCH    MPAC             CALL PRE-DIVIDE NORMALIZATION.
 1761   REF   6  LAST 1172   00,3004  50 137 1            INDEX   DVNORMCT
 1762   REF   2  LAST 1165   00,3005  1 2564 0            TCF     MAXTEST
 1763                            00,3006   32506 0  SLOPELO  DEC     .3324

 1764   REF 238  LAST 1173   00,3007  56 002 0  VECAGREE XCH      Q                   SAVE Q IN A
 1765   REF 522  LAST 1173   00,3010  52 155 1           DXCH     MPAC
 1766   REF   2  LAST 1171   00,3011  0 7500 0           TC       ALSIGNAG            SIGNAGREE MPAC
 1767   REF 523  LAST 1174   00,3012  52 155 1           DXCH     MPAC
 1768   REF 524  LAST 1174   00,3013  52 160 1           DXCH     MPAC +3
 1769   REF   3  LAST 1174   00,3014  0 7500 0           TC       ALSIGNAG            SIGN AGREE MPAC +3
 1770   REF 525  LAST 1174   00,3015  52 160 1           DXCH     MPAC +3
 1771   REF 526  LAST 1174   00,3016  52 162 0           DXCH     MPAC +5
 1772   REF   4  LAST 1174   00,3017  0 7500 0           TC       ALSIGNAG            SIGNAGREE MPAC +5
 1773   REF 527  LAST 1174   00,3020  52 162 0           DXCH     MPAC +5
 1774   REF 303  LAST 1173   00,3021  0 0000 1           TC       A
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P1775               THE FOLLOWING ROUTINE EXECUTES THE UNIT INSTRUCTION, WHICH TAKES THE UNIT OF THE VECTOR IN MPAC.

  1777   REF   2  LAST 1171   00,3022  0 3007 0  UNIT     TC      VECAGREE         FORCE SIGN AGREEMENT IN VECTOR
  1778   REF   2  LAST 1144   00,3023  0 7466 1           TC      MPACVBUF         SAVE ARGUMENT IN VBUF
  1779   REF 226  LAST 1169   00,3024  3 4772 1           CAF     ZERO             MUST SENSE OVERFLOW IN FOLLOWING DOT.
  1780   REF   6  LAST 1162   00,3025  56 121 0           XCH     OVFIND
  1781   REF   3  LAST   71   00,3026  54 141 1           TS      TEM1
  1782   REF   1              00,3027  0 3316 0           TC      VSQSUB           DOT MPAC WITH ITSELF.
  1783   REF   4  LAST 1175   00,3030  3 0141 0           CA      TEM1
  1784   REF   7  LAST 1175   00,3031  56 121 0           XCH     OVFIND
  1785                        00,3032  0 0006 1           EXTEND
  1786                        00,3033  1 3035 0           BZF     +2
  1787   REF  10  LAST 1173   00,3034  1 2404 1           TCF     DVOVF
  1788                        00,3035  0 0006 1           EXTEND
  1789   REF 528  LAST 1174   00,3036  3 0155 0           DCA     MPAC             LEAVE THE SQUARE OF THE LENGTH OF THE
  1790   REF  24  LAST 1130   00,3037  50 120 1           INDEX   FIXLOC           ARGUMENT IN LVSQUARE.
  1791   REF   1              00,3040  52 043 1           DXCH    LVSQUARE

  1792   REF   1              00,3041  0 3342 1           TC      SQRTSUB          GO TAKE THE NORMALIZED SQUARE ROOT.

  1793   REF 529  LAST 1175   00,3042  10 154 0           CCS     MPAC             CHECK FOR UNIT OVERFLOW.
  1794                        00,3043  1 3050 0           TCF     +5               MPAC IS NOT LESS THAN .5 UNLESS
  1795   REF 157  LAST 1166   00,3044  54 001 1           TS      L
  1796   REF  25  LAST 1175   00,3045  50 120 1           INDEX   FIXLOC
  1797   REF   1              00,3046  52 045 1           DXCH    LV
  1798   REF  11  LAST 1175   00,3047  1 2404 1           TCF     DVOVF            INPUT TO SQRTSUB WAS 0.

  1799   REF   1              00,3050  4 4321 1           CS      FOURTEEN         SEE IF THE INPUT WAS SO SMALL THE THE
  1800   REF  45  LAST 1161   00,3051  6 0135 0           AD      MPTEMP           FIRST TWO REGISTERS OF THE SQUARE WERE 0.
  1801   REF 304  LAST 1174   00,3052  10 000 0           CCS     A
  1802                        00,3053  4 0000 0           COM                      IF SO, SAVE THE NEGATIVE OF THE SHIFT
  1803   REF   1              00,3054  1 3132 0           TCF     SMALL            COUNT -15D.

  1804   REF   1              00,3055  1 3064 1           TCF     LARGE            (THIS IS USUALLY THE CASE.)

  1805   REF   4  LAST 1091   00,3056  4 4776 1           CS      THIRTEEN         IF THE SHIFT COUNT WAS EXACTLY 14, SET
  1806   REF  46  LAST 1175   00,3057  54 135 1           TS      MPTEMP           THE PRE-DIVIDE NORM COUNT TO -13D.

  1807   REF 530  LAST 1175   00,3060  3 0154 1           CA      MPAC             SHIFT THE LENGTH RIGHT 14 BEFORE STORING
  1808   REF 158  LAST 1175   00,3061  54 001 1  SMALL2   TS      L                (SMALL EXITS TO THIS POINT).
  1809   REF 227  LAST 1175   00,3062  3 4772 1           CAF     ZERO
  1810   REF   1              00,3063  1 3111 1           TCF     LARGE2           GO TO STORE LENGTH AND PROCEED.

  1811   REF  47  LAST 1175   00,3064  10 135 1  LARGE    CCS     MPTEMP           MOST ALL CASES COME HERE.
  1812   REF   1              00,3065  1 3073 1           TCF     LARGE3           SEE IF NO NORMALIZATION WAS REQUIRED BY

  1813   REF   1              00,3066  4 2024 1           CS      SRDDV            SQRT, AND IF SO, SET UP FOR A SHIFT
  1814   REF  48  LAST 1175   00,3067  54 135 1           TS      MPTEMP           RIGHT 1 BEFORE DIVIDING TO PRODUCE
  1815                        00,3070  0 0006 1           EXTEND                   THE DESIRED HALF UNIT VECTOR.
  1816   REF 531  LAST 1175   00,3071  3 0155 0           DCA     MPAC
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 1817  REF   2  LAST 1175   00,3072  1 3111 1            TCF     LARGE2
 1818                              00,3073  4 0000 0  LARGE3    COM                          LEAVE NEGATIVE OF SHIFT COUNT-1 FOR
 1819     REF  49  LAST 1175       00,3074  54 135 1            TS       MPTEMP              PREDIVIDE LEFT SHIFT.

 1820                              00,3075  4 0000 0            COM                          PICK UP REQUIRED SHIFTING BIT TO UNNORM-
 1821     REF 305  LAST 1175       00,3076  50 000 1            INDEX    A                   ALIZE THE SQRT RESULT.
 1822     REF  54  LAST 1160       00,3077  3 4753 1            CAF      BIT14
 1823     REF  95  LAST 1172       00,3100  54 130 1            TS       BUF
 1824                              00,3101  0 0006 1            EXTEND
 1825     REF 532  LAST 1175       00,3102  7 0155 1            MP       MPAC +1
 1826     REF  96  LAST 1177       00,3103  56 130 0            XCH      BUF
 1827                              00,3104  0 0006 1            EXTEND                       (UNNORMALIZE THE SQRT FOR LV).
 1828     REF 533  LAST 1177       00,3105  7 0154 0            MP       MPAC
 1829     REF 159  LAST 1175       00,3106  56 001 0            XCH      L
 1830     REF  97  LAST 1177       00,3107  6 0130 0            AD       BUF
 1831     REF 160  LAST 1177       00,3110  56 001 0            XCH      L

 1832     REF  26  LAST 1175       00,3111  50 120 1  LARGE2    INDEX    FIXLOC
 1833     REF   2  LAST 1175       00,3112  52 045 1            DXCH     LV                  LENGTH NOW STORED IN WORK AREA.

 1834     REF 133  LAST 1173       00,3113  4 4770 1            CS       ONE
 1835     REF   6  LAST 1173       00,3114  54 140 0            TS       MAXDVSW             NO MAXDV CASES IN UNIT.

 1836     REF  43  LAST 1173       00,3115  52 123 0            DXCH     VBUF                PREPARE X COMPONENT FOR DIVIDE, SETTING
 1837     REF 534  LAST 1177       00,3116  52 155 1            DXCH     MPAC                LENGTH OF VECTOR AS DIVISOR IN BUF.
 1838     REF  98  LAST 1177       00,3117  52 131 0            DXCH     BUF
 1839     REF   1                  00,3120  0 3150 0            TC       UNITDV

 1840     REF  44  LAST 1177       00,3121  52 125 0            DXCH     VBUF +2             DO Y AND Z IN USUAL FASHION SO WE CAN
 1841     REF 535  LAST 1177       00,3122  52 155 1            DXCH     MPAC                EXIT THROUGH VROTATEX.
 1842     REF 536  LAST 1177       00,3123  52 160 1            DXCH     MPAC +3
 1843     REF   2  LAST 1177       00,3124  0 3150 0            TC       UNITDV

 1844     REF  45  LAST 1177       00,3125  52 127 1            DXCH     VBUF +4
 1845     REF 537  LAST 1177       00,3126  52 155 1            DXCH     MPAC
 1846     REF 538  LAST 1177       00,3127  52 162 0            DXCH     MPAC +5
 1847     REF   3  LAST 1177       00,3130  0 3150 0            TC       UNITDV
 1848     REF   3  LAST 1172       00,3131  1 7354 0            TCF      VROTATEX            AND EXIT.
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P1849           IF THE LENGTH OF THE ARGUMENT VECTOR WAS LESS THAN 2(-28), EACH COMPONENT MUST BE SHIFTED LEFT AT LEAST
R1851   14 PLACES BEFORE THE DIVIDE. NOTE THAT IN THIS CASE, THE MAJOR PART OF EACH COMPONENT IS ZERO.

 1853   REF  50  LAST 1177   00,3132  54 135 1  SMALL      TS       MPTEMP              NEGATIVE OF PRE-DIVIDE SHIFT COUNT.

 1854   REF 228  LAST 1175   00,3133  3 4772 1             CAF      ZERO                SHIFT EACH COMPONENT LEFT 14.
 1855   REF  46  LAST 1177   00,3134  56 123 1             XCH      VBUF +1
 1856   REF  47  LAST 1178   00,3135  56 122 0             XCH      VBUF
 1857   REF  48  LAST 1178   00,3136  56 125 1             XCH      VBUF +3
 1858   REF  49  LAST 1178   00,3137  56 124 0             XCH      VBUF +2
 1859   REF  50  LAST 1178   00,3140  56 127 0             XCH      VBUF +5
 1860   REF  51  LAST 1178   00,3141  56 126 1             XCH      VBUF +4

 1861   REF  51  LAST 1178   00,3142  4 0135 1             CS       MPTEMP
 1862   REF 306  LAST 1177   00,3143  50 000 1             INDEX    A
 1863   REF  55  LAST 1177   00,3144  3 4753 1             CAF      BIT14
 1864                        00,3145  0 0006 1             EXTEND
 1865   REF 539  LAST 1177   00,3146  7 0154 0             MP       MPAC
 1866   REF   1              00,3147  1 3061 1             TCF      SMALL2

 1867   REF   4  LAST  776      4776            THIRTEEN =          OCT15
 1868   REF   2  LAST  786      4321            FOURTEEN =          OCT16
 1869   REF  14  LAST  382      4321            OCT16    =          R1D1
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P1870              THE FOLLOWING ROUTINE SETS UP THE CALL TO THE DIVIDE ROUTINES.

  1871    REF 540  LAST 1178    00,3150  10 154 0  UNITDV    CCS     MPAC            FORCE MPAC POSITIVE IF POSSIBLE, SETTING
  1872    REF   1               00,3151  1 3167 0            TCF     UMPAC+          DVSIGN ACCORDING TO THE SIGN OF MPAC
  1873                          00,3152  1 3154 0            TCF     +2              SINCE THE DIVISOR IS ALWAYS POSITIVE
  1874    REF   1               00,3153  1 3161 0            TCF     UMPAC-          HERE.

  1875    REF 541  LAST 1179    00,3154  10 155 1            CCS     MPAC +1
  1876    REF   2  LAST 1179    00,3155  1 3167 0            TCF     UMPAC+
  1877    REF 239  LAST 1174    00,3156  0 0002 0            TC      Q               EXIT IMMEDIATELY ON ZERO.
  1878    REF   2  LAST 1179    00,3157  1 3161 0            TCF     UMPAC-
  1879    REF 240  LAST 1179    00,3160  0 0002 0            TC      Q

  1880    REF 229  LAST 1178    00,3161  4 4772 0  UMPAC-    CS      ZERO            IF NEGATIVE, SET -0 IN DVSIGN FOR FINAL
  1881    REF   9  LAST 1173    00,3162  54 136 1            TS      DVSIGN          COMPLEMENT.
  1882                          00,3163  0 0006 1            EXTEND
  1883    REF 542  LAST 1179    00,3164  4 0155 1            DCS     MPAC            PICK UP ABSOLUTE VALUE OF ARG AND JUMP.
  1884    REF  52  LAST 1178    00,3165  50 135 0            INDEX   MPTEMP
  1885    REF   3  LAST 1173    00,3166  1 2563 1            TCF     MAXTEST -1

  1886    REF  10  LAST 1179    00,3167  54 136 1  UMPAC+    TS      DVSIGN          SET DVSIGN FOR POSITIVE QUOTIENT.
  1887    REF 543  LAST 1179    00,3170  52 155 1            DXCH    MPAC
  1888    REF  53  LAST 1179    00,3171  50 135 0            INDEX   MPTEMP
  1889    REF   4  LAST 1179    00,3172  1 2563 1            TCF     MAXTEST -1
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L        INTERPRETER                                                                           USER'S PAGE NO. 73       E3 S3

P1890             MISCELLANEOUS UNARY OPERATIONS.

  1891   REF   1                 00,3173  0 3277 0  DSQ        TC       DSQSUB           SQUARE THE DP CONTENTS OF MPAC.
  1892   REF  42  LAST 1165      00,3174  1 6030 0             TCF      DANZIG

  1893   REF  22  LAST 1161      00,3175  10 163 1  ABVALABS CCS      MODE             ABVAL OR ABS INSTRUCTION.
  1894   REF   1                 00,3176  1 3225 0             TCF      ABS              DO ABS ON SCALAR.
  1895   REF   2  LAST 1180      00,3177  1 3225 0             TCF      ABS

  1896   REF   2  LAST 1175      00,3200  0 3316 0  ABVAL      TC       VSQSUB           DOT MPAC WITH ITSELF.
  1897   REF  23  LAST 1180      00,3201  22 163 0             LXCH     MODE             MODE IS NOW DP (L ZERO AFTER DAS).

  1898                           00,3202  0 0006 1             EXTEND                    STORE SQUARE OF LENGTH IN WORK AREA.
  1899   REF 544  LAST 1179      00,3203  3 0155 0             DCA      MPAC
  1900   REF  27  LAST 1177      00,3204  50 120 1             INDEX    FIXLOC
  1901   REF   2  LAST 1175      00,3205  52 043 1             DXCH     LVSQUARE
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P1902   PROGRAM DESCRIPTION- SUBROUTINE SQRT
R1903   FUNCTIONAL DESCRIPTION-DOUBLE PRECISION SQUARE ROOT ROUTINE
R1904       THIS PROGRAM TAKES THE SQUARE ROOT OF THE 27 OR 28 MOST SIGNIFICANT BITS IN THE TRIPLE PRECISION SET OF
R1906       NUMBERS-MPAC,MPAC+1,AND MPAC+2.  THE ROOT IS RETURNED DOUBLE         PRECISION IN MPAC AND MPAC+1.
R1908   WARNING- THIS SUBROUTINE USES A TRIPLE PRECISION INPUT. THE PROGRAMMER  MUST ASSURE THE CONTENTS OF MPAC+2
R1910       ESPECIALLY IF THE CONTENTS OF MPAC IS SMALL OR ZERO.  FOR DETAILS SEE STG MEMO NO.949.
R1912   CALLING SEQUENCE- IN INTERPRETIVE MODE I.E., FOLLOWING TC  INTPRET,SQRT   NO ADDRESS IS ALLOWED
R1914   INPUT SCALING  THE BINARY POINT IS ASSUMED TO THE RIGHT OF BIT 15. THE  ANSWER IS RETURNED WITH THE SAME SCALING
R1916   SUBROUTINES- GENSCR,MPACSHR, SQRTSUB,ABORT
R1917   ABORT EXIT MODE- ABORTS ON NEGATIVE INPUT -1.2X10E-4 (77775  OCTAL)      OR LESS.
R1919       DISPLAYS ERROR CODE 1302
R1920                   TC    ABORT
R1921                   OCT   1302
R1922   DEBRIS -  LOCATIONS BUF,MPTEMP,ADDRWD ARE USED
 1923   REF   2  LAST 1175   00,3206  0 3342 1  SQRT      TC       SQRTSUB           TAKE THE SQUARE ROOT OF MPAC.
 1924   REF  54  LAST 1179   00,3207  10 135 1            CCS      MPTEMP            RETURNED NORMALIZED SQUARE ROOT. SEE IF
 1925                        00,3210  1 3212 1            TCF      +2                ANY UN-NORMALIZATION REQUIRED AND EXIT
 1926   REF  43  LAST 1180   00,3211  1 6030 0            TCF      DANZIG            IF NOT.

 1927   REF   3  LAST 1160   00,3212  6 3726 1            AD       NEG12             A RIGHT SHIFT OF MORE THAN 13 COULD BE
 1928                        00,3213  0 0006 1            EXTEND                     REQUIRED IF INPUT WAS ZERO IN MPAC,+1.
 1929   REF   1              00,3214  6 3220 1            BZMF     SQRTSHFT          GOES HERE IN MOST CASES.
 1930                        00,3215  22 007 0            ZL                         IF A LONG SHIFT IS REQUIRED, GO TO
 1931   REF  77  LAST 1161   00,3216  22 116 1            LXCH     ADDRWD            GENERAL RIGHT SHIFT ROUTINES.
 1932   REF   4  LAST 1160   00,3217  1 2303 1            TCF      GENSCR +4         ADDRWD WAS ZERO TO PREVENT ROUND.

 1933   REF  55  LAST 1181   00,3220  50 135 0  SQRTSHFT INDEX    MPTEMP            SELECT SHIFTING BIT AND EXIT THROUGH
 1934   REF  41  LAST 1132   00,3221  3 4752 0            CAF      BIT15             SHIFT ROUTINES.
 1935   REF  56  LAST 1181   00,3222  54 135 1            TS       MPTEMP
 1936   REF 230  LAST 1179   00,3223  3 4772 1            CAF      ZERO              TO ZERO MPAC +2 IN THE PROCESS.
 1937   REF   2  LAST 1160   00,3224  1 2036 1            TCF      MPACSHR +3

 1938   REF   3  LAST 1157   00,3225  0 6672 1  ABS       TC       BRANCH            TEST SIGN OF MPAC AND COMPLEMENT IF
 1939   REF  44  LAST 1181   00,3226  1 6030 0            TCF      DANZIG
 1940   REF  45  LAST 1181   00,3227  1 6030 0            TCF      DANZIG
 1941   REF   4  LAST 1151   00,3230  1 7624 1            TCF      COMP
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  1942    REF  17  LAST 1146    00,3231  4 4766 0  VDEF      CS      FOUR             VECTOR DEFINE - ESSENTIALLY TREATS
  1943    REF  13  LAST 1149    00,3232  26 166 1            ADS     PUSHLOC          SCALAR IN MPAC AS X COMPONENT, PUSHES UP
  1944                          00,3233  0 0006 1            EXTEND                   FOR Y AND THEN AGAIN FOR Z.
  1945    REF 307  LAST 1178    00,3234  5 0000 1            INDEX   A
  1946                          00,3235  3 0003 1            DCA     2
  1947    REF 545  LAST 1180    00,3236  52 160 1            DXCH    MPAC +3
  1948                          00,3237  0 0006 1            EXTEND
  1949    REF  14  LAST 1182    00,3240  5 0166 0            INDEX   PUSHLOC
  1950                          00,3241  3 0001 0            DCA     0
  1951    REF 546  LAST 1182    00,3242  52 162 0            DXCH    MPAC +5
  1952    REF   2  LAST 1146    00,3243  1 6470 0            TCF     VMODE            MODE IS NON VECTOR.

  1953    REF   3  LAST 1180    00,3244  0 3316 0  VSQ       TC      VSQSUB           DOT MPAC WITH ITSELF.
  1954    REF   1               00,3245  1 7266 0            TCF     DMODE            MODE IS NOW DP.

  1955                          00,3246  0 0006 1  PUSH      EXTEND                   PUSH DOWN MPAC LEAVING IT LOADED.
  1956    REF 547  LAST 1182    00,3247  3 0155 0            DCA     MPAC
  1957    REF  15  LAST 1182    00,3250  50 166 0            INDEX   PUSHLOC          PUSH DOWN FIRST TWO REGISTERS IN EACH
  1958                          00,3251  52 001 1            DXCH    0

  1959    REF  24  LAST 1180    00,3252  50 163 0            INDEX   MODE             INCREMENT PUSHDOWN POINTER.
  1960    REF   5  LAST 1127    00,3253  3 6213 1            CAF     NO.WDS
  1961    REF  16  LAST 1182    00,3254  26 166 1            ADS     PUSHLOC

  1962    REF  25  LAST 1182    00,3255  10 163 1            CCS     MODE
  1963    REF   1               00,3256  1 3271 1            TCF     TPUSH            PUSH DOWN MPAC +2.
  1964    REF  46  LAST 1181    00,3257  1 6030 0            TCF     DANZIG           DONE FOR DP.

  1965                          00,3260  0 0006 1            EXTEND                   ON VECTOR, PUSH DOWN Y AND Z COMPONENTS.
  1966    REF 548  LAST 1182    00,3261  3 0160 0            DCA     MPAC +3
  1967    REF  17  LAST 1182    00,3262  50 166 0            INDEX   PUSHLOC
  1968                          00,3263  51'775 0            DXCH    0 -4
  1969                          00,3264  0 0006 1            EXTEND
  1970    REF 549  LAST 1182    00,3265  3 0162 1            DCA     MPAC +5
  1971    REF  18  LAST 1182    00,3266  50 166 0            INDEX   PUSHLOC
  1972                          00,3267  51'777 1            DXCH    0 -2
  1973    REF  47  LAST 1182    00,3270  1 6030 0            TCF     DANZIG

  1974    REF 550  LAST 1182    00,3271  3 0156 0  TPUSH     CA      MPAC +2
  1975    REF   2  LAST 1126    00,3272  1 6523 1            TCF     ENDTPUSH +2

  1976    REF  28  LAST 1180    00,3273  50 120 1  RVQ       INDEX   FIXLOC           RVQ - RETURN IVA QPRET.
  1977    REF   6  LAST 1129    00,3274  3 0052 0            CA      QPRET
  1978    REF  21  LAST 1141    00,3275  54 117 1            TS      POLISH
  1979    REF   5  LAST 1130    00,3276  1 6621 0            TCF     GOTO +4          (ASSUME QPRET POINTS TO FIXED ONLY.)
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P1980              THE FOLLOWING SUBROUTINES ARE USED IN SQUARING MPAC, IN BOTH THE SCALAR AND VECTOR SENSE. THEY ARE
R1982       SPECIAL CASES OF DMPSUB AND DOTSUB, PUT IN TO SAVE SOME TIME.

  1983   REF 551  LAST 1182   00,3277  3 0155 0  DSQSUB   CA      MPAC +1         SQUARES THE SCALAR CONTENTS OF MPAC.
  1984                        00,3300  0 0006 1           EXTEND
  1985                        00,3301  7 0000 0           SQUARE
  1986   REF 552  LAST 1183   00,3302  54 156 1           TS      MPAC +2
  1987   REF 231  LAST 1181   00,3303  3 4772 1           CAF     ZERO            FORM 2(CROSS TERM).
  1988   REF 553  LAST 1183   00,3304  56 155 0           XCH     MPAC +1
  1989                        00,3305  0 0006 1           EXTEND
  1990   REF 554  LAST 1183   00,3306  7 0154 0           MP      MPAC
  1991                        00,3307  20 001 1           DDOUBL                  AND MAYBE OVERFLOW.
  1992   REF 555  LAST 1183   00,3310  20 156 1           DAS     MPAC +1         AND SET A TO NET OVERFLOW.
  1993   REF 556  LAST 1183   00,3311  56 154 1           XCH     MPAC
  1994                        00,3312  0 0006 1           EXTEND
  1995                        00,3313  7 0000 0           SQUARE
  1996   REF 557  LAST 1183   00,3314  20 155 1           DAS     MPAC
  1997   REF 241  LAST 1179   00,3315  0 0002 0           TC      Q

  1998                        00,3316  0 0006 1  VSQSUB   EXTEND                  DOTS THE VECTOR IN MPAC WITH ITSELF.
  1999   REF   8  LAST 1139   00,3317  22 137 1           QXCH    DOTRET
  2000   REF   2  LAST 1180   00,3320  0 3277 0           TC      DSQSUB          SQUARE THE X COMPONENT.
  2001   REF 558  LAST 1183   00,3321  52 160 1           DXCH    MPAC +3
  2002   REF 559  LAST 1183   00,3322  52 155 1           DXCH    MPAC
  2003   REF  99  LAST 1177   00,3323  52 131 0           DXCH    BUF             SO WE CAN END IN DOTSUB.
  2004   REF 560  LAST 1183   00,3324  3 0156 0           CA      MPAC +2
  2005   REF 100  LAST 1183   00,3325  54 132 0           TS      BUF +2

  2006   REF   3  LAST 1183   00,3326  0 3277 0           TC      DSQSUB          SQUARE Y COMPONENT.
  2007   REF 561  LAST 1183   00,3327  52 156 1           DXCH    MPAC +1
  2008   REF 101  LAST 1183   00,3330  20 132 0           DAS     BUF +1
  2009   REF 562  LAST 1183   00,3331  6 0154 1           AD      MPAC
  2010   REF 102  LAST 1183   00,3332  6 0130 0           AD      BUF
  2011   REF 103  LAST 1183   00,3333  54 130 1           TS      BUF
  2012                        00,3334  1 3336 0           TCF     +2
  2013   REF   8  LAST 1175   00,3335  54 121 1           TS      OVFIND          IF OVERFLOW.

  2014   REF 563  LAST 1183   00,3336  52 162 0           DXCH    MPAC +5
  2015   REF 564  LAST 1183   00,3337  52 155 1           DXCH    MPAC
  2016   REF   4  LAST 1183   00,3340  0 3277 0           TC      DSQSUB          SQUARE Z COMPONENT.
  2017   REF   1              00,3341  1 7154 1           TCF     ENDDOT          END AS IN DOTSUB.
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P2018           DOUBLE PRECISION SQUARE ROOT ROUTINE. TAKE THE SQUARE ROOT OF THE TRIPLE PRECISION (MPAC +2 USED ONLY
R2020      IN NORMALIZATION) CONTENTS OF MPAC AND LEAVE THE NORMALIZED RESULT IN MPAC (C(MPAC) GREATER THAN OR EQUAL TO
R2022      .5). THE RIGHT SHIFT COUNT (TO UNNORMALIZE) IS LEFT IN MPTEMP.

  2023    REF 232  LAST 1183   00,3342  3 4772 1  SQRTSUB  CAF     ZERO               START BY ZEROING RIGHT SHIFT COUNT.
  2024    REF  57  LAST 1161   00,3343  54 135 1           TS      MPTEMP

  2025    REF 565  LAST 1183   00,3344  10 154 0           CCS     MPAC               CHECK FOR POSITIVE ARGUMENT, SHIFTING
  2026    REF   1              00,3345  1 3403 1           TCF     SMPAC+             FIRST SIGNIFICANT MPAC REGISTER INTO
  2027                         00,3346  1 3350 0           TCF     +2                 MPAC ITSELF.
  2028    REF   1              00,3347  1 3372 0           TCF     SQRTNEG            SEE IF MAG OF ARGUMENT LESS THAN 1 (-4).

  2029    REF 566  LAST 1184   00,3350  56 156 0           XCH     MPAC +2            MPAC IS ZERO - SHIFT LEFT 14.
  2030    REF 567  LAST 1184   00,3351  56 155 0           XCH     MPAC +1
  2031    REF 568  LAST 1184   00,3352  54 154 0           TS      MPAC
  2032    REF  14  LAST  903   00,3353  3 4774 1           CAF     SEVEN              AUGMENT RIGHT SHIFT COUNTER.
  2033    REF  58  LAST 1184   00,3354  54 135 1           TS      MPTEMP

  2034    REF 569  LAST 1184   00,3355  10 154 0           CCS     MPAC               SEE IF MPAC NOW PNZ.
  2035    REF   2  LAST 1184   00,3356  1 3403 1           TCF     SMPAC+
  2036                         00,3357  1 3361 1           TCF     +2
  2037    REF   1              00,3360  1 3375 1           TCF     ZEROANS            NEGATIVE BUT LESS THAN 1 (-4) IN MAG.

  2038    REF 570  LAST 1184   00,3361  56 155 0           XCH     MPAC +1            ZERO - SHIFT LEFT 14 AGAIN.
  2039    REF 571  LAST 1184   00,3362  54 154 0           TS      MPAC
  2040    REF  15  LAST 1184   00,3363  3 4774 1           CAF     SEVEN              AUGMENT RIGHT SHIFT COUNTER.
  2041    REF  59  LAST 1184   00,3364  26 135 1           ADS     MPTEMP

  2042    REF 572  LAST 1184   00,3365  10 154 0           CCS     MPAC
  2043    REF   3  LAST 1184   00,3366  1 3403 1           TCF     SMPAC+
  2044    REF 242  LAST 1183   00,3367  0 0002 0           TC      Q                  SQRT(0) = 0.
  2045    REF   2  LAST 1184   00,3370  1 3375 1           TCF     ZEROANS
  2046    REF   1              00,3371  1 3450 1           TCF     FIXROOT            DO NOT LEAVE SQRTSUB WITH -0 IN MPAC.

  2047    REF 308  LAST 1182   00,3372  10 000 0  SQRTNEG  CCS     A                  ARGUMENT IS NEGATIVE, BUT SEE IF SIGN-
  2048    REF   1              00,3373  1 3401 0           TCF     SQRTABRT           CORRECTED ARGUMENT IS LESS THAN 1 (-4)

  2049    REF 573  LAST 1184   00,3374  10 155 1           CCS     MPAC +1            IN MAGNITUDE. IF SO, CALL ANSWER ZERO.
  2050    REF 233  LAST 1184   00,3375  3 4772 1  ZEROANS  CAF     ZERO               FORCE ANSWER TO ZERO HERE.
  2051    REF   2  LAST 1184   00,3376  1 3450 1           TCF     FIXROOT
  2052    REF   2  LAST 1184   00,3377  1 3401 0           TCF     SQRTABRT
  2053    REF   3  LAST 1184   00,3400  1 3450 1           TCF     FIXROOT

  2054    REF   5  LAST  925   00,3401  0 5726 1  SQRTABRT TC      POODOO
  2055                         00,3402   21302 0           OCT     21302              SQRT CALLED WITH NEGATIVE ARGUMENT

  2056    REF   1              00,3403  6 2443 0  SMPAC+   AD      -1/2+2             SEE IF ARGUMENT GREATER THAN OR EQUAL TO
  2057                         00,3404  0 0006 1           EXTEND                     .5.
  2058  REF   1             00,3405  6 3453 0             BZMF    SRTEST       IF SO, SEE IF LESS THAN .25.

  2059  REF 574  LAST 1184  00,3406  52 155 1             DXCH    MPAC         WE WILL TAKE THE SQUARE ROOT OF MPAC/2.
  2060  REF  22  LAST 1166  00,3407  22 021 1             LXCH    SR           SHIFT RIGHT 1 AND GO TO THE SQRT ROUTINE
  2061                      00,3410  0 0006 1             EXTEND
  2062  REF  18  LAST 1166  00,3411  7 4753 0             MP      HALF
  2063  REF 575  LAST 1185  00,3412  52 155 1             DXCH    MPAC
  2064  REF  23  LAST 1185  00,3413  56 021 1             XCH     SR
  2065  REF 576  LAST 1185  00,3414  26 155 1             ADS     MPAC +1      GUARANTEED NO OVERFLOW.

  2066  REF   1             00,3415  3 2314 0  ARGHI      CAF     SLOPEHI      ARGUMENT BETWEEN .25 AND .5. GET A
  2067                      00,3416  0 0006 1             EXTEND               LINEAR APPROXIMATION FOR THIS RANGE.
  2068  REF 577  LAST 1185  00,3417  7 0154 0             MP      MPAC
  2069  REF   1             00,3420  6 2565 0             AD      BIASHI       X0/2 = (MPAC/2)(SLOPEHI) + BIASHI/2.

  2070  REF 104  LAST 1183  00,3421  54 130 1     +4      TS      BUF          X0/2 (ARGLO ENTERS HERE).
  2071  REF 578  LAST 1185  00,3422  3 0154 1             CA      MPAC         SINGLE-PRECISION THROUGHOUT.
  2073                      00,3423  0 0006 1             EXTEND
  2074  REF  19  LAST 1185  00,3424  7 4753 0             MP      HALF         .5(MPAC/2)
  2075                      00,3425  0 0006 1             EXTEND
  2076  REF 105  LAST 1185  00,3426  10 130 1             DV      BUF          .5(MPAC/2)/(X0/2)
  2077  REF 106  LAST 1185  00,3427  26 130 1             ADS     BUF          XI = X0/2 + .5(MPAC/2)/(X0/2).

  2078                      00,3430  0 0006 1             EXTEND
  2079  REF  20  LAST 1185  00,3431  7 4753 0             MP      HALF         FORM UP X1/2.
  2080  REF 579  LAST 1185  00,3432  52 155 1             DXCH    MPAC         SAVE AND BRING OUT ARGUMENT.
  2081                      00,3433  0 0006 1             EXTEND               TAKE DP QUOTIENT WITH X1.
  2082  REF 107  LAST 1185  00,3434  10 130 1             DV      BUF
  2083  REF 108  LAST 1185  00,3435  54 131 0             TS      BUF +1       SAVE MAJOR PART OF QUOTIENT.
  2084  REF 234  LAST 1184  00,3436  3 4772 1             CAF     ZERO         FORM MINOR PART OF QUOTIENT USING
  2085  REF 161  LAST 1177  00,3437  56 001 0             XCH     L            (REMAINDER,0).
  2086                      00,3440  0 0006 1             EXTEND
  2087  REF 109  LAST 1185  00,3441  10 130 1             DV      BUF
  2088  REF 162  LAST 1185  00,3442  54 001 1             TS      L            IN PREPARATION FOR DAS.
  2089  REF 110  LAST 1185  00,3443  3 0131 1             CA      BUF +1
  2090  REF 580  LAST 1185  00,3444  20 155 1             DAS     MPAC         X2 = X1/2 + (MPAC/2)XI

  2091                      00,3445  0 0006 1             EXTEND               OVERFLOWS IF ARG. NEAR POSMAX.
  2092  REF   1             00,3446  1 3452 0             BZF     TCQBNK00
  2093  REF  33  LAST 1170  00,3447  3 4750 1             CAF     POSMAX
  2094  REF 581  LAST 1185  00,3450  54 154 0  FIXROOT    TS      MPAC
  2095  REF 582  LAST 1185  00,3451  54 155 1             TS      MPAC +1
  2096  REF 243  LAST 1184  00,3452  0 0002 0  TCQBNK00   TC      Q            RETURN TO CALLER TO UNNORMALIZE, ETC.
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 2097   REF   6  LAST 1020   00,3453  6 4754 0  SRTEST   AD      QUARTER      ARGUMENT WAS LESS THAN .5, SEE IF LESS
 2098                        00,3454  0 0006 1           EXTEND               THAN .25.
 2099   REF   1              00,3455  6 3477 0           BZMF    SQRTNORM     IF SO, BEGIN NORMALIZATION.

 2100   REF 583  LAST 1185   00,3456  52 155 1           DXCH    MPAC         IF BETWEEN .5 AND .25, SHIFT RIGHT 1 AND
 2101   REF  24  LAST 1185   00,3457  22 021 1           LXCH    SR           START AT ARGLO.
 2102                        00,3460  0 0006 1           EXTEND
 2103   REF  21  LAST 1185   00,3461  7 4753 0           MP      HALF
 2104   REF 584  LAST 1186   00,3462  52 155 1           DXCH    MPAC
 2105   REF  25  LAST 1186   00,3463  56 021 1           XCH     SR
 2106   REF 585  LAST 1186   00,3464  26 155 1           ADS     MPAC +1      NO OVERFLOW.

 2107   REF   1              00,3465  3 3006 1  ARGLO    CAF     SLOPELO      (NORMALIZED) ARGUMENT BETWEEN .125 AND
 2108                        00,3466  0 0006 1           EXTEND               .25
 2109   REF 586  LAST 1186   00,3467  7 0154 0           MP      MPAC
 2110   REF   1              00,3470  6 2270 0           AD      BIASLO
 2111   REF   1              00,3471  1 3421 1           TCF     ARGHI +4     BEGIN SQUARE ROOT.

 2112                        00,3472  0 0006 1  SQRTNM2  EXTEND               SHIFT LEFT 2 AND INCREMENT RIGHT SHIFT
 2113   REF 587  LAST 1186   00,3473  3 0156 0           DCA     MPAC +1      COUNT (FOR TERMINAL UNNORMALIZATION).
 2114   REF 588  LAST 1186   00,3474  20 156 1           DAS     MPAC +1
 2115   REF 589  LAST 1186   00,3475  6 0154 1           AD      MPAC
 2116   REF 590  LAST 1186   00,3476  26 154 0           ADS     MPAC         (NO OVERFLOW).

 2117   REF  60  LAST 1184   00,3477  24 135 0  SQRTNORM INCR    MPTEMP       FIRST TIME THROUGH, JUST SHIFT LEFT 1
 2118                        00,3500  0 0006 1           EXTEND               (PUTS IN EFFECTIVE RIGHT SHIFT SINCE
 2119   REF 591  LAST 1186   00,3501  3 0156 0           DCA     MPAC +1      WE WANT MPAC/2).
 2120   REF 592  LAST 1186   00,3502  20 156 1           DAS     MPAC +1
 2121   REF 593  LAST 1186   00,3503  6 0154 1           AD      MPAC
 2122   REF 594  LAST 1186   00,3504  26 154 0           ADS     MPAC         (AGAIN NO OVERFLOW).
 2123                        00,3505  6 0000 1           DOUBLE
 2124   REF  22  LAST  385   00,3506  54 022 0           TS      CYL

 2125   REF  23  LAST 1186   00,3507  10 022 0  NORMTEST CCS     CYL          SEE IF ARGUMENT NOW NORMALIZED AT
 2126   REF  24  LAST 1186   00,3510  10 022 0           CCS     CYL          GREATER THAN .125.
 2127   REF   1              00,3511  1 3472 1           TCF     SQRTNM2      NO - SHIFT LEFT 2 MORE AND TRY AGAIN.
 2128   REF   2  LAST 1186   00,3512  1 3415 0           TCF     ARGHI        YES - NOW BETWEEN .5 AND .25.
 2129   REF   1              00,3513  1 3465 1           TCF     ARGLO        ARGUMENT NOW BETWEEN .25 AND .125.
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P2130   TRIGONOMETRIC FUNCTION PACKAGE.

R2131            THE FOLLOWING TRIGONOMETRIC FUNCTIONS ARE AVAILABLE AS INTERPRETIVE OPERATIONS:

R2133            1.  SIN                   COMPUTES (1/2)SINE(2 PI MPAC).
R2134            2.  COS                   COMPUTES (1/2)COSINE(2 PI MPAC).

R2135            3.  ASIN                  COMPUTES (1/2PI)ARCSINE(2 MPAC).
R2136            4.  ACOS                  COMPUTES (1/2PI)ARCCOSINE(2 MPAC).

R2137   SIN-ASIN AND COS-ACOS ARE MUTUALLY INVERSE, IE SIN(ASIN(X)) = X.


  2138   REF   4  LAST 1181   00,3514  0 6672 1  COSINE   TC      BRANCH          FINDS COSINE USING THE IDENTITY
  2139                        00,3515  1 3520 1           TCF     +3              COS(X) = SIN(PI/2 - ABS(X)).
  2140   REF   1              00,3516  1 3523 1           TCF     PRESINE
  2141   REF   2  LAST 1187   00,3517  1 3523 1           TCF     PRESINE

  2142                        00,3520  0 0006 1    +3     EXTEND
  2143   REF 595  LAST 1186   00,3521  4 0155 1           DCS     MPAC
  2144   REF 596  LAST 1187   00,3522  52 155 1           DXCH    MPAC

  2145   REF   7  LAST 1186   00,3523  3 4754 0  PRESINE  CAF     QUARTER         PI/2 SCALED
  2146   REF 597  LAST 1187   00,3524  26 154 0           ADS     MPAC


  2147   REF 598  LAST 1187   00,3525  52 155 1  SINE     DXCH    MPAC            DOUBLE ARGUMENT.
  2148                        00,3526  20 001 1    +1     DDOUBL
  2149                        00,3527  54 000 0           OVSK                    SEE IF OVERFLOW PRESENT.
  2150                        00,3530  1 3533 0           TCF     +3              IF NOT, ARGUMENT OK AS IS.

  2151                        00,3531  0 0006 1           EXTEND                  IF SO, WE LOST (OR GAINED) PI, SO
  2152                        00,3532  4 0001 1           DCOM                    COMPLEMENT MPAC USING THE IDENTITY
 A2153                                                                            SIN(X-(+)PI) = SIN(-X).
  2154   REF 599  LAST 1187   00,3533  52 155 1    +3     DXCH    MPAC
  2155   REF 600  LAST 1187   00,3534  3 0154 1           CA      MPAC            SEE IF ARGUMENT GREATER THAN .5 IN
  2156                        00,3535  6 0000 1           DOUBLE                  MAGNITUDE. IF SO, REDUCE IT TO LESS THAN
  2157   REF 163  LAST 1185   00,3536  54 001 1           TS      L               .5 (+-PI/2 SCALED) AS FOLLOWS:
  2158   REF   1              00,3537  1 3550 0           TCF     SN1

  2159   REF 309  LAST 1184   00,3540  50 000 1           INDEX   A               IF POSITIVE, FORM PI - X, IF NEGATIVE
  2160   REF   7  LAST 1082   00,3541  3 4752 0           CAF     NEG1/2 +1       USE -PI - X.
  2161                        00,3542  6 0000 1           DOUBLE
  2162                        00,3543  0 0006 1           EXTEND
  2163   REF 601  LAST 1187   00,3544  60 154 1           SU      MPAC            GUARANTEED NO OVERFLOW.
  2164   REF 602  LAST 1187   00,3545  54 154 0           TS      MPAC
  2165   REF 603  LAST 1187   00,3546  4 0155 1           CS      MPAC +1
  2166   REF 604  LAST 1187   00,3547  54 155 1           TS      MPAC +1
 2167                          00,3550  0 0006 1  SN1      EXTEND             SET UP TO EVALUATE HASTINGS POLYNOMIAL
 2168   REF 605  LAST 1187     00,3551  3 0155 0           DCA     MPAC
 2169   REF  17  LAST 1173     00,3552  52 134 0           DXCH    BUF2
 2170   REF   5  LAST 1183     00,3553  0 3277 0           TC      DSQSUB             SQUARE MPAC.

 2171   REF   5  LAST  903     00,3554  0 7171 1           TC      POLY               EVALUATE FOURTH ORDER POLYNOMIAL.
 2172                          00,3555   00003 1           DEC     3
 2173                          00,3556   14441 0           2DEC    +.3926990796
 2173                          00,3557   37325 1
 2174                          00,3560   53250 0           2DEC    -.6459637111
 2174                          00,3561   60764 1
 2175                          00,3562   12146 1           2DEC    +.318758717
 2175                          00,3563   21276 1
 2176                          00,3564   75466 1           2DEC    -.074780249
 2176                          00,3565   71471 0
 2177                          00,3566   00236 0           2DEC    +.009694988
 2177                          00,3567   32757 0

 2178   REF   1                00,3570  3 2467 0           CAF     LBUF2              MULTIPLY BY ARGUMENT AND SHIFT LEFT 2.
 2179   REF  19  LAST 1149     00,3571  0 7055 0           TC      DMPSUB -1

 2180                          00,3572  0 0006 1           EXTEND
 2181   REF 606  LAST 1188     00,3573  3 0156 0           DCA     MPAC +1
 2182   REF 607  LAST 1188     00,3574  20 156 1           DAS     MPAC +1
 2183   REF 608  LAST 1188     00,3575  6 0154 1           AD      MPAC
 2184   REF 609  LAST 1188     00,3576  26 154 0           ADS     MPAC               NEITHER SHIFT OVERFLOWS.
 2185                          00,3577  0 0006 1           EXTEND
 2186   REF 610  LAST 1188     00,3600  3 0156 0           DCA     MPAC +1
 2187   REF 611  LAST 1188     00,3601  20 156 1           DAS     MPAC +1
 2188   REF 612  LAST 1188     00,3602  6 0154 1           AD      MPAC
 2189   REF 613  LAST 1188     00,3603  26 154 0           ADS     MPAC
 2190   REF  48  LAST 1182     00,3604  1 6030 0           TCF     DANZIG
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P2191              ARCSIN/ARCCOS ROUTINE.

 2192   REF   1               00,3605  3 3626 0  ARCSIN   CAF     LASINEX         COMPUTE ARCSIN BY USING THE IDENTITY
 2193                         00,3606  1 3610 1           TCF     +2              ARCSIN(X) = PI/2 - ARCCOS(X).

 2194   REF   1               00,3607  3 3710 1  ARCCOS   CAF     LODANZIG        (EXITS IMMEDIATELY).
 2195   REF   1               00,3610  54 136 1           TS      ESCAPE
 2196   REF   5  LAST 1187    00,3611  0 6672 1           TC      BRANCH          TEST SIGN OF INPUT.
 2197   REF   1               00,3612  1 3622 0           TCF     ACOSST          START IMMEDIATELY IF POSITIVE.
 2198   REF   1               00,3613  1 3724 1           TCF     ACOSZERO        ARCCOS(0) = PI/2 = .25.
 2199                         00,3614  0 0006 1           EXTEND                  IF NEGATIVE, USE THE IDENTITY
 2200   REF 614  LAST 1188    00,3615  4 0155 1           DCS     MPAC            ARCCOS(X) = PI - ARCCOS(-X), FORCING
 2201   REF 615  LAST 1189    00,3616  52 155 1           DXCH    MPAC            ARGUMENT POSITIVE.
 2202   REF   1               00,3617  3 3727 0           CAF     TOSUBTR         SET EXIT  TO DO ABOVE BEFORE
 2203   REF   2  LAST 1189    00,3620  56 136 0           XCH     ESCAPE          ARCSIN/ARCCOS CONSIDERATIONS.
 2204   REF   1               00,3621  54 137 0           TS      ESCAPE2

 2205   REF  22  LAST 1186    00,3622  4 4753 0  ACOSST   CS      HALF            TEST MAGNITUDE OF INPUT.
 2206   REF 616  LAST 1189    00,3623  6 0154 1           AD      MPAC
 2207   REF 310  LAST 1187    00,3624  10 000 0           CCS     A
 2208   REF   1               00,3625  1 3716 0           TCF     ACOSOVF         THIS IS PROBABLY AN OVERFLOW CASE.

 2209   REF   1               00,3626  1 3704 0  LASINEX  TCF     ASINEX

 2210   REF   1               00,3627  1 3637 1           TCF     ACOSST2         NO OVERFLOW - PROCEED.

 2211   REF 617  LAST 1189    00,3630  10 155 1           CCS     MPAC +1         IF MAJOR PART IS .5, CALL ANSWER 0
 2212   REF 235  LAST 1185    00,3631  3 4772 1           CAF     ZERO            UNLESS MINOR PART NEGATIVE.
 2213   REF   1               00,3632  1 3634 1           TCF     ACOS=0

 2214   REF   2  LAST 1189    00,3633  1 3637 1           TCF     ACOSST2

 2215   REF 618  LAST 1189    00,3634  54 155 1  ACOS=0   TS      MPAC +1
 2216   REF 619  LAST 1189    00,3635  54 154 0    +1     TS      MPAC
 2217   REF   3  LAST 1189    00,3636  0 0136 0           TC      ESCAPE

 2218                         00,3637  0 0006 1  ACOSST2  EXTEND                  NOW THAT ARGUMENT IS IN PROPER RANGE,
 2219   REF 620  LAST 1189    00,3640  4 0155 1           DCS     MPAC            BEGIN COMPUTATION. USE HASTINGS
 2220   REF  23  LAST 1189    00,3641  6 4753 1           AD      HALF            APPROXIMATION ARCCOS(X) = SQRT(1-X)P(X)
 2221   REF 621  LAST 1189    00,3642  52 155 1           DXCH    MPAC            IN A SCALED VERSION WHERE P(X) IS A
 2222   REF  18  LAST 1188    00,3643  52 134 0           DXCH    BUF2            SEVENTH ORDER POLYNOMIAL.

 2223   REF   3  LAST 1181    00,3644  0 3342 1           TC      SQRTSUB         RETURNS WITH NORMALIZED SQUARE ROOT.

 2224   REF  61  LAST 1186    00,3645  10 135 1           CCS     MPTEMP          SEE IF UN-NORMALIZATION REQUIRED.
 2225   REF   1               00,3646  1 3711 1           TCF     ACOSSHR         IF SO.
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  2226   REF 622  LAST 1189   00,3647  52 155 1  ACOS3     DXCH    MPAC                SET UP FOR POLYNOMIAL EVALUATION.
  2227   REF  19  LAST 1189   00,3650  52 134 0            DXCH    BUF2
  2228   REF 623  LAST 1190   00,3651  52 155 1            DXCH    MPAC

  2229   REF   6  LAST 1188   00,3652  0 7171 1            TC      POLY
  2230                        00,3653   00006 1            DEC     6
  2231                        00,3654   13240 0            2DEC    +.353553385         COEFFICIENTS ARE C 2(+I)/PISQRT(2) WHERE
  2231                        00,3655   23630 0
  2232                        00,3656   74721 0            2DEC*   -.0483017006 B+1*                       I
  2232                        00,3657   47775 1
  2233                        00,3660   02440 0            2DEC*   +.0200273085 B+2*     WHERE C STANDS FOR ORIGINAL COEFFS.
  2233                        00,3661   20237 0
  2234                        00,3662   75067 1            2DEC*   -.0112931863 B+3*
  2234                        00,3663   70742 1
  2235                        00,3664   03436 0            2DEC*   +.00695311612 B+4*
  2235                        00,3665   26756 1
  2236                        00,3666   74037 0            2DEC*   -.00384617957 B+5*
  2236                        00,3667   57640 1
  2237                        00,3670   03046 0            2DEC*   +.001501297736 B+6*
  2237                        00,3671   07143 0
  2238                        00,3672   76654 1            2DEC*   -.000284160334 B+7*
  2238                        00,3673   42244 0

  2239   REF   2  LAST 1188   00,3674  3 2467 0            CAF     LBUF2               DO FINAL MULTIPLY AND GO TO ANY
  2240   REF  20  LAST 1188   00,3675  0 7055 0            TC      DMPSUB -1           EPILOGUE SEQUENCES.
  2241   REF   4  LAST 1189   00,3676  0 0136 0            TC      ESCAPE

  2242                        00,3677  0 0006 1  SUBTR     EXTEND                      EPILOGUE FOR NEGATIVE INPUTS TO ARCCOS.
  2243   REF 624  LAST 1190   00,3700  4 0155 1            DCS     MPAC
  2244   REF  24  LAST 1189   00,3701  6 4753 1            AD      HALF                FORMS PI - ARCCOS(-X) = ARCCOS(X).
  2245   REF 625  LAST 1190   00,3702  52 155 1            DXCH    MPAC
  2246   REF   2  LAST 1189   00,3703  0 0137 1            TC      ESCAPE2             GO TO POSSIBLE ARCSIN EPILOGUE.

  2247                        00,3704  0 0006 1  ASINEX    EXTEND
  2248   REF 626  LAST 1190   00,3705  4 0155 1            DCS     MPAC                ARCSIN EPILOGUE - GET ARCSIN(X)
  2249   REF   8  LAST 1187   00,3706  6 4754 0            AD      QUARTER             = PI/2 - ARCCOS(X).
  2250   REF 627  LAST 1190   00,3707  52 155 1            DXCH    MPAC
  2251   REF  49  LAST 1188   00,3710  1 6030 0  LDANZIG   TCF     DANZIG
  2252    REF 311  LAST 1189   00,3711  50 000 1  ACOSSHR  INDEX  A              THE SHIFT RIGHT IS LESS THAN 14 SINCE
  2253    REF  56  LAST 1178   00,3712  3 4755 1           CAF    BIT14          THE INPUT WAS NON-ZERO DP.
  2254    REF  62  LAST 1189   00,3713  54 135 1           TS     MPTEMP
  2255    REF   4  LAST 1155   00,3714  0 2073 1           TC     VSHRRND        DP SHIFT RIGHT AND ROUND.
  2256    REF   1              00,3715  1 3647 0           TCF    ACOS3          PROCEED.

  2257                         00,3716  0 0006 1  ACOSOVF  EXTEND                IF MAJOR PART WAS ONLY 1 MORE THAN .5,
  2258    REF   2  LAST 1189   00,3717  1 3634 1           BZF    ACOS=0         CALL ANSWER ZERO.

  2259    REF  31  LAST  832   00,3720  0 5671 1  ACOSABRT TC     ALARM          IF OVERFLOW, CALL ANSWER ZERO BUT
  22591                        00,3721   01301 1           OCT    1301           SOUND AN ALARM.

  2260    REF 236  LAST 1189   00,3722  3 4772 1           CAF    ZERO
  22601   REF   3  LAST 1191   00,3723  1 3634 1           TCF    ACOS=0

  2261    REF   9  LAST 1190   00,3724  3 4754 0  ACOSZERO CAF    QUARTER        ACOS(0) = PI/2.
  2262    REF   4  LAST 1191   00,3725  1 3635 0           TCF    ACOS=0 +1      SET MPAC AND EXIT VIA ESCAPE.

  2263                         00,3726   77763 0  NEG12    DEC    -12
  2264    REF   1              00,3727  1 3677 0  TCSUBTR  TCF    SUBTR
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L        INTERPRETER                                                                        USER'S PAGE NO. 85      E3 S3

P2265            THE FOLLOWING INSTRUCTIONS ARE AVAILABLE FOR SETTING, MODIFYING, AND BRANCHING ON INDEX REGISTERS:

R2267            1.  AXT                       ADDRESS TO INDEX TRUE.
R2268            1.  AXC                       ADDRESS TO INDEX COMPLEMENTED.
R2269            3.  LXA                       LOAD INDEX FROM ERASABLE.
R2270            4.  LXC                       LOAD INDEX COMPLEMENTED FROM ERASABLE.
R2271            5.  SXA                       STORE INDEX IN ERASABLE.
R2272            6.  XCHX                      EXCHANGE INDEX REIGSTER WITH ERASABLE.

R2273            7.  INCR                      INCREMENT INDEX REGISTER.
R2274            8.  XAD                       ERASABLE ADD TO INDEX REGISTER.
R2275            9.  XSU                       ERASABLE SUBTRACT FROM INDEX REGISTER.

R2276           10.  TIX                       BRANCH ON INDEX REGISTER AND DECREMENT.

 2277   REF  1                01,2000                          SETLOC INTERB1
 22775                        01,2341                          BANK

 2278   REF  1                                                 COUNT* $$/INTER
 2279   REF  1                01,2341  0 2436 1  AXT           TC     TAGSUB           SELECT APPROPRIATE INDEX REGISTER.
 2280   REF 22  LAST 1182     01,2342  3 0117 0                CA     POLISH
 2281   REF  4  LAST 1112     01,2343  50 130 0  XSTORE        INDEX  INDEXLOC         CONTAINS C(FIXLOC) OR C(FIXLOC)+1.
 2282   REF 48  LAST 1122     01,2344  54 046 1                TS     X1
 2283   REF 50  LAST 1190     01,2345  1 6030 0                TCF    DANZIG

 2284   REF  2  LAST 1192     01,2346  0 2436 1  AXC           TC     TAGSUB
 2285   REF 23  LAST 1192     01,2347  4 0117 1                CS     POLISH
 2286   REF  1                01,2350  0 2343 1                TC     XSTORE

 2287   REF  1                01,2351  0 2424 1  LXA           TC     15ADRERS         LOAD INDEX REGISTER FROM ERASABLE.
 2288   REF 24  LAST 1192     01,2352  50 117 0                INDEX  POLISH
 2289                         01,2353  3 0000 1                CA     0
 2290   REF  2  LAST 1192     01,2354  1 2343 0                TCF    XSTORE

 2291   REF  2  LAST 1192     01,2355  0 2424 1  LXC           TC     15ADRERS         LOAD NDX REG FROM ERASABLE COMPLEMENTED.
 2292   REF 25  LAST 1192     01,2356  50 117 0                INDEX  POLISH
 2293                         01,2357  4 0000 0                CS
 2294   REF  3  LAST 1192     01,2360  1 2343 0                TCF    XSTORE

 2295   REF  3  LAST 1192     01,2361  0 2424 1  SXA           TC     15ADRERS         STORE INDEX REGISTER IN ERASABLE.
 2296   REF  5  LAST 1192     01,2362  50 130 0                INDEX  INDEXLOC
 2297   REF 49  LAST 1192     01,2363  3 0046 0                CA     X1
 2298   REF 26  LAST 1192     01,2364  50 117 0  MSTORE1       INDEX  POLISH
 2299                         01,2365  54 000 0                TS     0
 2300   REF 51  LAST 1192     01,2366  1 6030 0                TCF    DANZIG
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  2301   REF    4  LAST 1192   01,2367  0 2424 1  XCHX      TC      15ADRERS          EXCHANGE INDEX REGISTER WITH ERASABLE.
  2302   REF   27  LAST 1192   01,2370  50 117 0            INDEX   POLISH
  2303                         01,2371  3 0000 1            CA      0
  2304   REF    6  LAST 1192   01,2372  50 130 0            INDEX   INDEXLOC
  2305   REF   50  LAST 1192   01,2373  56 046 0            XCH     X1
  2306   REF    1              01,2374  1 2364 0            TCF     MSTORE1

  2307   REF    5  LAST 1193   01,2375  0 2424 1  XAD       TC      15ADRERS          ADD ERASABLE TO INDEX REGISTER.
  2308   REF   28  LAST 1193   01,2376  50 117 0            INDEX   POLISH
  2309                         01,2377  3 0000 1            CA      0
  2310   REF    7  LAST 1193   01,2400  50 130 0  XAD2      INDEX   INDEXLOC
  2311   REF   51  LAST 1193   01,2401  26 046 1            ADS     X1                IGNORING OVERFLOWS.
  2312   REF   52  LAST 1192   01,2402  1 6030 0            TCF     DANZIG

  2313   REF    3  LAST 1192   01,2403  0 2436 1  INCR      TC      TAGSUB            INCREMENT INDEX REGISTER.
  2314   REF   29  LAST 1193   01,2404  3 0117 0            CA      POLISH
  2315   REF    1              01,2405  1 2400 0            TCF     XAD2

  2316   REF    6  LAST 1193   01,2406  0 2424 1  XSU       TC      15ADRERS          SUBTRACT ERASABLE FROM INDEX REGISTER.
  2317   REF   30  LAST 1193   01,2407  50 117 0            INDEX   POLISH
  2318                         01,2410  4 0000 0            CS      0
  2319   REF    2  LAST 1193   01,2411  1 2400 0            TCF     XAD2


  2320   REF    4  LAST 1193   01,2412  0 2436 1  TIX       TC      TAGSUB            BRANCH AND DECREMENT ON INDEX.
  2321   REF    8  LAST 1193   01,2413  50 130 0            INDEX   INDEXLOC
  2322   REF   34  LAST  926   01,2414  4 0050 0            CS      S1
  2323   REF    9  LAST 1193   01,2415  50 130 0            INDEX   INDEXLOC
  2324   REF   52  LAST 1193   01,2416  6 0046 0            AD      X1
  2325                         01,2417  0 0006 1            EXTEND                    NO OPERATION IF DECREMENTED INDEX IS
  2326   REF   53  LAST 1193   01,2420  6 6030 1            BZMF    DANZIG            NEGATIVE OR ZERO.

  2327   REF   10  LAST 1193   01,2421  50 130 0  DOTIXBR   INDEX   INDEXLOC
  2328   REF   53  LAST 1193   01,2422  56 046 0            XCH     X1                IGNORING OVERFLOWS.

  2329   REF    6  LAST 1182   01,2423  1 6615 1            TCF     GOTO              DO THE BRANCH USING THE CADR IN POLISH.
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P2330              SUBROUTINE TO CONVERT AN ERASABLE ADDRESS (11 BITS) TO AN EBANK SETTING AND SUBADDRESS.

 2332  REF  31  LAST 1193   01,2424  4 0117 1  15ADRERS CS     POLISH
 2333  REF   3  LAST 1122   01,2425  6 5006 1           AD     DEC45
 2334  REF 312  LAST 1191   01,2426  10 000 0           CCS    A                 DOES THE ADDRESS POINT TO THE WORK AREA?
 2335  REF  29  LAST 1182   01,2427  3 0120 1           CA     FIXLOC            YES.  ADD FIXLOC.  EBANK OK AS IS.
 2336                       01,2430  1 2435 0           TCF    +5

 2337  REF   7  LAST 1122   01,2431  3 5024 1           CA     OCT1400           NO.  SET EBANK & MAKE UP SUBADDRESS.
 2338  REF  32  LAST 1194   01,2432  56 117 0           XCH    POLISH
 2339  REF  34  LAST 1130   01,2433  54 003 0           TS     EBANK
 2340  REF  12  LAST 1130   01,2434  7 4350 1           MASK   LOW8
 2341  REF  33  LAST 1194   01,2435  26 117 1   +5      ADS    POLISH            FALL INTO TAGSUB, AND RETURN VIA Q.

R2342              SUBROUTINE WHICH SETS THE ADDRESS OF THE SPECIFIED INDEX IN INDEXLOC. (ACTUALLY, THE ADDRESS -38D.)

 2344  REF  30  LAST 1194   01,2436  3 0120 1  TAGSUB   CA     FIXLOC
 2345  REF  11  LAST 1193   01,2437  54 130 1           TS     INDEXLOC

 2346  REF  30  LAST 1161   01,2440  10 020 1           CCS    CYR               BIT 15 SPECIFIES INDEX.
 2347  REF  12  LAST 1194   01,2441  24 130 0           INCR   INDEXLOC          0 MEANS USE X2.
 2348  REF 244  LAST 1185   01,2442  0 0002 0           TC     Q
 2349  REF 245  LAST 1194   01,2443  0 0002 0           TC     Q                 1 FOR X1.
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P2350           MISCELLANEOUS OPERATION CODES WITH DIRECT ADDRESSES. INCLUDED HERE ARE:

R2352           1.  ITA                 STORE QPRET (RETURN ADDRESS) IN ERASABLE.
R2354           2.  CALL                CALL A SUBROUTINE, LEAVING RETURN IN QPRET.
R2356           3.  RTB                 RETURN TO BASIC LANGUAGE AT THE GIVEN ADDRESS.
R2358           4.  BHIZ                BRANCH IF THE HIGH ORDER OF MPAC IS ZERO (SINGLE PRECISION).
R2360           5.  BOV                 BRANCH ON OVERFLOW.
R2361           6.  GOTO                SIMPLE SEQUENCE CHANGE.

 2362  REF  31  LAST 1194  01,2444  10 020 1  RTB/BHIZ CCS     CYR
 2363  REF  34  LAST 1194  01,2445  3 0117 0  RTB      CA      PCLISH
 2364  REF   2  LAST  424  01,2446  0 4641 0           TC      SWCALL    -1     SO A "TC Q" FROM ROUTINE LEADS TO DANZIG

 2365  REF 628  LAST 1190  01,2447  10 154 0  BHIZ     CCS     MPAC
 2366  REF  54  LAST 1193  01,2450  1 6030 0           TCF     DANZIG
 2367  REF   7  LAST 1193  01,2451  1 6615 1           TCF     GOTO
 2368  REF  55  LAST 1195  01,2452  1 6030 0           TCF     DANZIG
 2369  REF   8  LAST 1195  01,2453  1 6615 1           TCF     GOTO

 2370  REF   9  LAST 1183  01,2454  10 121 1  BOV(B)   CCS     OVFIND           BRANCH ON OVERFLOW TO BASIC OR INTERP.
 2371                      01,2455  1 2457 1           TCF     +2
 2372  REF  56  LAST 1195  01,2456  1 6030 0           TCF     DANZIG
 2373  REF  10  LAST 1195  01,2457  54 121 1           TS      OVFIND
 2374  REF  32  LAST 1195  01,2460  10 020 1           CCS     CYR
 2375  REF   1             01,2461  1 2445 1           TCF     RTB              IF BASIC.
 2376                      01,2462   00360 1  B5TOB8   OCT     360
 2377  REF   9  LAST 1195  01,2463  1 6615 1           TCF     GOTO
 2378     REF  33  LAST 1195   01,2464  10 020 1  BZE/GOTO CCS     CYR              SEE WHICH OP-CODE IS DESIRED.
 2379     REF   6  LAST 1189   01,2465  0 6672 1           TC      BRANCH           DO BZE.
 2380     REF  57  LAST 1195   01,2466  1 6030 0           TCF     DANZIG
 2381     REF  10  LAST 1195   01,2467  1 6615 1           TCF     GOTO             DO GOTO.
 2382     REF  58  LAST 1196   01,2470  1 6030 0           TCF     DANZIG

 2383     REF  34  LAST 1196   01,2471  10 020 1  BPL/BMN  CCS     CYR
 2384     REF   1              01,2472  1 2500 1           TCF     BPL
 2385                          01,2473   12000 1  5B10     DEC     5 B+10           SHIFTS OP CODE IN SWITCH INSTRUCTION ADR

 2386     REF   7  LAST 1196   01,2474  0 6672 1           TC      BRANCH           DO BMN.
 2387     REF  59  LAST 1196   01,2475  1 6030 0           TCF     DANZIG
 2388     REF  60  LAST 1196   01,2476  1 6030 0           TCF     DANZIG
 2389     REF  11  LAST 1196   01,2477  1 6615 1           TCF     GOTO             ONLY IF NNZ.

 2390     REF   8  LAST 1196   01,2500  0 6672 1  BPL      TC      BRANCH
 2391     REF  12  LAST 1196   01,2501  1 6615 1           TCF     GOTO             IF POSITIVE OR ZERO.
 2392     REF  13  LAST 1196   01,2502  1 6615 1           TCF     GOTO
 2393     REF  61  LAST 1196   01,2503  1 6030 0           TCF     DANZIG

 2394     REF  35  LAST 1196   01,2504  10 020 1  CALL/ITA CCS     CYR
 2395     REF   1              01,2505  1 6607 1           TCF     CALL

 2396                          01,2506  12 507 0           NOOP                     CANNOT GET HERE
 2397     REF   7  LAST 1193   01,2507  0 2424 1           TC      15ADRERS         STORE QPRET. (TAGSUB AFTER 15ADRERS IS
 2398     REF  31  LAST 1194   01,2510  50 120 1           INDEX   FIXLOC           SLOW IN THIS CASE, BUT SAVES STORAGE.)
 2399     REF   7  LAST 1182   01,2511  3 0052 0           CA      QPRET
 2400     REF   2  LAST 1193   01,2512  1 2364 0           TCF     MSTORE1
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P2401            THE FOLLOWING OPERATIONS ARE AVAILABLE FOR ALTERING AND TESTING INTERPRETIVE SWITCHES:

R2403   00       BONSET                    SET A SWITCH AND DO A GOTO IF IT WAS ON.
R2404   01       SETGO                     SET A SWITCH AND DO A GOTO.
R2405   02       BOFSET                    SET A SWITCH AND DO A GOTO IF IT WAS OFF
R2406   03       SET                       SET A SWITCH.

R2407   04       BONINV                    INVERT A SWITCH AND BRANCH IF IT WAS ON.
R2408   05       INVGO                     INVERT A SWITCH AND DO A GOTO.
R2409   06       BOFINV                    INVERT A SWITCH AND BRANCH IF IT WAS OFF
R2410   07       INVERT                    INVERT A SWITCH.

R2411   10       BONCLR                    CLEAR A SWITCH AND BRANCH IF IT WAS ON.
R2412   11       CLRGO                     CLEAR A SWITCH AND DO A GOTO.
R2413   12       BOFCLR                    CLEAR A SWITCH AND BRANCH IF IT WAS OFF.
R2414   13       CLEAR                     CLEAR A SWITCH.

R2415   14       BON                       BRANCH IF A SWITCH WAS ON.
R2416   16       BOFF                      BRANCH IF A SWITCH WAS OFF.


R2417            THE ADDRESS SUPPLIED WITH THE SWITCH INSTRUCTION IS INTERPRETED AS FOLLOWS:

R2419            BITS 1-4    SWITCH BIT NUMBER (1-15).
R2420            BITS 5-8    SWITCH OPERATION NUMBER.
R2421            BITS 9-     SWITCH WORD NUMBER (UP TO 64 SWITCH WORDS).

R2422            THE ADDRESS ITSELF IS MADE UP BY THE YUL SYSTEM ASSEMBLER. THE BRANCH INSTRUCTIONS REQUIRE TWO
R2424   ADDRESSES, THE SECOND TAKEN AS THE DIRECT (OR INDIRECT IF IN ERASABLE) ADDRESS OF THE BRANCH.


  2426  REF   5  LAST 1004   01,2513  3 4777 1  SWITCHES CAF    LOW4              LEAVE THE SWITCH BIT IN  SWBIT  .
  2427  REF  35  LAST 1195   01,2514  7 0117 1           MASK   POLISH
  2428  REF 313  LAST 1194   01,2515  50 000 1           INDEX  A
  2429  REF  42  LAST 1181   01,2516  3 4752 0           CAF    BIT15             (NUMBER FROM LEFT TO RIGHT.)
  2430  REF   1              01,2517  54 131 0           TS     SWBIT

  2431  REF  36  LAST 1098   01,2520  3 4762 0           CAF    BIT7              LEAVE THE SWITCH NUMBER IN SWWORD.
  2432                       01,2521  0 0006 1           EXTEND
  2433  REF  36  LAST 1197   01,2522  7 0117 1           MP     POLISH
  2434  REF   1              01,2523  54 130 1           TS     SWWORD

  2435                       01,2524  0 0004 0           INHINT                   DURING SWITCH CHANGE SO RUPT CAN USE TOO
  2436  REF 314  LAST 1197   01,2525  50 000 1           INDEX  A                 LEAVE THE SWITCH WORD ITSELF IN L.
  2437  REF  25  LAST  852   01,2526  3 0074 1           CA     STATE
  2438  REF 246  LAST 1194   01,2527  54 002 1           TS     Q                 Q WILL BE USED AS A CHANNEL.
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 2439   REF  26  LAST 1034   01,2530  3 4756 1             CAF      BIT11
 2440                        01,2531  0 0006 1             EXTEND               DISPATCH SWITCH BIT OPERATION AS IN BITS
 2441   REF  37  LAST 1197   01,2532  7 0117 1             MP       POLISH      7-8 OF POLISH.
 2442   REF   1              01,2533  7 3024 0             MASK     B3TOB4      GETS 4X2-BIT CODE.
 2443   REF 315  LAST 1197   01,2534  50 000 1             INDEX    A
 2444                        01,2535  1 2536 1             TCF      +1

 2445   REF   2  LAST 1197   01,2536  3 0131 1   +1        CA       SWBIT       00 - SET SWITCH IN QUESTION.
 2446                        01,2537  0 0006 1             EXTEND
 2447   REF   1              01,2540  04 002 1             ROR      CCHAN
 2448   REF   1              01,2541  1 2550 1             TCF      SWSTORE

 2449   REF   3  LAST 1198   01,2542  3 0131 1   +5        CA       SWBIT       01 - INVERT SWITCH.
 2450                        01,2543  0 0006 1             EXTEND
 2451   REF   2  LAST 1198   01,2544  06 002 0             RXOR     CCHAN
 2452   REF   2  LAST 1198   01,2545  1 2550 1             TCF      SWSTORE

 2453   REF   4  LAST 1198   01,2546  4 0131 0   +9D       CS       SWBIT       10 - CLEAR.
 2454   REF 247  LAST 1197   01,2547  7 0002 1             MASK     Q
 2455   REF   2  LAST 1197   01,2550  50 130 0   SWSTORE   INDEX    SWWORD
 2456   REF  26  LAST 1197   01,2551  54 074 0             TS       STATE       NEW SWITCH WORD.
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  2457                      01,2552  0 0003 1  +13D      RELINT              11 - NOOP.
  2458  REF  37  LAST 1102  01,2553  3 4754 0            CAF     BIT13
  2459                      01,2554  0 0006 1            EXTEND              DISPATCH SEQUCE CHANGING OR BRANCHING
  2460  REF  38  LAST 1198  01,2555  7 0117 1            MP      POLISH      CODE.
  2461  REF   2  LAST 1198  01,2556  7 3024 0            MASK    B3TOB4
  2462  REF 316  LAST 1198  01,2557  50 000 1            INDEX   A
  2463                      01,2560  1 2561 0            TCF     +1          ORIGINALLY STORED IN BITS 5-6.

  2464  REF 248  LAST 1198  01,2561  4 0002 1  +1        CS      Q           00 - BRANCH IF ON.
  2465  REF   5  LAST 1198  01,2562  7 0131 0  TEST      MASK    SWBIT
  2466  REF 317  LAST 1199  01,2563  10 000 0            CCS     A
  2467  REF   1             01,2564  1 2574 1            TCF     SWSKIP

  2468  REF   1             01,2565  1 6664 1  +5        TCF     SWBRANCH    01 - GO TO.

  2469  REF   2  LAST 1199  01,2566  1 2574 1            TCF     SWSKIP      HERE ONLY ON BIT 15.

  2470                      01,2567  12 570 0            NOOP                CANNOT GET HERE
  2471                      01,2570  12 571 1            NOOP                CANNOT GET HERE
  2472  REF 249  LAST 1199  01,2571  3 0002 0  +9D       CA      Q           10 - BRANCH IF OFF.
  2473  REF   1             01,2572  1 2562 0            TCF     TEST

  2474                      01,2573  12 574 1  +11D      NOOP                CANNOT GET HERE
  2475  REF  26  LAST 1131  01,2574  24 164 1  SWSKIP    INCR    LOC

  2477  REF  62  LAST 1196  01,2575  1 6030 0  +13D      TCF     DANZIG      11 - NOOP.

  2478  REF   1             01,3024            B3TOB4    EQUALS COREINC
  2479  REF   1             01,2513            SW/       EQUALS SWITCHES
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L        FIXED-FIXED CONSTANT POOL                                                              USER'S PAGE NO.  1      E0 S3

 00005  REF   4  LAST 1104     4000                     SETLOC FFTAG1
 0001                          4747                     BANK

 00015  REF   1                                         COUNT* $$/FCONS
R00016   THE FOLLOWING TABLE OF 18 VALUES IS INDEXED. DO NOT INSERT OR REMOVE ANY QUANTITIES.

 0002                          4747   37777 1  DPOSMAX  OCT     37777          MUST PRECEDE POSMAX
 0003                          4750   37777 1  POSMAX   OCT     37777

 0004   REF   8  LAST 1187     4751            LIMITS   =       NEG1/2

 0007                          4751   57777 1  NEG1/2   OCT     -20000         USED BY SIN ROUTINE (MUST BE TWO
A0008                                                                          LOCATIONS IN FRONT OF BIT14)
R0009           BIT TABLE

 0010                          4752   40000 0  BIT15    OCT     40000
 0011                          4753   20000 0  BIT14    OCT     20000
 0012                          4754   10000 0  BIT13    OCT     10000
 0013                          4755   04000 0  BIT12    OCT     04000
 0014                          4756   02000 0  BIT11    OCT     02000
 0015                          4757   01000 0  BIT10    OCT     01000
 0016                          4760   00400 0  BIT9     OCT     00400
 0017                          4761   00200 0  BIT8     OCT     00200
 0018                          4762   00100 0  BIT7     OCT     00100
 0019                          4763   00040 0  BIT6     OCT     00040
 0020                          4764   00020 0  BIT5     OCT     00020
 0021                          4765   00010 0  BIT4     OCT     00010
 0022                          4766   00004 0  BIT3     OCT     00004
 0023                          4767   00002 0  BIT2     OCT     00002
 0024                          4770   00001 0  BIT1     OCT     00001

R0025   DO NOT DESTROY THIS COMBINATION, SINCE IT IS USED IN DOUBLE PRECISION INSTRUCTIONS.
 0027                          4771   77777 0  NEG0     OCT     -0             MUST PRECEDE ZERO
 0028                          4772   00000 1  ZERO     OCT     0              MUST FOLLOW NEG0
A0029                                          BIT1     OCT     00001
A0030                                          NO.WDS   OCT     2              INTERPRETER
A0031                                          OCTAL3   OCT     3              INTERPRETER
A0032                                          R3D1     OCT     4              PINBALL
 0033                          4773   00005 1  FIVE     OCT     5
A0034                                          REVCNT   OCT     6              INTERPRETER
 0035                          4774   00007 0  SEVEN    OCT     7
A0036                                          BIT4     OCT     00010
A0037                                          R2D1     OCT     11             PINBALL
 00375  REF   6  LAST  382     4322            OCT11    =       R2D1           P20S
A0038                                          BINCON   DEC     10             PINBALL             (OCTAL 12)
 0039                          4775   00013 0  ELEVEN   DEC     11
A0040                                          OCT14    OCT     14             ALARM AND ABORT (FILLER)
 00401                         4776   00015 0  OCT15    OCT     15
A0041                                          R1D1     OCT     16             PINBALL
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 0043                            4777   00017 1  LOW4      OCT      17
A0044                                            BIT5      OCT      00020
A0045                                            N01       OCT      21              PINBALL
 00455                           5000   00022 1  OCT22     OCT      22
A0046                                            V01       OCT      23              PINBALL
A0047                                            OCT24     OCT      24              SERVICE ROUTINES
A0048                                            M01       OCT      25              PINBALL
A00481                                           VBSP2LD   DEC      22              PINBALL     (OCT26)
A00482                                           DEC23     DEC      23              AUTO MAN.   (OCT27)
 00485                           5001   00030 1  BITS4&5   OCT      30
A0049                                            OCT31     OCT      31              SERVICE ROUTINES
 0050                            5002   00032 0  CALLCODE  OCT      00032
 00501  REF    8  LAST   579     4342            OCT37     =        LOW5
A0051                                            LOW5      OCT      37              PINBALL
 0052                            5003   00041 1  33DEC     DEC      33
A0053                                            34DEC     DEC      34              PINBALL              (OCTAL 42)
A0056                                            BIT6      OCT      00040
 0057                            5004   00050 1  OCT50     OCT      50
 00575                           5005   00054 0  LTHVACA   DEC      44
 0058                            5006   00055 1  DEC45     DEC      45
 00585                           5007   00056 1  MINDB     DEC      46              OCT 56
 0059                            5010   00060 1  SUPER011  OCT      60              BITS FOR SUPERBNK SETTING 011.
 0060                            5011   00062 0  .5SEC     DEC      50
 00605                           5012   00075 0  OCT75     OCT      75
A0061                                            BIT7      OCT      00100

 0062   REF   37  LAST 1197      4762            SUPER100  =        BIT7            BITS FOR SUPERBNK SETTING 100
A0063                                                                               (LAST 4K OF ROPE)
 00631                           5013   00110 1  BITS7+4   OCT      110
 0064                            5014   00120 1  SUPER101  OCT      120             BITS FOR SUPERBNK SETTING 101
A0065                                            OCT121    OCT      121             SERVICE ROUTINES
A0066                                                                               (FIRST 8K OF ACM)
 0067                            5015   00140 1  SUPER110  OCT      140             BITS FOR SUPERBNK SETTING 110.
A0068                                                                               (LAST 8K OF ACM)
 0069                            5016   00144 0  1SEC      DEC      100
A0070                                            LOW7      OCT      177             INTERPRETER
A0071                                            BIT8      OCT      00200
A0072                                            OCT215    OCT      215             ALARM AND ABORT
A0073                                            8,5       OCT      00220           P20-P25 SUNDANCE
 0074                            5017   00310 0  2SECS     DEC      200
A0075                                            LOW8      OCT      377             PINBALL
A0076                                            BIT9      OCT      00400
 0080                            5020   00620 0  4SECS     DEC      400
 00801                           5021   00777 0  LOW9      OCT      777
A0081                                            BIT10     OCT      01000
A0082                                            5.5DEGS   DEC      .03056          P20-P25 SUNDANCE    (OCTAL 00765)
A0083                                            OCT1103   OCT      1103            ALARM AND ABORT
 0084                            5022   01124 1  C5/2      DEC      .0363551                            (OCTAL 01124)
 0085                            5023   01211 1  V05N09    VN       0509            (SAME AS OCTAL 1211)
 0086                            5024   01400 1  OCT1400   OCT      01400
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L         FIXED-FIXED CONSTANT POOL                                                                 USER'S PAGE NO.   3       E0 S3

 008649 REF   6  LAST  803       5025              7.9SEC     EQUALS  V06N22
 00865                           5025   01426 0    V06N22     VN      0622
 008651                          5026   01441 1    V06N33     VN      0633
 008652                          5027   01442 1    V06N34     VN      0634
 008653                          5030   01461 0    V06N49     VN      0649
 008654                          5031   01422 1    V06N18     VN      0618
 008655                          5032   01451 0    V06N41     VN      0641
 008656                          5033   01474 1    V06N60     VN      0660
 008657                          5034   01475 0    V06N61     VN      0661
 00866                           5035   01530 0    V06N88     VN      0688
 008661                          5036   01531 1    V06N89     VN      0689
 008662                          5037   01532 1    V06N90     VN      0690
 008665                          5040   01535 0    V06N93     VN      0693
A0087                                              MID5       OCT     1740              PINBALL
 0088                            5041   01777 1    LOW10      OCT     1777
A0089                                              BIT11      OCT     02000
A0090                                              2K+3       OCT     2003              PINBALL
 0091                            5042   02177 1    LOW7+2K    OCT     2177
 0092                            5043   02400 1    EBANK5     OCT     02400
 00925                           5044   02600 0    OCT2600    OCT     2600
 0093                            5045   03000 1    PRIO3      OCT     03000
 0094                            5046   03400 0    EBANK7     OCT     03400
A0095                                              LOW11      OCT     3777              PINBALL
A0096                                              BIT12      OCT     04000
A0097                                              RELTAB     OCT     04025             T4RUPT
 0098                            5047   05000 1    PRIO5      OCT     05000
 0099                            5050   06000 1    PRIO6      OCT     06000
 0100                            5051   07000 0    PRIO7      OCT     07000

A0102                                              BIT13      OCT     10000
A0103                                                         OCT     10003             T4RUPT      RELTAB +10
A0104                                              13,7,2     OCT     10102             P20-P25 SUNDANCE
A0106                                              PRIO12     OCT     12000             BANKCALL
 0107                            5052   13000 0    PRIO13     OCT     13000
 0108                            5053   14000 1    PRIO14     OCT     14000
A0109                                                         OCT     14031             T4RUPT      RELTAB +20
 0110                            5054   15000 0    PRIO15     OCT     15000
 0111                            5055   16000 0    PRIO16     OCT     16000
A0112                                              85DEGS     DEC     .45556            P20-P25 SUNDANCE   (OCTAL 16450)
 0114                            5056   17770 1    OCT17770   OCT     17770
A0115                                              BIT14      OCT     20000
A0116                                                         OCT     20033             T4RUPT      RELTAB +30
 0117                            5057   21000 1    PRIO21     OCT     21000
 01174  REF   2  LAST 1065       6000                         SETLOC  FFTAG6
 01175                           7644                         BANK

 01176  REF   1                                               COUNT*  $$/FCONS
 0118                            7644   22000 1    PRIO22     OCT     22000             SERVICE ROUTINES
 0120                            7645   24000 1    PRIO24     OCT     24000
A0121                                              5/8+1      OCT     24001             SINGLE PRECISION SUBROUTINES
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L          FIXED-FIXED CONSTANT POOL                                              USER'S PAGE NO.  4        EO S3

A0122                                                 OCT      24017             T4RUPT      RELTAB +4D
 01221                         7646   24100 0  14,12,7   OCT      24100
 0123                          7647   25000 0  PRIO25    OCT      25000
 0124                          7650   26000 0  PRIO26    OCT      26000
 0125                          7651   27000 1  PRIO27    OCT      27000
A0126                                          CHRPRIO   OCT      30000             PINBALL
A0127                                                    OCT      30036             T4RUPT      RELTAB +5D
 0128                          7652   31000 0  PRIO31    OCT      31000
 0129                          7653   31103 1  C1/2      DEC      .7853134                            (OCTAL 31103)
 0130                          7654   32000 0  PRIO32    OCT      32000
 0131                          7655   33000 1  PRIO33    OCT      33000
 0132                          7656   34000 0  PRIO34    OCT      34000
A0133                                                    OCT      34034             T4RUPT      RELTAB +6D
 0134                          7657   35000 1  PRIO35    OCT      35000
 0136                          7660   37000 0  PRIO37    OCT      37000
A0138                                          MID7      OCT      37600             PINBALL
 0139                          7661   37766 1  OCT37766  OCT      37766
 0140                          7662   37774 1  OCT37774  OCT      37774
 0141                          7663   37776 0  OCT37776  OCT      37776
A01411                                         DPOSMAX   OCT      37777
A0142                                          BIT15     OCT      40000
A0143                                          OCT40001  OCT      40001             INTERPRETER  ( CS   I   INSTRUCTION)
 01435                         7664   40010 1  OT40010   OCT      40010
 0144                          7665   40014 0  DLOADCOD  OCT      40014
 0145                          7666   40015 1  DLOAD*    OCT      40015
A0146                                                    OCT      40023             T4RUPT      RELTAB +7D
 01465                         7667   40040 1  BIT15+6   OCT      40040
 01466                         7670   40200 1  OCT40200  OCT      40200
A0147                                                    OCT      44035             T4RUPT    RELTAB +8D
 01475                         7671   47777 0  NEG30000  OCT      47777
A0148                                                    OCT      50037             T4RUPT      RELTAB +9D
A0149                                                    OCT      54000             T4RUPT      RELTAB +10D
 01495  REF   9  LAST 1200     4751            -BIT14    EQUALS NEG1/2
A0150                                          RELTAB11  OCT      60000             T4RUPT
 0151                          7672   65552 0  C3/2      DEC      -.3216147                           (OCTAL 65552)
 0152                          7673   70000 0  13,14,15  OCT      70000
 0153                          7674   73777 1  -1/8      OCT      73777
 0154                          7675   74000 1  HIGH4     OCT      74000
 0155                          7676   74056 1  -ENDERAS  DEC      -2001                               (OCTAL 74056)
A0156                                          HI5       OCT      76000             PINBALL
 0157                          7677   77700 0  HIGH9     OCT      77700
A0158                                          -ENDVAC   DEC      -45               INTERPRETER         (OCTAL 77722)
A01585                                         DECNEG23  DEC      -23               AUTO MAN.  (OCT77750)
A0159                                          -OCT10    OCT      -10                                  (OCT 77767)
A0161                                          NEG4      DEC      -4                                  (OCTAL 77773)
 0162                          7700   77774 0  NEG3      DEC      -3
 0163                          7701   77775 1  NEG2      OCT      77775
 0164                          7702   77776 1  NEGONE    DEC      -1
```

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L         FIXED-FIXED CONSTANT POOL                                                       USER'S PAGE NO.   5        E0 53

P0165     DEFINED BY EQUALS

R0166     IT WOULD BE TO THE USERS ADVANTAGE TO OCCASIONALLY CHECK ANY OF THESE SYMBOLS IN ORDER TO PREVENT ANY
R0168     ACCIDENTAL DEFINITION CHANGES.

 0169     REF   5  LAST  346        7702              MINUS1     =       NEG1
 0170     REF  25  LAST 1164        7702              NEG1       =       NEGONE
 0171     REF  61  LAST 1110        4770              ONE        =       BIT1
 0172     REF  37  LAST 1009        4767              TWO        =       BIT2
 0173     REF   1                   6214              THREE      =       OCTAL3
 0174     REF  43  LAST 1134        6214              LOW2       =       THREE
 0175     REF  41  LAST 1013        4766              FOUR       =       BIT3
 0176     REF   3  LAST 1114        6211              SIX        =       REVCNT
 0177     REF  16  LAST 1184        4774              LOW3       =       SEVEN
 0178     REF  35  LAST 1055        4765              EIGHT      =       BIT4
 0179     REF   7  LAST 1200        4322              NINE       =       R2D1
 0180     REF   4  LAST  392        4355              TEN        =       BINCON
 0181     REF  10  LAST 1058        4775              NOUTCON    =       ELEVEN
 0182     REF   8  LAST  949        4351              OCT23      =       VD1
 01825    REF   3  LAST  385        4353              OCT25      =       MD1
 0183     REF  27  LAST 1160        4757              PRIO1      =       BIT10
 0184     REF   8  LAST 1194        5024              EBANK3     =       OCT1400
 0185     REF  27  LAST 1198        4756              PRIO2      =       BIT11
 0186     REF   1                   5014              OCT120     =       SUPER101
 0187     REF   1                   5015              OCT140     =       SUPER110
 0188     REF  28  LAST 1204        4756              2K         =       BIT11
 0189     REF  29  LAST 1204        4756              EBANK4     =       BIT11
 0190     REF  26  LAST  971        4755              PRIO4      =       BIT12
 0191     REF   2  LAST  507        5045              EBANK6     =       PRIO3
 0192     REF  38  LAST 1199        4754              QUARTER    =       BIT13
 0193     REF  39  LAST 1204        4754              PRIO10     =       BIT13
 01935    REF   1                   7617              OCT10001   =       CCSL
 0194     REF  25  LAST 1190        4753              POS1/2     =       HALF
 0195     REF  57  LAST 1191        4753              PRIO20     =       BIT14
 0196     REF  58  LAST 1204        4753              HALF       =       BIT14
 0197     REF   2  LAST  365        4346              PRIO30     =       CHRPRIO
 0198     REF  10  LAST 1132        4346              BIT13-14   =       PRIO30             INTERPRETER USES IN PROCESSING STORECODE
 01985    REF   3  LAST 1117        6440              OCT30002   =       TLOAD +1
 0199     REF   3  LAST 1013        7656              B12T14     =       PRIO34
 0200     REF  43  LAST 1197        4752              NEGMAX     =       BIT15
 0201     REF  44  LAST 1204        4752              VLOADCOD   =       BIT15
 0202     REF   1                   6056              VLOAD*     =       OCT40001
 0203     REF   3  LAST  366        4076              OCT60000   =       RELTAB11
 0204     REF   5  LAST  344        4344              BANKMASK   =       HI5
```

```
L       INTERPRETIVE CONSTANTS                                                          USER'S PAGE NO.  1     60 53

 0001   REF    1                 26,2000                           SETLOC  INTPRET1
 0002                            26,3325                           BANK

 0003   REF    1                                                   COUNT*  $$/ICONS
 0004                            26,3325   10000 0  DP1/4TH        2DEC    .25
 0004                            26,3326   00000 1
 0005                            26,3327   00000 1  UNITZ          2DEC    0
 0005                            26,3330   00000 1
 0006                            26,3331   00000 1  UNITY          2DEC    0
 0006                            26,3332   00000 1
 0007                            26,3333   20000 0  UNITX          2DEC    .5
 0007                            26,3334   00000 1
 0008                            26,3335   00000 1  ZEROVECS       2DEC    0
 0008                            26,3336   00000 1
 0009                            26,3337   00000 1                 2DEC    0
 0009                            26,3340   00000 1
 0010                            26,3341   00000 1                 2DEC    0
 0010                            26,3342   00000 1
 0011   REF    6  LAST   938     26,3333            DPHALF         =       UNITX
 0012                            26,3343   37777 1  DPPOSMAX       OCT     37777
 0013                            26,3344   37777 1                 OCT     37777
```

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P0014    INTERPRETIVE CONSTANTS IN THE OTHER HALF-MEMORY

  0015   REF   1                04,2000                         SETLOC INTPRET2
  0016                          04,3753                         BANK

  0017   REF   1                                                COUNT* $$/ICONS
  0018                          04,3753   00000 1  ZUNIT        2DEC    0
  0018                          04,3754   00000 1
  0019                          04,3755   00000 1  YUNIT        2DEC    0
  0019                          04,3756   00000 1
  0020                          04,3757   20000 0  XUNIT        2DEC    .5
  0020                          04,3760   00000 1
  0021                          04,3761   00000 1  ZEROVEC      2DEC    0
  0021                          04,3762   00000 1
  0022                          04,3763   00000 1               2DEC    0
  0022                          04,3764   00000 1
  0023                          04,3765   00000 1               2DEC    0
  0023                          04,3766   00000 1
  0024                          04,3767   77777 0               OCT     77777              -0,-6,-12 MUST REMAIN IN THIS ORDER
  0025                          04,3770   77771 0  DEC-6        DEC     -6
  0026                          04,3771   77763 0  DEC-12       DEC     -12
  0027                          04,3772   37777 1  LODPMAX      2OCT    3777737777         THESE TWO CONSTANTS MUST REMAIN
  0027                          04,3773   37777 1
  0028                          04,3774   37777 1  LODPMAX1     2OCT    3777737777         ADJACENT AND THE SAME FOR INTEGRATION
  0028                          04,3775   37777 1
  0029   REF  15  LAST  775     04,3761            ZERODP       =       ZEROVEC
  0030   REF   5  LAST  724     04,3757            HALFDP       =       XUNIT
```

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L         SINGLE PRECISION SUBROUTINES                                                    USER'S PAGE NO.  1      E0 S3

  00005 REF   5  LAST 1200       4000                        SETLOC FFTAG1
  0001                           5060                        BANK

R0002     SINGLE PRECISION SINE AND COSINE

  00025 REF   1                                              COUNT* $$/INTER
  0003  REF  26  LAST 1204       5060  6 4753 1  SPCOS       AD     HALF              ARGUMENTS SCALED AT PI
  0004  REF   1                  5061  54 742 1  SPSIN       TS     TEMK
  0005  REF   1                  5062  1 5064 1              TCF    SPT
  0006  REF   2  LAST 1207       5063  4 0742 1              CS     TEMK
  0007                           5064  6 0000 1  SPT         DOUBLE
  0008  REF   3  LAST 1207       5065  54 742 1              TS     TEMK
  0009  REF   1                  5066  1 5077 0              TCF    POLLEY
  0010  REF   4  LAST 1207       5067  56 742 0              XCH    TEMK
  0011  REF   5  LAST 1207       5070  50 742 0              INDEX  TEMK
  0012  REF   6  LAST 1134       5071  6 4751 0              AD     LIMITS
  0013                           5072  4 0000 0              COM
  0014  REF   6  LAST 1207       5073  6 0742 0              AD     TEMK
  0015  REF   7  LAST 1207       5074  54 742 1              TS     TEMK
  0016  REF   2  LAST 1207       5075  1 5077 0              TCF    POLLEY
  0017  REF   1                  5076  1 5115 0              TCF    ARG90
  0018                           5077  0 0006 1  POLLEY      EXTEND
  0019  REF   8  LAST 1207       5100  7 0742 1              MP     TEMK
  0020  REF   1                  5101  54 743 0              TS     SQ
  0021                           5102  0 0006 1              EXTEND
  0022  REF   1                  5103  7 5022 0              MP     C5/2
  0023  REF   1                  5104  6 7672 0              AD     C3/2
  0024                           5105  0 0006 1              EXTEND
  0025  REF   2  LAST 1207       5106  7 0743 0              MP     SQ
  0026  REF   1                  5107  6 7653 0              AD     C1/2
  0027                           5110  0 0006 1              EXTEND
  0028  REF   9  LAST 1207       5111  7 0742 1              MP     TEMK
  0029                           5112  20 001 1              DDOUBL
  0030  REF  10  LAST 1207       5113  54 742 1              TS     TEMK
  0031  REF 250  LAST 1199       5114  0 0002 0              TC     Q
  0032  REF 318  LAST 1199       5115  50 000 1  ARG90       INDEX  A
  0033  REF   7  LAST 1207       5116  4 4751 1              CS     LIMITS
  0034  REF 251  LAST 1207       5117  0 0002 0              TC     Q                 RESULT SCALED AT 1
R0040                  SPROOT WAS DELETED IN REV 51 OF MASTER. ASS. CONT. HAS CARDS.
```

```
 00005  REF   1                  4000                            SETLOC EXECF2
 00010                           5120                            BANK

R00020              TO ENTER A JOB REQUEST REQUIRING NO VAC AREA:

 00025  REF   1                                                  COUNT* $$/EXEC
 00026  REF  11  LAST 1204       5120  3 4346 1  NOVAC30  CAF    PRIO30
 00029                           5121  0 0004 0  NOVAC    INHINT
 00030  REF   1                  5122  6 5213 1           AD     FAKEPRET       LOC(MPAC +6) - LOC(QPRET)
 00031  REF   3  LAST  224       5123  54 063 0           TS     NEWPRIO        PRIORITY OF NEW JOB + NOVAC C(FIXLOC)

 00040                           5124  0 0006 1           EXTEND
 00050  REF 252  LAST 1207       5125  5 0002 0           INDEX  Q              Q WILL BE UNDISTURBED THROUGHOUT.
 00060                           5126  3 0001 0           DCA    0              2CADR OF JOB ENTERED.
 00070  REF   2  LAST  224       5127  52 066 0           DXCH   NEWLOC
 00080  REF   1                  5130  3 4756 1           CAF    EXECBANK
 00090  REF  24  LAST 1150       5131  56 004 0           XCH    FBANK
 00100  REF   1                  5132  54 061 1           TS     EXECTEM1
 00110  REF   1                  5133  1 2620 0           TCF    NOVAC2         ENTER EXECUTIVE BANK.

R00120              TO ENTER A JOB REQUEST REQUIRING A VAC AREA - E.G., ALL (PARTIALLY) INTERPRETIVE JOBS.

 00139  REF   4  LAST  829       5134  3 4753 1  FINVAC20 CAF    PRIO20
 00140                           5135  0 0004 0  FINDVAC  INHINT
 00145  REF   4  LAST 1208       5136  54 063 0           TS     NEWPRIO
 00150                           5137  0 0006 1           EXTEND
 00160  REF 253  LAST 1208       5140  5 0002 0           INDEX  Q
 00170                           5141  3 0001 0           DCA    0
 00180  REF   3  LAST 1208       5142  52 066 0  SPVACIN  DXCH   NEWLOC
 00190  REF   2  LAST 1208       5143  3 4756 1           CAF    EXECBANK
 00200  REF  25  LAST 1208       5144  56 004 0           XCH    FBANK
 00210  REF   1                  5145  1 2576 0           TCF    FINDVAC2       OFF TO EXECUTIVE SWITCHED-BANK.

R00211              TO ENTER A FINDVAC WITH THE PRIORITY IN NEWPRIO TO THE 2CADR ARRIVING IN A AND L:

R002125             USERS OF SPVAC MUST INHINT BEFORE STORING IN NEWPRIO.

 00213  REF 254  LAST 1208       5146  56 002 0  SPVAC    XCH    Q
 00214  REF   9  LAST 1048       5147  6 7701 0           AD     NEG2
 00215  REF 255  LAST 1208       5150  56 002 0           XCH    Q
 00216  REF   1                  5151  1 5142 1           TCF    SPVACIN

R00220              TO SUSPEND A BASIC JOB SO A HIGHER PRIORITY JOB MAY BE SERVICED:

 00240  REF 256  LAST 1208       5152  22 002 0  CHANG1   LXCH   Q
 00250  REF   3  LAST 1208       5153  3 4756 1           CAF    EXECBANK
 00260  REF  18  LAST 1131       5154  56 006 1           XCH    BBANK
 00270  REF   1                  5155  1 2677 1           TCF    CHANJOB

R00300              TO SUSPEND AN INTERPRETIVE JOB:
 0031   REF  27  LAST 1199      5156  4 0164 0  CHANG2   CS      LOC             NEGATIVE LOC SHOWS JOB = INTERPRETIVE.
R00315           ITRACE (4) REFERS TO "CHANG2".
 0032   REF 164  LAST 1187      5157  54 001 1           TS      L
 0033   REF   4  LAST 1208      5160  3 4756 1    +2     CAF     EXECBANK
 00335  REF  19  LAST 1208      5161  54 006 0           TS      BBANK
 0034   REF   2  LAST 1208      5162  1 2676 0           TCF     CHANJOB -1
```

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P0035             TO VOLUNTARILY SUSPEND A JOB UNTIL THE COMPLETION OF SOME ANTICIPATED EVENT (I/O EVENT ETC.):

 0037   REF  28  LAST 1209        5163  54 164 0  JOBSLEEP TS      LOC
 0038   REF   5  LAST 1209        5164  3 4756 1           CAF     EXECBANK
 0039   REF  26  LAST 1208        5165  54 004 1           TS      FBANK
 0040   REF   1                   5166  1 2767 1           TCF     JOBSLP1

R0041             TO AWAKEN A JOB PUT TO SLEEP IN THE ABOVE FASHION:

 0042                             5167  0 0004 0  JOBWAKE  INHINT
 00421  REF   4  LAST 1208        5170  54 065 0           TS      NEWLOC
 0043   REF  55  LAST 1147        5171  4 4767 1           CS      TWO                 EXIT IS VIA FINDVAC/NOVAC PROCEDURES.
 0044   REF 257  LAST 1208        5172  26 002 1           ADS     Q
 0045   REF   6  LAST 1210        5173  3 4756 1           CAF     EXECBANK
 0046   REF  27  LAST 1210        5174  56 004 0           XCH     FBANK
 0047   REF   1                   5175  1 3014 0           TCF     JOBWAKE2

R0048             TO CHANGE THE PRIORITY OF A JOB CURRENTLY UNDER EXECUTION:

 0049                             5176  0 0004 0  PRIOCHNG INHINT                      NEW PRIORITY ARRIVES IN A. RETURNS TO
 0050   REF   5  LAST 1208        5177  54 063 0           TS      NEWPRIO             CALLER AS SOON AS NEW JOB PRIORITY IS
 0051   REF   7  LAST 1210        5200  3 4756 1           CAF     EXECBANK            HIGHEST. PREPARE FOR POSSIBLE BASIC-
 0052   REF  20  LAST 1209        5201  56 006 1           XCH     BBANK               STYLE CHANGE-JOB.
 0053   REF   9  LAST 1131        5202  54 165 1           TS      BANKSET
 0054   REF 258  LAST 1210        5203  3 0002 0           CA      Q
 0055   REF   1                   5204  1 3063 0           TCF     PRIOCH2

R0058             TO REMOVE A JOB FROM EXECUTIVE CONSIDERATIONS:

 0059   REF   8  LAST 1210        5205  3 4756 1  ENDOFJOB CAF     EXECBANK
 0060   REF  28  LAST 1210        5206  54 004 1           TS      FBANK
 0061   REF   1                   5207  1 3074 0           TCF     ENDJOB1

 0062   REF   2  LAST 1208        5210  3 0061 0  ENDFIND  CA      EXECTEM1            RETURN TO CALLER AFTER JOB ENTRY
 0063   REF  29  LAST 1210        5211  54 004 1           TS      FBANK               COMPLETE.
 0064   REF   4  LAST  781        5212  1 6710 0           TCF     Q+2
 0066   REF  30  LAST 1204        4756            EXECBANK EQUALS  BIT11               THIS IS TRUE IF FINDVAC2 STAYS IN BANK01

 00665  REF 629  LAST 1195        5213   00110 1  FAKEPRET ADRES   MPAC -360           LOC(MPAC +6) - LOC(QPRET)
```

```
P0067             LOCATE AN AVAILABLE VAC AREA.

 00675 REF    1                 01,2000                               SETLOC EXECB1
 0068                           01,2576                               BANK

 00685 *REF   1                                                       COUNT* $$/EXEC
A00686                                                       ******** IF THE EXECUTIVE IS
A00687                                                                MOVED  OUT OF BANK 01
A00688                                                                DONT   FORGET TO CHANGE
A00689                                                                THE    VALUE OF
A006891                                                               ****** EXECBANK ****
 0069   REF    3  LAST 1210    01,2576   54 061 1  FINDVAC2 TS     EXECTEM1          (SAVE CALLER'S BANK FIRST.)
 0070   REF    3  LAST  205    01,2577   10 400 1           CCS    VAC1USE
 0071   REF    1               01,2600    1 2613 0          TCF    VACFOUND
 0072   REF    2  LAST  204    01,2601   10 454 0           CCS    VAC2USE
 0073   REF    2  LAST 1211    01,2602    1 2613 0          TCF    VACFOUND
 0074   REF    2  LAST  204    01,2603   10 530 0           CCS    VAC3USE
 0075   REF    3  LAST 1211    01,2604    1 2613 0          TCF    VACFOUND
 0076   REF    2  LAST  204    01,2605   10 604 1           CCS    VAC4USE
 0077   REF    4  LAST 1211    01,2606    1 2613 0          TCF    VACFOUND
 0078   REF    2  LAST  204    01,2607   10 660 0           CCS    VAC5USE
 0079   REF    5  LAST 1211    01,2610    1 2613 0          TCF    VACFOUND
 0080   REF    2  LAST  242    01,2611    0 7706 1          TC     BAILOUT
 0081                          01,2612    31201 0           OCT    31201             NO VAC AREAS

 0082   REF   56  LAST 1210    01,2613    6 4767 0 VACFOUND AD     TWO               RESERVE THIS VAC AREA BY STORING A ZERO
 0083                          01,2614   22 007 0           ZL                       IN ITS VAC USE REGISTER AND STORE THE
 0084   REF  319  LAST 1207    01,2615   50 000 1           INDEX  A                 ADDRESS OF THE FIRST WORD OF IT IN THE
 0085                          01,2616   21'777 0           LXCH   0 -1              LOW NINE BITS OF THE PRIORITY WORD.
 0086   REF    6  LAST 1210    01,2617   26 063 0           ADS    NEWPRIO

 0087   REF  237  LAST 1191    01,2620    3 4772 1 NOVAC2   CAF    ZERO              NOVAC ENTERS HERE. FIND A CORE SET.
 0088   REF    3  LAST  426    01,2621   54 064 1           TS     LOCCTR
 0089   REF    1               01,2622    3 2627 0          CAF    NO.CORES          SEVEN SETS OF ELEVEN REGISTERS EACH.
 0090   REF    1               01,2623   54 062 1  NOVAC3   TS     EXECTEM2
 0091   REF    4  LAST 1211    01,2624   50 064 0           INDEX  LOCCTR
 0092   REF    9  LAST  223    01,2625   10 167 0           CCS    PRIORITY          EACH PRIORITY REGISTER CONTAINS -0 IF
 0093   REF    1               01,2626    1 2667 0          TCF    NEXTCORE          THE CORRESPONDING CORE SET IS AVAILABLE.
 0094                          01,2627    00006 1  NO.CORES DEC    6
 0095   REF    2  LAST 1211    01,2630    1 2667 0          TCF    NEXTCORE          AN ACTIVE JOB HAS A POSITIVE PRIORITY
A0096                                                                                BUT A DORMANT JOB'S PRIORITY IS NEGATIVE
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 0097   REF   7  LAST 1211   01,2631  3 0063 1  CORFOUND CA      NEWPRIO           SET THE PRIORITY OF THIS JOB IN THE CORE
 0098   REF   5  LAST 1211   01,2632  50 064 0           INDEX   LOCCTR            SET'S PRIORITY REGISTER AND SET THE
 0099   REF  10  LAST 1211   01,2633  54 167 0           TS      PRIORITY          JOB'S PUSH-DOWN POINTER AT THE BEGINNING
 0100   REF   4  LAST  358   01,2634  7 5021 0           MASK    LOW9              OF THE WORK AREA AND OVERFLOW INDICATOR
 0101   REF   6  LAST 1212   01,2635  50 064 0           INDEX   LOCCTR
 0102   REF  19  LAST 1182   01,2636  54 166 1           TS      PUSHLOC           OFF TO PREPARE FOR INTERPRETIVE PROGRAMS

 0103   REF   7  LAST 1212   01,2637  10 064 1           CCS     LOCCTR            IF CORE SET ZERO IS BEING LOADED, SET UP
 0104   REF   1              01,2640  1 2654 0           TCF     SETLOC            OVFIND AND FIXLOC IMMEDIATELY .
 0105   REF  11  LAST 1195   01,2641  54 121 1           TS      OVFIND
 0106   REF  20  LAST 1212   01,2642  3 0166 0           CA      PUSHLOC
 0107   REF  32  LAST 1196   01,2643  54 120 0           TS      FIXLOC

 0108   REF   7  LAST 1109   01,2644  10 067 1  SPECTEST CCS     NEWJOB            SEE IF ANY ACTIVE JOBS WAITING (RARE).
 0109   REF   2  LAST 1212   01,2645  1 2654 0           TCF     SETLOC            MUST BE AWAKENED BUT UNCHANGED JOB.
 0110                        01,2646  12 647 1           NOOP                      CANNOT GET HERE
 0111                        01,2647  12 650 1           NOOP                      CANNOT GET HERE
 0112   REF   8  LAST 1212   01,2650  54 067 1           TS      NEWJOB            +0 SHOWS ACTIVE JOB ALREADY SET.
 0113   REF   5  LAST 1210   01,2651  52 066 0           DXCH    NEWLOC
 0114   REF  29  LAST 1210   01,2652  52 165 1           DXCH    LOC
 0115   REF   1              01,2653  1 5210 0           TCF     ENDFIND

 0116   REF   6  LAST 1212   01,2654  52 066 0  SETLOC   DXCH    NEWLOC            SET UP THE LOCATION REGISTERS FOR THIS
 0117   REF   8  LAST 1212   01,2655  50 064 0           INDEX   LOCCTR
 0118   REF  30  LAST 1212   01,2656  52 165 1           DXCH    LOC
 0119   REF   9  LAST 1212   01,2657  50 067 0           INDEX   NEWJOB            THIS INDEX INSTRUCTION INSURES THAT THE
 0120   REF  11  LAST 1212   01,2660  4 0167 0           CS      PRIORITY          HIGHEST ACTIVE PRIORITY WILL BE COMPARED
 0121   REF   8  LAST 1212   01,2661  6 0063 1           AD      NEWPRIO           WITH THE NEW PRIORITY TO SEE IF NEWJOB
 0122                        01,2662  0 0006 1           EXTEND                    SHOULD BE SET TO SIGNAL A SWITCH.
 0123   REF   2  LAST 1212   01,2663  6 5210 1           BZMF    ENDFIND
 0124   REF   9  LAST 1212   01,2664  3 0064 0           CA      LOCCTR            LOCCTR IS LEFT SET AT THIS CORE SET IF
 0125   REF  10  LAST 1212   01,2665  54 067 1           TS      NEWJOB            THE CALLER WANTS TO LOAD ANY MPAC
 0126   REF   3  LAST 1212   01,2666  1 5210 0           TCF     ENDFIND           REGISTERS, ETC.

 0127   REF   2  LAST 1199   01,2667  3 3024 1  NEXTCORE CAF     COREINC
 0128   REF  10  LAST 1212   01,2670  26 064 1           ADS     LOCCTR
 0129   REF   2  LAST 1211   01,2671  10 062 1           CCS     EXECTEM2
 0130   REF   1              01,2672  1 2623 0           TCF     NOVAC3
 0131   REF   3  LAST 1211   01,2673  0 7706 1           TC      BAILOUT           NO CORE SETS.
 0132                        01,2674   31202 0           OCT     31202
```

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P0133              THE FOLLOWING ROUTINE SWAPS CORE SET 0 WITH THAT WHOSE RELATIVE ADDRESS IS IN NEWJOB.

 01345  REF  31  LAST 1212   01,2675  22 164 1    -2      LXCH    LOC
 0135   REF  10  LAST 1210   01,2676  30 165 0    -1      CAE     BANKSET           BANKSET, NOT BBANK, HAS RIGHT CONTENTS.
 0136                        01,2677  0 0004 0  CHANJOB   INHINT
 01362                       01,2700  0 0006 1            EXTEND
 01364  REF  12  LAST 1105   01,2701  04 007 1            ROR     SUPERBNK          PICK UP CURRENT SBANK FOR BBCON
 01366  REF 165  LAST 1209   01,2702  56 001 0            XCH     L                 LOC IN A AND BBCON IN L.
 01368  REF  11  LAST 1212   01,2703  50 067 0    +4      INDEX   NEWJOB            SWAP LOC AND BANKSET.
 0137   REF  32  LAST 1213   01,2704  52 165 1            DXCH    LOC
 0138   REF  33  LAST 1213   01,2705  52 165 1            DXCH    LOC

 01382  REF  11  LAST 1213   01,2706  30 165 0            CAE     BANKSET
 01384                       01,2707  0 0006 1            EXTEND
 01388  REF  13  LAST 1213   01,2710  01 007 1            WRITE   SUPERBNK          SET SBANK FOR NEW JOB.
 0139   REF 630  LAST 1210   01,2711  52 155 1            DXCH    MPAC              SWAP MULTI-PURPOSE ACCUMULATOR AREAS.
 0140   REF  12  LAST 1213   01,2712  50 067 0            INDEX   NEWJOB
 0141   REF 631  LAST 1213   01,2713  52 155 1            DXCH    MPAC
 0142   REF 632  LAST 1213   01,2714  52 155 1            DXCH    MPAC
 0143   REF 633  LAST 1213   01,2715  52 157 0            DXCH    MPAC +2
 0144   REF  13  LAST 1213   01,2716  50 067 0            INDEX   NEWJOB
 0145   REF 634  LAST 1213   01,2717  52 157 0            DXCH    MPAC +2
 0146   REF 635  LAST 1213   01,2720  52 157 0            DXCH    MPAC +2
 0147   REF 636  LAST 1213   01,2721  52 161 0            DXCH    MPAC +4
 0148   REF  14  LAST 1213   01,2722  50 067 0            INDEX   NEWJOB
 0149   REF 637  LAST 1213   01,2723  52 161 0            DXCH    MPAC +4
 0150   REF 638  LAST 1213   01,2724  52 161 0            DXCH    MPAC +4
 0151   REF 639  LAST 1213   01,2725  52 163 1            DXCH    MPAC +6
 0152   REF  15  LAST 1213   01,2726  50 067 0            INDEX   NEWJOB
 0153   REF 640  LAST 1213   01,2727  52 163 1            DXCH    MPAC +6
 0154   REF 641  LAST 1213   01,2730  52 163 1            DXCH    MPAC +6

 0155   REF 238  LAST 1211   01,2731  3 4772 1            CAF     ZERO
 0156   REF  12  LAST 1212   01,2732  56 121 0            XCH     OVFIND            MAKE PUSHLOC NEGATIVE IF OVFIND NZ.
 0157                        01,2733  0 0006 1            EXTEND
 0158                        01,2734  1 2737 1            BZF     +3
 0159   REF  21  LAST 1212   01,2735  4 0166 1            CS      PUSHLOC
 0160   REF  22  LAST 1213   01,2736  54 166 1            TS      PUSHLOC

 0161   REF  23  LAST 1213   01,2737  52 167 0            DXCH    PUSHLOC
 0162   REF  16  LAST 1213   01,2740  50 067 0            INDEX   NEWJOB
 0163   REF  24  LAST 1213   01,2741  52 167 0            DXCH    PUSHLOC
 0164   REF  25  LAST 1213   01,2742  52 167 0            DXCH    PUSHLOC           SWAPS PUSHLOC AND PRIORITY.
 0165   REF   5  LAST 1212   01,2743  3 5021 1            CAF     LOW9              SET FIXLOC TO BASE OF VAC AREA.
 0166   REF  12  LAST 1212   01,2744  7 0167 0            MASK    PRIORITY
 0167   REF  33  LAST 1212   01,2745  54 120 0            TS      FIXLOC

 0168   REF  26  LAST 1213   01,2746  10 166 1            CCS     PUSHLOC           SET OVERFLOW INDICATOR ACCORDING TO
 0169   REF 239  LAST 1213   01,2747  3 4772 1            CAF     ZERO
 0170   REF   1              01,2750  1 2755 0            TCF     ENDPRCHG -1
```

```
L         EXECUTIVE                                                                          USER'S PAGE NO.   7      EC 53

 0171     REF  27  LAST 1213    01,2751  4 0166 1            CS       PUSHLOC
 0172     REF  28  LAST 1214    01,2752  54 166 1            TS       PUSHLOC
 0173     REF 134  LAST 1177    01,2753  3 4776 0            CAF      ONE
 0174     REF  13  LAST 1213    01,2754  56 121 0            XCH      CVFIND
 0175     REF  17  LAST 1213    01,2755  54 067 1    -1      TS       NEWJOB
 0176                           01,2756  0 0003 1  ENDPRCHG RELINT
 0177     REF  34  LAST 1213    01,2757  52 165 1            DXCH     LOC              BASIC JOBS HAVE POSITIVE ADDRESSES, SO
 0178                           01,2760  0 0006 1            EXTEND                    DISPATCH WITH A DTCB.
 0179                           01,2761  6 2763 1            BZMF     +2               IF INTERPRETIVE, SET UP EBANK, ETC.
 0180                           01,2762  52 006 0            DTCB
```

```
0181                       01,2763  4 0000 0            COM                 EPILOGUE TO JOB CHANGE FOR INTERPRETIVE
0182    REF 135  LAST 1214 01,2764  6 4770 0            AD      ONE
0183    REF  35  LAST 1214 01,2765  54 164 0            TS      LOC         RESUME.
0186    REF   1            01,2766  1 6017 0            TCF     INTRSM

R0187            COMPLETE JOBSLEEP PREPARATIONS.

0188                       01,2767  0 0004 0  JOBSLP1   INHINT
0189    REF  13  LAST 1213 01,2770  4 0167 0            CS      PRIORITY    NNZ PRIORITY SHOWS JOB ASLEEP.
0190    REF  14  LAST 1215 01,2771  54 167 0            TS      PRIORITY
0191    REF   8  LAST 1149 01,2772  3 6043 0            CAF     LOW7
0192    REF  21  LAST 1210 01,2773  7 0006 0            MASK    BBANK
01921                      01,2774  0 0006 1            EXTEND
01922   REF  14  LAST 1213 01,2775  04 007 1            ROR     SUPERBNK    SAVE OLD SUPERBANK VALUE.
0193    REF  12  LAST 1213 01,2776  54 165 1            TS      BANKSET
0194    REF 240  LAST 1213 01,2777  4 4772 0            CS      ZERO
0195    REF 111  LAST 1185 01,3000  54 131 0  JOBSLP2   TS      BUF +1      HOLDS - HIGHEST PRIORITY.
0196    REF   1            01,3001  1 3111 1            TCF     EJSCAN      SCAN FOR HIGHEST PRIORITY ALA ENDOFJOB.

01961                      01,3002  0 0004 0  NUCHANG2  INHINT              QUICK... DONT LET NEWJOB CHANGE TO +0 .
019611  REF  18  LAST 1214 01,3003  10 067 1            CCS     NEWJOB
019612                     01,3004  1 3007 1            TCF     +3          NEWJOB STILL PNZ
019613                     01,3005  0 0003 1            RELINT              NEWJOB HAS CHANGED TO +0. WAKE UP JOB
019614  REF   1            01,3006  1 3201 0            TCF     ADVAN +2    VIA NUDIRECT. (VERY RARE CASE.)

01962   REF  57  LAST 1211 01,3007  3 4767 0            CAF     TWO
01963                      01,3010  0 0006 1            EXTEND
01964   REF  24  LAST  834 01,3011  05 011 1            WOR     DSALMOUT    TURN ON ACTIVITY LIGHT
01965   REF  36  LAST 1215 01,3012  52 165 1            DXCH    LOC         AND SAVE ADDRESS INFO FOR BENEFIT OF
01966   REF   3  LAST 1209 01,3013  1 2763 0            TCF     CHANJOB + 4  POSSIBLE SLEEPING JOB.
```

```
L       EXECUTIVE                                                                          USER'S PAGE NO.   9      EC S3

P0197           TO WAKE UP A JOB, EACH CORE SET IS FOUND TO LOCATE ALL JOBS WHICH ARE ASLEEP. IF THE FCADR IN THE
R0199   LOC REGISTER OF ANY SUCH JOB MATCHES THAT SUPPLIED BY THE CALLER, THAT JOB IS AWAKENED. IF NO JOB IS FOUND,
R0201   LOCCTR IS SET TO -1 AND NO FURTHER ACTION TAKES PLACE.

 0202   REF   4  LAST 1211   01,3014  54 061 1  JOBWAKE2 TS     EXECTEM1
 0203   REF 241  LAST 1215   01,3015  3 4772 1           CAF    ZERO                BEGIN CORE SET SCAN.
 0204   REF  11  LAST 1212   01,3016  54 064 1           TS     LOCCTR
 0205   REF   2  LAST 1211   01,3017  3 2627 0           CAF    NO.CORES
 0206   REF   3  LAST 1212   01,3020  54 062 1  JOBWAKE4 TS     EXECTEM2
 0207   REF  12  LAST 1216   01,3021  50 064 0           INDEX  LOCCTR
 0208   REF  15  LAST 1215   01,3022  10 167 0           CCS    PRIORITY
 0209   REF   1              01,3023  1 3026 1           TCF    JOBWAKE3            ACTIVE JOB - CHECK NEXT CORE SET.
 0210                        01,3024   00014 1  COREINC  DEC    12                  12 REGISTERS PER CORE SET.
 0211   REF   1              01,3025  1 3035 0           TCF    WAKETEST            SLEEPING JOB - SEE IF CADR MATCHES.

 0212   REF   3  LAST 1212   01,3026  3 3024 1  JOBWAKE3 CAF    COREINC
 0213   REF  13  LAST 1216   01,3027  26 064 1           ADS    LOCCTR
 0214   REF   4  LAST 1216   01,3030  10 062 1           CCS    EXECTEM2
 0215   REF   1              01,3031  1 3020 1           TCF    JOBWAKE4
 0216   REF 136  LAST 1215   01,3032  4 4770 1           CS     ONE                 EXIT IF SLEEPING JOB NOT FOUND.
 0217   REF  14  LAST 1216   01,3033  54 064 1           TS     LOCCTR
 0218   REF   4  LAST 1212   01,3034  1 5210 0           TCF    ENDFIND

 0219   REF   7  LAST 1212   01,3035  4 0065 0  WAKETEST CS     NEWLOC
 0220   REF  15  LAST 1216   01,3036  50 064 0           INDEX  LOCCTR
 0221   REF  37  LAST 1215   01,3037  6 0164 1           AD     LOC
 0222                        01,3040  0 0006 1           EXTEND
 0223                        01,3041  1 3043 1           BZF    +2                  IF MATCH.
 0224   REF   2  LAST 1216   01,3042  1 3026 1           TCF    JOBWAKE3            EXAMINE NEXT CORE SET IF NO MATCH.

 0225   REF  16  LAST 1216   01,3043  50 064 0           INDEX  LOCCTR              RE-COMPLEMENT PRIORITY TO SHOW JOB AWAKE
 0226   REF  16  LAST 1216   01,3044  4 0167 0           CS     PRIORITY
 0227   REF   9  LAST 1212   01,3045  54 063 0           TS     NEWPRIO
 0228   REF  17  LAST 1216   01,3046  50 064 0           INDEX  LOCCTR
 0229   REF  17  LAST 1216   01,3047  54 167 0           TS     PRIORITY

 0230   REF   1              01,3050  4 4344 1           CS     FBANKMSK            MAKE UP THE 2CADR OF THE WAKE ADDRESS
 0231   REF   8  LAST 1216   01,3051  7 0065 0           MASK   NEWLOC              USING THE CADR IN NEWLOC AND THE EBANK
 0232   REF   3  LAST 1129   01,3052  6 4756 1           AD     2K                  HALF OF BBANK SAVED IN BANKSET.
 0233   REF   9  LAST 1216   01,3053  56 065 1           XCH    NEWLOC
 0234   REF   2  LAST 1216   01,3054  7 4344 1           MASK   FBANKMSK
 0235   REF  18  LAST 1216   01,3055  50 064 0           INDEX  LOCCTR
 0236   REF  13  LAST 1215   01,3056  6 0165 0           AD     BANKSET
 0237   REF  10  LAST 1216   01,3057  54 066 0           TS     NEWLOC +1

 0238   REF  19  LAST 1216   01,3060  10 064 1           CCS    LOCCTR              SPECIAL TREATMENT IF THIS JOB WAS
 0239   REF   3  LAST 1212   01,3061  1 2654 0           TCF    SETLOC              ALREADY IN THE RUN (0) POSITION.
 0240   REF   1              01,3062  1 2644 1           TCF    SPECTEST
```

```
P0241            PRIORITY CHANGE. CHANGE THE CONTENTS OF PRIORITY AND SCAN FOR THE JOB OF HIGHEST PRIORITY.

 0243  REF  38  LAST 1216   01,3063  54 164 0  PRIOCH2  TS     LOC
 0244  REF 242  LAST 1216   01,3064  3 4772 1           CAF    ZERO             SET FLAG TO TELL ENDJOB SCANNER IF THIS
 0245  REF 112  LAST 1215   01,3065  54 130 1           TS     BUF              JOB IS STILL HIGHEST PRIORITY.
 0246  REF   6  LAST 1213   01,3066  3 5021 1           CAF    LOW9
 0247  REF  18  LAST 1216   01,3067  7 0167 0           MASK   PRIORITY
 0248  REF  10  LAST 1216   01,3070  6 0063 1           AD     NEWPRIO
 0249  REF  19  LAST 1217   01,3071  54 167 0           TS     PRIORITY
 0250                       01,3072  4 0000 0           COM
 0251  REF   1              01,3073  1 3000 0           TCF    JOBSLP2          AND TO EJSCAN.
```

```
P0252             RELEASE THIS CORE SET AND VAC AREA AND SCAN FOR THE JOB OF HIGHEST ACTIVE PRIORITY.

 0254                             01,3074  0 0004 0  ENDJOB1   INHINT
 0255    REF 243  LAST 1217      01,3075  4 4772 0            CS       ZERO
 0256    REF 113  LAST 1217      01,3076  54 131 0            TS       BUF +1
 0257    REF  20  LAST 1217      01,3077  56 167 1            XCH      PRIORITY
 0258    REF   7  LAST 1217      01,3100  7 5021 0            MASK     LOW9
 02581   REF 166  LAST 1213      01,3101  54 001 1            TS       L

 02582   REF   2  LAST 1208      01,3102  4 5213 0            CS       FAKEPRET
 025821  REF 167  LAST 1218      01,3103  6 0001 0            AD       L

 02583                            01,3104  0 0006 1            EXTEND
 02584   REF   2  LAST 1215      01,3105  6 3111 0            BZMF     EJSCAN            NOVAC ENDOFJOB

 0259    REF 168  LAST 1218      01,3106  10 001 1            CCS      L
 0260    REF 320  LAST 1211      01,3107  50 000 1            INDEX    A
 0261                             01,3110  54 000 0            TS       0

 0262    REF  21  LAST 1218      01,3111  10 203 1  EJSCAN    CCS      PRIORITY +12D
 0263    REF   1                  01,3112  0 3156 0            TC       EJ1
 02635   REF   4  LAST  273         1361                       EBANK=   SELFRET
 0264    REF   3  LAST  273      01,3113   66102 1  SELFBANK  BBCON    SELFCHK           CANNOT GET HERE
 0265                             01,3114  1 3115 0            TCF      +1

 0266    REF  22  LAST 1218      01,3115  10 217 1            CCS      PRIORITY +24D     EXAMINE EACH PRIORITY REGISTER TO FIND
 0267    REF   2  LAST 1218      01,3116  0 3156 0            TC       EJ1               THE JOB OF HIGHEST ACTIVE PRIORITY.
 0268                             01,3117   40201 0  OCT40201  OCT      40201             CANNOT GET HERE
 0269                             01,3120  1 3121 1            TCF      +1

 0270    REF  23  LAST 1218      01,3121  10 233 1            CCS      PRIORITY +36D
 0271    REF   3  LAST 1218      01,3122  0 3156 0            TC       EJ1
 0272    REF  24  LAST 1218      01,3123   67610 1  -CCSPR   -CCS      PRIORITY
 0273                             01,3124  1 3125 0            TCF      +1

 0274    REF  25  LAST 1218      01,3125  10 247 1            CCS      PRIORITY +48D
 0275    REF   4  LAST 1218      01,3126  0 3156 0            TC       EJ1
 0276    REF   1                  01,3127   03724 0  PHS2CADR  GENADR   PHSPART2          CANNOT GET HERE
 0277                             01,3130  1 3131 0            TCF      +1

 0278    REF  26  LAST 1218      01,3131  10 263 1            CCS      PRIORITY +60D
 0279    REF   5  LAST 1218      01,3132  0 3156 0            TC       EJ1
 0280    REF   1                  01,3133   03502 0  PRT2CADR  GENADR   GETPART2          CANNOT GET HERE
 0281                             01,3134  1 3135 1            TCF      +1

 0282    REF  27  LAST 1218      01,3135  10 277 1            CCS      PRIORITY +72D
 0283    REF   6  LAST 1218      01,3136  0 3156 0            TC       EJ1
 0284    REF   4  LAST  699      01,3137   05332 0  LGCLCADR  GENADR   LONGCALL          CANNOT GET HERE
 0285                             01,3140  1 3141 1            TCF      +1
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L        EXECUTIVE                                                                     USER'S PAGE NO.  12      EQ 53

P0286              EVALUATE THE RESULTS OF THE SCAN.

 0287    REF 114  LAST 1218   01,3141  10 131 0             CCS     BUF +1          SEE IF THERE ARE ANY ACTIVE JOBS WAITING
R02875   * WAITLIST TASK GETCADR *
 0288    REF   1              01,3142  53'301 0  GETCADR    DXCH    LONGCADR        CANNOT GET HERE
 0289    REF   4  LAST  640   01,3143  0 5214 0             TC      SUPDXCHZ
 0290                         01,3144  1 3146 0             TCF     +2
 0291    REF   2  LAST  196   01,3145  1 3171 1             TCF     DUMMYJOB
 0292    REF 115  LAST 1219   01,3146  10 130 1             CCS     BUF             BUF IS ZERO IF THIS IS A PRIOCHNG AND
 0293                         01,3147  1 3151 0             TCF     +2              CHANGED PRIORITY IS STILL HIGHEST.
 0294    REF   2  LAST 1213   01,3150  1 2755 0             TCF     ENDPRCHG -1

 0295    REF 321  LAST 1218   01,3151  50 000 1             INDEX   A               OTHERWISE, SET NEWJOB TO THE RELATIVE
 0296                         01,3152  2'7777 0             CAF     0 -1            ADDRESS OF THE NEW JOB'S CORE SET.
 0297    REF   1              01,3153  6 3123 1             AD      -CCSPR
 0298    REF  19  LAST 1215   01,3154  54 067 1             TS      NEWJOB
 0299    REF   4  LAST 1215   01,3155  1 2675 0             TCF     CHANJOB -2

 0300    REF 116  LAST 1219   01,3156  54 132 0  EJ1        TS      BUF +2
 0301    REF 117  LAST 1219   01,3157  6 0131 1             AD      BUF +1          - OLD HIGH PRIORITY.
 0302    REF 322  LAST 1219   01,3160  10 000 0             CCS     A
 0303    REF 118  LAST 1219   01,3161  4 0132 0             CS      BUF +2
 0304    REF   1              01,3162  1 3165 1             TCF     EJ2             NEW HIGH PRIORITY.
 0305                         01,3163  13 164 0             NOOP
 0306    REF   5  LAST 1210   01,3164  1 6710 0             TCF     Q+2

 0308    REF 119  LAST 1219   01,3165  54 131 0  EJ2        TS      BUF +1
 0309    REF 259  LAST 1210   01,3166  3 0002 0             CA      Q
 0310    REF 120  LAST 1219   01,3167  54 130 1             TS      BUF             FOR LOCATING CCS PRIORITY + X INSTR.
 0311    REF   6  LAST 1219   01,3170  1 6710 0             TCF     Q+2
```

```
P0314            IDLING AND COMPUTER ACTIVITY (GREEN) LIGHT MAINTENANCE. THE IDLING ROUTINE IS NOT A JOB IN ITSELF,
R0316   BUT RATHER A SUBROUTINE OF THE EXECUTIVE.

 0318   REF   5  LAST 1218      1361                     EBANK= SELFRET         SELF-CHECK STORAGE IN EBANK.

 0319   REF 244  LAST 1218   01,3171  4 4772 0  DUMMYJOB CS     ZERO           SET NEWJOB TO -0 FOR IDLING.
 0320   REF  20  LAST 1219   01,3172  54 0067 1          TS     NEWJOB
 0321                        01,3173  0 0003 1     +2    RELINT
 0322   REF  58  LAST 1215   01,3174  4 4767 1          CS     TWO            TURN OFF THE ACTIVITY LIGHT.
 0323                        01,3175  0 0006 1          EXTEND
 0324   REF  25  LAST 1215   01,3176  03 011 1          WAND   DSALMOUT
 0328   REF  21  LAST 1220   01,3177  10 067 1  ADVAN    CCS    NEWJOB         IS A NEWJOB ACTIVE ?
 0329   REF   1              01,3200  1 3002 1          TCF    NUCHANG2       YES... ONE REQUIRING A CHANGE JOB.
 0330   REF  59  LAST 1220   01,3201  3 4767 0     +2    CAF    TWO            NEW JOB ALREADY IN POSITION FOR
 0331   REF   1              01,3202  1 3207 0          TCF    NUDIRECT       EXECUTION.

 03317  REF   6  LAST 1220   01,3203  3 1361 1          CA     SELFRET
 03318  REF 169  LAST 1218   01,3204  54 001 1          TS     L              PUT RETURN ADDRESS IN L.
 0332   REF   1              01,3205  3 3113 1          CAF    SELFBANK
 0333   REF   5  LAST 1219   01,3206  1 5215 0          TCF    SUPDXCHZ + 1    AND DISPATCH JOB.

 0335                        01,3207  0 0006 1  NUDIRECT EXTEND                TURN THE GREEN LIGHT BACK ON.
 0336   REF  26  LAST 1220   01,3210  05 011 1          WOR    DSALMOUT
 0337   REF  39  LAST 1217   01,3211  52 165 1          DXCH   LOC            JOBS STARTED IN THIS FASHION MUST BE
 03372  REF   6  LAST 1220   01,3212  1 5214 1          TCF    SUPDXCHZ

 03375  REF   2  LAST 1208      4000                     SETLOC EXECF2
 03378                          5214                     BANK

 03379  REF   2 LAST 1208 TO 1211:    60     60*         COUNT* $$/EXEC
R033791 SUPDXCHZ - ROUTINE TO TRANSFER TO SUPERBANK.
R033792 CALLING SEQUENCE
A033793                                                  TCF    SUPDXCHZ       WITH 2CADR OF DESIRED LOCATION IN A + L.

 0338   REF 170  LAST 1220      5214  56 001 0  SUPDXCHZ XCH    L              BASIC.
 03381                          5215  0 0006 1  +1       EXTEND
 03382  REF  15  LAST 1215      5216  01 007 1          WRITE  SUPERBNK
 03383  REF  22  LAST 1215      5217  54 006 0          TS     BBANK
 03384  REF 171  LAST 1220      5220  0 0001 0          TC     L

 0339                           5221   77677 1  NEG100   OCT    77677
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L         WAITLIST                                                                      USER'S PAGE NO.  1       E0 S3

R0001     PROGRAM DESCRIPTION                                                                     DATE - 10 OCTOBER 1966
R0003     MOD NO - 2                                                                              LOG SECTION - WAITLIST
R0005     MOD BY - MILLER    (DTMAX INCREASED TO 162.5 SEC)                                       ASSEMBLY SUNBURST REV 5
R00072    MOD 3 BY KERNAN  (INHINT INSERTED AT WAITLIST)  2/28/68 SKIPPER REV 4

R00073    MOD 4BY KERNAN (TWIDDLE IN 54)  3/28/68 SKIPPER REV 13.
R000799

R0008     FUNCTIONAL DESCRIPTION-
R0009             PART OF A SECTION OF PROGRAMS,-WAITLIST, TASKOVER, T3RUPT, USED  TO CALL A PROGRAM, (CALLED A TASK),
R0011         WHICH IS TO BEGIN IN C(A) CENTISECONDS.  WAITLIST UPDATES TIME3, LST1 AND LST2. THE MEANING OF THESE LISTS
R0013         FOLLOW.

R0014                        C(TIME3)  = 16384 -(T1-T) CENTISECONDS, (T=PRESENT TIME, T1-TIME FOR TASK1)
R0016

R0017                                          C(LST1)     = -(T2-T1)+1
R0018                                          C(LST1 +1) = -(T3-T2)+1
R0019                                          C(LST1 +2) = -(T4-T3)+1
R0020                                                      .
R0021                                                      .
R0022                                          C(LST1 +6) = -(T8-T7)+1
R0023                                          C(LST1 +7) = -(T9-T8)+1

R0024                                          C(LST2)     = 2CADR OF TASK1
R0025                                          C(LST2 +2) = 2CADR OF TASK2
R0026                                                      .
R0027                                                      .
R0028                                          C(LST2 +14)= 2CADR OF TASK8
R0029                                          C(LST2 +16)= 2CADR OF TASK9

R0030     WARNINGS-
R0031     --------
R0032                        1) 1 <= C(A) <= 16250D (1 CENTISECOND TO 162.5 SEC)
R0033                        2) 9 TASKS MAXIMUM
R0034                        3) TASKS CALLED UNDER INTERRUPT INHIBITED
R0035                        4) TASKS END BY TC TASKOVER

R0036     CALLING SEQUENCE-

R0037                        L-1     CA      DELTAT   (TIME IN CENTISECONDS TO TASK START)
R0039                        L       TC      WAITLIST
R0040                        L+1     2CADR   DESIRED TASK
R0041                        L+2     (MINOR OF 2CADR)
R0042                        L+3     RELINT             (RETURNS HERE)

R00421    TWIDDLE-
R00422    -------
R00423                       TWIDDLE IS FOR USE WHEN THE TASK BEING SET UP IS IN THE SAME EBANK AND FBANK AS THE USER.   IN
R00425                       SUCH CASES, IT IMPROVES UPON WAITLIST BY ELIMINATING THE NEED FOR THE BBCON HALF OF THE 2CADR,
L      WAITLIST                                                                                    USER'S PAGE NO.  2      EC S3

R00427                 SAVING A WORD.  TWIDDLE IS LIKE WAITLIST IN EVERY RESPECT EXCEPT CALLING SEQUENCE, TO WIT-

R0043                  L-1     CA      DELTAT
R00431                 L       TC      TWIDDLE
R00432                 L+1     ADRES   DESIRED TASK
R00433                 L+2     RELINT                    (RETURNS HERE)

R00435  NORMAL EXIT MODES-

R0044                  AT L+3 OF CALLING SEQUENCE

R0045   ALARM OR ABORT EXIT MODES-

R0046                  TC      ABORT
R0047                  OCT     1203   (WAITLIST OVERFLOW - TOO MANY TASKS)

R0048   ERASABLE INITIALIZATION REQUIRED-

R0049                  ACCOMPLISHED BY FRESH START,--LST2,...., LST2 +16 =ENDTASK
R0050                                                   LST1,...., LST1 +7  =NEG1/2

R0051   OUTPUT--

R0052                  LST1 AND LST2 UPDATED WITH NEW TASK AND ASSOCIATED TIME.
R0053   DEBRIS-

R0054                  CENTRALS- A,Q,L
R0055                  OTHER   - WAITEXIT, WAITADR, WAITTEMP, WAITBANK
R0056   DETAILED ANALYSIS OF TIMING-

R0057              CONTROL WILL NOT BE RETURNED TO THE SPECIFIED ADDRESS (2CADR)   IN EXACTLY DELTA T CENTISECONDS.
R0059        THE APPROXIMATE TIME MAY BE CALCULATED AS FOLLOWS

R0060                  LET TO = THE TIME OF THE TC WAITLIST
R0061                  LET TS = TO +147U + COUNTER INCREMENTS (SET UP TIME)
R0062                  LET X  = TS -(100TS)/100  (VARIANCE FROM COUNTERS)
R0063                  LET Y  = LENGTH OF TIME OF INHIBIT INTERRUPT AFTER T3RUPT
R0064                  LET Z  = LENGTH OF TIME TO PROCESS TASKS WHICH ARE DUE THIS T3RUPT BUT DISPATCHED EARLIER.
R0066        (Z=0, USUALLY)
R0067                  LET DELTO = THE ACTUAL TIME TAKEN TO GIVE CONTROL TO 2CADR
R0068               THEN   DELTO = TS+DELTA T -X +Y +Z +1.05MS* +COUNTERS*
R0069        *-THE TIME TAKEN BY WAITLIST ITSELF AND THE COUNTER TICKING DURING THIS WAITLIST TIME.
R0071

R0072              IN SHORT, THE ACTUAL TIME TO RETURN CONTROL TO A 2CADR IS AUGMENTED BY THE TIME TO SET UP THE TASK:S
R0074        INTERRUPT, ALL COUNTERS TICKING, THE T3RUPT PROCESSING TIME, THE WAITLIST PROCESSING TIME AND THE POSSIBILITY
R0076        OF OTHER TASKS INHIBITING THE INTERRUPT.


 0077   REF   1               4000                      SETLOC WAITF2
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00775                          5222                     BANK

0078   REF  13  LAST  203   E3,1400                     EBANK= LST1            TASK  LISTS IN SWITCHED E BANK.

0079   REF   1                                          COUNT* $$/WAIT
00791  REF 137  LAST 1216      5222  3 4770 0  TWIDBIT1 CAF    ONE
00795                          5223  0 0004 0  TWIDDLE  INHINT
0080   REF 172  LAST 1220      5224  54 001 1           TS     L               SAVE DELAY TIME IN L
0081   REF  34  LAST 1185      5225  3 4750 1           CA     POSMAX
0082   REF 260  LAST 1219      5226  26 002 1           ADS    Q               CREATING OVERFLOW AND Q-1 IN Q
0083   REF  23  LAST 1220      5227  3 0006 1           CA     BBANK
00832                          5230  0 0006 1           EXTEND
00834  REF  16  LAST 1220      5231  04 007 1           ROR    SUPERBNK
0084   REF 173  LAST 1223      5232  56 001 0           XCH    L

00849                          5233  0 0004 0  WAITLIST INHINT
008495                         5234  0 0006 1           EXTEND
008496 REF   1                 5235  6 5247 0           BZMF   WATLST0-
0085   REF 261  LAST 1223      5236  56 002 0           XCH    Q               SAVE DELTA T IN Q AND RETURN IN
0086   REF   1                 5237  54 061 1           TS     WAITEXIT        WAITEXIT.
0087                           5240  0 0006 1           EXTEND
0088   REF   2  LAST 1223      5241  5 0061 0           INDEX  WAITEXIT        IF TWIDDLING, THE TS SKIPS TO HERE
0089                           5242  3 0001 0           DCA    0               PICK UP 2CADR OF TASK.
0090   REF   1                 5243  54 063 0  -1       TS     WAITADR         BBCON WILL REMAIN IN L
0091   REF   2  LAST  140      5244  3 5254 1  DLY2     CAF    WAITBB          ENTRY FROM FIXDELAY AND VARDELAY.
0092   REF  24  LAST 1223      5245  56 006 1           XCH    BBANK
0093   REF   1                 5246  1 3213 0           TCF    WAIT2

00935  REF   6  LAST 1184      5247  0 5726 1  WATLST0- TC     POODOO
00936                          5250   21204 1           OCT    21204

R0094           RETURN TO CALLER AFTER TASK INSERTION:

0095   REF   3  LAST 1223      5251  52 062 1  LVWTLIST DXCH   WAITEXIT
0096   REF  60  LAST 1220      5252  6 4767 0           AD     TWO
0097                           5253  52 006 0           DTCB

0099   REF  14  LAST 1223   E3,1400                     EBANK= LST1
0100   REF   2  LAST 1223      5254   02063 0  WAITBB   BBCON  WAIT2

R0101           RETURN TO CALLER +2 AFTER WAITING DT SPECIFIED AT CALLER +1.

0102   REF 262  LAST 1223      5255  50 002 0  FIXDELAY INDEX  Q               BOTH ROUTINES MUST BE CALLED UNDER
0103                           5256  3 0000 1           CAF                    WAITLIST CONTROL AND TERMINATE THE TASK
0104   REF 263  LAST 1223      5257  24 002 0           INCR   Q               IN WHICH THEY WERE CALLED.

R0105           RETURN TO CALLER +1 AFTER WAITING THE DT AS ARRIVING IN A.

0106                           5260  0 0006 1  VARDELAY EXTEND
01064  REF   2  LAST 1223      5261  6 5247 0           BZMF   WATLST0-
```

```
 01066  REF 264  LAST 1223     5262  56 002 0             XCH     Q
 0107   REF   2  LAST 1223     5263  54 063 0             TS      WAITADR
 0108   REF  25  LAST 1223     5264  3 0006 1             CA      BBANK             BBANK IS SAVED DURING DELAY.
 0109                          5265  0 0006 1             EXTEND
 0110   REF  17  LAST 1223     5266  04 007 1             ROR     SUPERBNK          ADD SBANK TO BBCON.
 0111   REF 174  LAST 1223     5267  54 001 1             TS      L
 0112   REF   1                5270  3 5273 1             CAF     DELAYEX
 0113   REF   4  LAST 1223     5271  54 061 1             TS      WAITEXIT          GO TO TASKOVER AFTER TASK ENTRY.
 0114   REF   1                5272  1 5244 1             TCF     DLY2

 0115   REF  54  LAST 1089     5273  1 5312 0   DELAYEX   TCF     TASKOVER -2       RETURNS TO TASKOVER
```

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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971  ZEUS     .046  PAGE 1225

L         WAITLIST                                                                 USER'S PAGE NO.  5      E3 S3

R0116     ENDTASK MUST BE ENTERED IN FIXED-FIXED SO IT IS DISTINGUISHABLE BY ITS ADRES ALONE.

 0118     REF  15  LAST 1223   E3,1400                      EBANK=  LST1
 0119     REF   1                    5274   72501 0  ENDTASK -2CADR   SVCT3
 0119     REF   1                    5275   73714 1

 0120     REF  25  LAST 1067         5276  3 0076 0  SVCT3    CA      FLAGWRD2
 0121     REF   3  LAST  827         5277  7 4752 1           MASK    DRFTBIT
 0122                                5300  0 0006 1           EXTEND
 0123     REF  55  LAST 1224         5301  1 5314 0           BZF     TASKOVER
 01231    REF   2  LAST  204         5302  11'335 1           CCS     IMUCADR          DON'T DO NBDONLY IF SOMEONE ELSE IS IN
 01232    REF   1                    5303  1 7703 0           TCF     SVCT3X
 01233                               5304  1 5307 1           TCF     +3
 01234    REF   2  LAST 1225         5305  1 7703 0           TCF     SVCT3X
 01235    REF   3  LAST 1225         5306  1 7703 0           TCF     SVCT3X
 0124     REF   1                    5307  3 7657 1     +3    CAF     PRIO35           COMPENSATE FOR NBD COEFFICIENTS ONLY.
 0125     REF  21  LAST 1013         5310  0 5121 0  NOVACADR TC      NOVAC            ENABLE EVERY 81.93 SECONDS (=GENADR)
 0126     REF   6  LAST  826   E3,1460                      EBANK=  NBDX
 0127     REF   1                    5311   03561 0           2CADR   NBDONLY
 0127     REF   1                    5312   14063 1
 01275    REF  56  LAST 1225         5313  0 5314 1  TSKOVCDR TC      TASKOVER         (=GENADR)
 01276    REF   3  LAST 1202         6000                     SETLOC  FFTAG6
 01277                               7703                     BANK

 01278    REF   1                                             COUNT*  $$/WAIT
 0128     REF  10  LAST  831         7703  0 5255 0  SVCT3X   TC      FIXDELAY         DELAY MAX OF 2 TIMES FOR IMU ZERO
 01282                               7704   00764 1  DEC500   DEC     500              MUST COME AFTER SVCT3X
 01285    REF   2  LAST 1225         7705  0 5276 1           TC      SVCT3            CHECK DRIFT FLAG AGAIN
```

```
L       WAITLIST                                                                      USER'S PAGE NO.   6      E3 53

P0129            BEGIN TASK INSERTION.

 0130   REF   2  LAST 1211   01,2000                       SETLOC EXEC81
 01305                       01,3213                       BANK

 0131   REF   1                                            COUNT* $$/WAIT
 0132   REF   1              01,3213  54 062 1  WAIT2      TS     WAITBANK         BBANK OF CALLING PROGRAM.
 0133   REF   2  LAST  202   01,3214  4 0026 1             CS     TIME3
 0134   REF  30  LAST 1158   01,3215  6 4761 0             AD     BIT8             BIT 8 = OCT 200
 0135   REF 323  LAST 1219   01,3216  10 000 0             CCS    A                TEST 200 - C(TIME3).  IF POSITIVE,
A0136                                           IT MEANS THAT TIME3 OVERFLOW HAS OCCURRED PRIOR TO CS  TIME3 AND THAT
A0137                                           C(TIME3) = T - T1, INSTEAD OF 1.0 - (T1 - T).  THE FOLLOWING FOUR
A0138                                           ORDERS SET C(A) = TD - T1 + 1 IN EITHER CASE.

 0139   REF   2  LAST 1204   01,3217  6 6056 1             AD     OCT40001         OVERFLOW HAS OCCURRED.  SET C(A) =
 0140   REF 324  LAST 1226   01,3220  4 0000 0             CS     A                T - T1 + 1.0 - 201

R0141   NORMAL CASE (C(A) NNZ) YIELDS SAME C(A):  -( -(1.0-(T1-T)) + 200) - 1

 0142   REF   1              01,3221  6 3117 0             AD     OCT40201
 0143   REF 265  LAST 1224   01,3222  6 0002 0             AD     Q                RESULT = TD - T1 + 1.

 0144   REF 325  LAST 1226   01,3223  10 000 0             CCS    A                TEST TD - T1 + 1

 0145   REF  16  LAST 1225   01,3224  6 1400 1             AD     LST1             IF TD - T1 POS, GO TO WTLST5 WITH
 0146   REF   1              01,3225  1 3267 0             TCF    WTLST5           C(A) = (TD - T1) + C(LST1) = TD-T2+1

 0147                        01,3226  13 227 1             NOOP
 0148   REF 266  LAST 1226   01,3227  4 0002 1             CS     Q

R0149   NOTE THAT THIS PROGRAM SECTION IS NEVER ENTERED WHEN T-T1 G/E -1,
R0150   SINCE TD-T1+1 = (TD-T) + (T-T1+1), AND DELTA T = TD-T G/E +1 .  (G/E
R0151   SYMBOL MEANS GREATER THAN OR EQUAL TO).  THUS THERE NEED BE NO CON-
R0152   CERN OVER A PREVIOUS OR IMMINENT OVERFLOW OF TIME3 HERE.

 0153   REF   8  LAST 1087   01,3230  6 4753 1             AD     POS1/2           WHEN TD IS NEXT, FORM QUANTITY
 0154   REF   9  LAST 1226   01,3231  6 4753 1             AD     POS1/2             1.0 - DELTA T = 1.0 - (TD - T)
 0155   REF   3  LAST 1226   01,3232  56 026 0             XCH    TIME3
 0156   REF  12  LAST 1148   01,3233  6 4752 0             AD     NEGMAX
 0157   REF 267  LAST 1226   01,3234  6 0002 0             AD     Q                1.0 - DELTAT T NOW COMPLETE.
 0158                        01,3235  0 0006 1             EXTEND                  ZERO INDEX Q.
 0159                        01,3236  22 007 0             QXCH   7                (ZQ)
```

```
  0160    REF  17  LAST 1226    01,3237  57'400 1  WTLST4    XCH      LST1
  0161    REF  18  LAST 1227    01,3240  57'401 0            XCH      LST1 +1
  0162    REF  19  LAST 1227    01,3241  57'402 0            XCH      LST1 +2
  0163    REF  20  LAST 1227    01,3242  57'403 1            XCH      LST1 +3
  0164    REF  21  LAST 1227    01,3243  57'404 0            XCH      LST1 +4
  0165    REF  22  LAST 1227    01,3244  57'405 1            XCH      LST1 +5
  0166    REF  23  LAST 1227    01,3245  57'406 1            XCH      LST1 +6
  0167    REF  24  LAST 1227    01,3246  57'407 0            XCH      LST1 +7

  0168    REF   3  LAST 1224    01,3247  3 0063 1            CA       WAITADR          (MINOR PART OF TASK CADR HAS BEEN IN L.)
  0169    REF 268  LAST 1226    01,3250  50 002 0            INDEX    Q
  0170                          01,3251  1 3252 0            TCF      +1

  0171    REF  19  LAST  203    01,3252  53'411 0            DXCH     LST2
  0172    REF  20  LAST 1227    01,3253  53'413 1            DXCH     LST2 +2
  0173    REF  21  LAST 1227    01,3254  53'415 1            DXCH     LST2 +4
  0174    REF  22  LAST 1227    01,3255  53'417 0            DXCH     LST2 +6
  0175    REF  23  LAST 1227    01,3256  53'421 0            DXCH     LST2 +8D
  0176    REF  24  LAST 1227    01,3257  53'423 1            DXCH     LST2 +10D        AT END, CHECK THAT C(LST2+10) IS STD
  0177    REF  25  LAST 1227    01,3260  53'425 1            DXCH     LST2 +12D
  0178    REF  26  LAST 1227    01,3261  53'427 0            DXCH     LST2 +14D
  0179    REF  27  LAST 1227    01,3262  53'431 1            DXCH     LST2 +16D
  0180    REF   3  LAST  203    01,3263  6 5274 0            AD       ENDTASK            END ITEM, AS CHECK FOR EXCEEDING
 AC181                                                                                     THE LENGTH OF THE LIST.
  0182                          01,3264  0 0006 1            EXTEND                    DUMMY TASK ADRES SHOULD BE IN FIXED-
  0183    REF   1               01,3265  1 5251 0            BZF      LVWTLIST         FIXED SO ITS ADRES ALONE DISTINGUISHES
  0184    REF   1               01,3266  1 3342 0            TCF      WTABORT          IT.
```

```
L         WAITLIST                                                                          USER'S PAGE NO.  8      E3 S3

 0185   REF 326  LAST 1226   01,3267  10 000 0  WTLST5   CCS    A                    TEST  TD - T2 + 1
 0186   REF  25  LAST 1227   01,3270  6 1401 0           AD     LST1 +1
 0187                        01,3271  1 3275 0           TCF    +4
 0188   REF 138  LAST 1223   01,3272  6 4770 0           AD     ONE
 0189   REF   1              01,3273  0 3347 1           TC     WTLST2
 0190                        01,3274   00001 0           OCT    1

 0191   REF 327  LAST 1228   01,3275  10 000 0  +4       CCS    A                    TEST  TD - T3 + 1
 0192   REF  26  LAST 1228   01,3276  6 1402 0           AD     LST1 +2
 0193                        01,3277  1 3303 0           TCF    +4
 0194   REF 139  LAST 1228   01,3300  6 4770 0           AD     ONE
 0195   REF   2  LAST 1228   01,3301  0 3347 1           TC     WTLST2
 0196                        01,3302   00002 0           OCT    2

 0197   REF 328  LAST 1228   01,3303  10 000 0  +4       CCS    A                    TEST  TD - T4 + 1
 0198   REF  27  LAST 1228   01,3304  6 1403 1           AD     LST1 +3
 0199                        01,3305  1 3311 0           TCF    +4
 0200   REF 140  LAST 1228   01,3306  6 4770 0           AD     ONE
 0201   REF   3  LAST 1228   01,3307  0 3347 1           TC     WTLST2
 0202                        01,3310   00003 1           OCT    3

 0203   REF 329  LAST 1228   01,3311  10 000 0  +4       CCS    A                    TEST  TD - T5 + 1
 0204   REF  28  LAST 1228   01,3312  6 1404 0           AD     LST1 +4
 0205                        01,3313  1 3317 0           TCF    +4
 0206   REF 141  LAST 1228   01,3314  6 4770 0           AD     ONE
 0207   REF   4  LAST 1228   01,3315  0 3347 1           TC     WTLST2
 0208                        01,3316   00004 0           OCT    4

 0209   REF 330  LAST 1228   01,3317  10 000 0  +4       CCS    A                    TEST  TD - T6 + 1
 0210   REF  29  LAST 1228   01,3320  6 1405 1           AD     LST1 +5
 0211                        01,3321  1 3325 1           TCF    +4
 0212   REF 142  LAST 1228   01,3322  6 4770 0           AD     ONE
 0213   REF   5  LAST 1228   01,3323  0 3347 1           TC     WTLST2
 0214                        01,3324   00005 1           OCT    5

 0215   REF 331  LAST 1228   01,3325  10 000 0   +4      CCS    A                    TEST TD - T7 + 1
 0216   REF  30  LAST 1228   01,3326  6 1406 1           AD     LST1 +6
 0217                        01,3327  1 3333 0           TCF    +4
 0218   REF 143  LAST 1228   01,3330  6 4770 0           AD     ONE
 0219   REF   6  LAST 1228   01,3331  0 3347 1           TC     WTLST2
 0220                        01,3332   00006 1           OCT    6
 0221   REF 332  LAST 1228   01,3333  10 000 0    +4       CCS     A
 0222   REF  31  LAST 1228   01,3334  6 1407 0             AD      LST1 +7
 0223                        01,3335  1 3341 0             TCF     +4
 0224   REF 144  LAST 1228   01,3336  6 4770 0             AD      ONE
 0225   REF   7  LAST 1228   01,3337  0 3347 1             TC      WTLST2
 0226                        01,3340   00007 0             OCT     7

 0227   REF 333  LAST 1229   01,3341  10 000 0    +4       CCS     A
 0228   REF   4  LAST 1212   01,3342  0 7706 1  WTABORT   TC      BAILOUT         NO ROOM IN THE INN.
 0229                        01,3343   31203 1             OCT     31203

 0230   REF 145  LAST 1229   01,3344  6 4770 0             AD      ONE
 0231   REF   8  LAST 1229   01,3345  0 3347 1             TC      WTLST2
 0232                        01,3346   00010 0             OCT     10
```

```
R0234   THE ENTRY TO WTLST2 JUST PRECEDING OCT   N  IS FOR T   LE TD LE T     -1.
R0235                                                     N            N+1

R0236   (LE MEANS LESS THAN OR EQUAL TO).  AT ENTRY, C(A) = -(TD - T    + 1)
R0237                                                            N+1

R0238   THE LST1 ENTRY -(T     - T +1) IS TO BE REPLACED BY -(TD - T + 1), AND
R0239                     N+1    N                                N

R0240   THE ENTRY -(T    - TD + 1) IS TO BE INSERTED IMMEDIATELY FOLLOWING.
R0241                N+1

 0242   REF   1                01,3347  54 064 1  WTLST2   TS      WAITTEMP            C(A) = -(TD - T    + 1)
 0243   REF 269  LAST 1227     01,3350  50 002 0           INDEX   Q
 0244                          01,3351  3 0000 1           CAF     0
 0245   REF 270  LAST 1230     01,3352  54 002 1           TS      Q                 INDEX VALUE INTO Q.

 0246   REF 146  LAST 1229     01,3353  3 4770 0           CAF     ONE
 0247   REF   2  LAST 1230     01,3354  6 0064 0           AD      WAITTEMP
 0248   REF 271  LAST 1230     01,3355  50 002 0           INDEX   Q                 C(A) = -(TD - T ) + 1.
 0249   REF  32  LAST 1229     01,3356  27'377 1           ADS     LST1 -1                          N

 0250   REF   3  LAST 1230     01,3357  4 0064 1           CS      WAITTEMP
 0251   REF 272  LAST 1230     01,3360  50 002 0           INDEX   Q
 0252   REF   1                01,3361  1 3237 0           TCF     WTLST4

R0253   C(TIME3) = 1.0 - (T1 - T)

R0254   C(LST1  ) = - (T2 - T1) + 1
R0255   C(LST1+1) = - (T3 - T2) + 1
R0256   C(LST1+2) = - (T4 - T3) + 1
R0257   C(LST1+3) = - (T5 - T4) + 1
R0258   C(LST1+4) = - (T6 - T5) + 1

R0259   C(LST2   ) = 2CADR  TASK1
R0260   C(LST2+2 ) = 2CADR  TASK2
R0261   C(LST2+4 ) = 2CADR  TASK3
R0262   C(LST2+6 ) = 2CADR  TASK4
R0263   C(LST2+8 ) = 2CADR  TASK5
R0264   C(LST2+10) = 2CADR  TASK6
```

```
P0265                ENTERS HERE ON T3 RUPT TO DISPATCH WAITLISTED TASK.

 0266                           01,3362  0 0006 1  T3RUPT    EXTEND
 0267   REF  18  LAST 1224      01,3363  04 007 1            ROR      SUPERBNK        READ CURRENT SUPERBANK VALUE AND
 0268   REF  22  LAST 1096      01,3364  54 016 1            TS       BANKRUPT        SAVE WITH E AND F BANK VALUES.
 0269                           01,3365  0 0006 1            EXTEND
 0270   REF  18  LAST 1096      01,3366  22 012 1            QXCH     QRUPT

 0271   REF  10  LAST 1203      01,3367  3 4751 0  T3RUPT2   CAF      NEG1/2          DISPATCH WAITLIST TASK.
 0272   REF  33  LAST 1230      01,3370  57'407 0            XCH      LST1 +7
 0273   REF  34  LAST 1231      01,3371  57'406 1            XCH      LST1 +6
 0274   REF  35  LAST 1231      01,3372  57'405 1            XCH      LST1 +5
 0275   REF  36  LAST 1231      01,3373  57'404 0            XCH      LST1 +4         1.  MOVE UP LST1 CONTENTS, ENTERING
 0276   REF  37  LAST 1231      01,3374  57'403 1            XCH      LST1 +3             A VALUE OF 1/2 +1 AT THE BOTTOM
 0277   REF  38  LAST 1231      01,3375  57'402 0            XCH      LST1 +2             FOR T6-T5, CORRESPONDING TO THE
 0278   REF  39  LAST 1231      01,3376  57'401 0            XCH      LST1 +1             INTERVAL 81.91 SEC FOR ENDTASK.
 0279   REF  40  LAST 1231      01,3377  57'400 1            XCH      LST1
 0280   REF  35  LAST 1223      01,3400  6 4750 1            AD       POSMAX          2. SET T3 = 1.0 - T2 -T USING LIST 1.
 0281   REF   4  LAST 1226      01,3401  26 026 1            ADS      TIME3           SO T3 WONT TICK DURING UPDATE.
 0282   REF   2  LAST   81      01,3402  55'137 1            TS       RUPTAGN
 0283   REF 245  LAST 1220      01,3403  4 4772 0            CS       ZERO
 0284   REF   3  LAST 1231      01,3404  55'137 1            TS       RUPTAGN         SETS RUPTAGN TO +1 ON OVERFLOW.

 0285                           01,3405  0 0006 1            EXTEND                   DISPATCH TASK.
 0286   REF   4  LAST 1227      01,3406  4 5275 0            DCS      ENDTASK
 0287   REF  28  LAST 1227      01,3407  53'431 1            DXCH     LST2 +16D
 0288   REF  29  LAST 1231      01,3410  53'427 0            DXCH     LST2 +14D
 0289   REF  30  LAST 1231      01,3411  53'425 1            DXCH     LST2 +12D
 0290   REF  31  LAST 1231      01,3412  53'423 1            DXCH     LST2 +10D
 0291   REF  32  LAST 1231      01,3413  53'421 0            DXCH     LST2 +8D
 0292   REF  33  LAST 1231      01,3414  53'417 0            DXCH     LST2 +6
 0293   REF  34  LAST 1231      01,3415  53'415 1            DXCH     LST2 +4
 0294   REF  35  LAST 1231      01,3416  53'413 1            DXCH     LST2 +2
 0295   REF  36  LAST 1231      01,3417  53'411 0            DXCH     LST2

 0296   REF 175  LAST 1224      01,3420  56 001 0            XCH      L
 0297                           01,3421  0 0006 1            EXTEND
 0298   REF  19  LAST 1231      01,3422  01 007 1            WRITE    SUPERBNK        SET SUPERBANK FROM BBCON OF 2CADR
 0299   REF 176  LAST 1231      01,3423  56 001 0            XCH      L               RESTORE TO L FOR DXCH Z.
 0300                           01,3424  52 006 0            DTCB
```

```
P0301           RETURN, AFTER EXECUTION OF T3 OVERFLOW TASK:

 0302   REF   2  LAST 1222        4000                         SETLOC WAITF2
 03025                            5314                         BANK

 0303   REF   2 LAST 1223 TO 1225:     58      58*             COUNT* $$/WAIT
 0304   REF   4  LAST 1231        5314  11'137 1   TASKOVER CCS     RUPTAGN        IF +1 RETURN TO T3RUPT, IF -0 RESUME.
 0305   REF   3  LAST 1223        5315  3 5254 1            CAF     WAITBB
 0306   REF  26  LAST 1224        5316  54 006 0            TS      BBANK
 0307   REF   1                   5317  1 3367 1            TCF     T3RUPT2        DISPATCH NEXT TASK IF IT WAS DUE.

 0308   REF  23  LAST 1231        5320  3 0016 0   SUPERRSM CA      BANKRUPT
 0309                             5321  0 0006 1            EXTEND
 0310   REF  20  LAST 1231        5322  01 007 1            WRITE   SUPERBNK       RESTORE SUPERBANK BEFORE RESUME IS DONE

 0311                             5323  0 0006 1   RESUME   EXTEND
 0312   REF  19  LAST 1231        5324  22 012 1            QXCH    QRUPT
 0313   REF  24  LAST 1232        5325  3 0016 0   NOQRSM   CA      BANKRUPT
 0314   REF  27  LAST 1232        5326  56 006 1    +1      XCH     BBANK
 0315   REF  10  LAST  139        5327  52 011 0   NOQBRSM  DXCH    ARUPT
 03155                            5330  0 0003 1            RELINT
 0316                             5331  5 0017 1            RESUME
```

```
P0317    LONGCALL

R0318    PROGRAM DESCRIPTION                                       DATE- 17 MARCH 1967
R0319    PROGRAM WRITTEN BY W.H. VANDEVER                          LOG SECTION WAITLIST
R0320    MOD BY- R. MELANSON TO ADD DOCUMENTATION          ASSEMBLY SUNDISK REV. 100

R0321    FUNCTIONAL DESCRIPTION-
R0322    LONGCALL IS CALLED WITH THE DELTA TIME ARRIVING IN A,L SCALED AS TIME2,TIME1 WITH THE 2CADR OF THE TASK
R0324    IMMEDIATELY FOLLOWING THE TC LONGCALL.  FOR EXAMPLE, IT MIGHT BE DONE AS FOLLOWS WHERE TIMELOC IS THE NAME OF
R0326    A DP REGISTER CONTAINING A DELTA TIME AND WHERE TASKTODO IS THE NAME OF THE LOCATION AT WHICH LONGCALL IS TO
R0328    START

R0329    CALLING SEQUENCE-
A0330                                                              EXTEND
A0331                                                              DCA     TIMELOC
A0332                                                              TC      LONGCALL
A0333                                                              2CADR   TASKTODO

R0334    NORMAL EXIT MODE-
R0335       1). TC     WAITLIST
R0336       2). DTCB   (TO L+3 OF CALLING ROUTINE 1ST PASS THRU LONGCYCL)
R0337       3). DTCB   (TO TASKOVER ON SUBSEQUENT PASSES THRU LONGCYCL)

R0338    ALARM OR ABORT EXIT MODE-
R0339       NONE

R0340    OUTPUT-
R0341       LONGTIME AND LONGTIME+1 = DELTA TIME
R0342       LONGEXIT AND LONGEXIT+1 = RETURN 2CADR
R0343       LONGCADR AND LONGCADR+1 = TASK 2CADR
R0344       A = SINGLE PRECISION TIME FOR WAITLIST

R0345    ERASABLE INITIALIZATION-
R0346       A = MOST SIGNIFICANT PART OF DELTA TIME
R0347       L = LEAST SIGNIFICANT PART OF DELTA TIME
R0348       Q = ADDRESS OF 2CADR TASK VALUE

R0349    DEBRIS-
R0350       A,Q,L
R0351       LONGCADR AND LONGCADR+1
R0352       LONGEXIT AND LONGEXIT+1
R0353       LONGTIME AND LONGTIME+1

R0354    *** THE FOLLOWING IS TO BE IN FIXED-FIXED AND UNSWITCHED ERRASIBLE ***

 03545   REF   3  LAST 1232        4000                            SETLOC WAITF2
 0355                              5332                            BANK

 03555   REF   3 LAST 1232 TO 1233:     14     72*                 COUNT* $$/WAIT
 0356    REF  41  LAST 1231   E3,1400                              EBANK= LST1
 0357   REF   1                     5332   53'305 1  LONGCALL DXCH    LONGTIME         OBTAIN THE DELTA TIME

 0358                               5333   0 0006 1           EXTEND                   OBTAIN THE 2CADR
 0359   REF 273  LAST 1230          5334   5 0002 0           NDX      Q
 0360                               5335   3 0001 0           DCA      0
 0361   REF   2  LAST 1219          5336   53'301 0           DXCH     LONGCADR

 0362                               5337   0 0006 1           EXTEND                   NOW GO TO THE APPROPRIATE SWITCHED BANK
 0363   REF   1                     5340   3 5343 0           DCA      LGCL2CDR        FOR THE REST OF LONGCALL
 0364                               5341   52 006 0           DTCB

 0365   REF  42  LAST 1233   E3,1400                          EBANK=   LST1
 0366   REF   1                     5342    03425 1  LGCL2CDR 2CADR    LNGCALL2
 0366   REF   1                     5343    02063 0

R0367   *** THE FOLLOWING MAY BE IN A SWITCHED BANK, INCLUDING ITS ERASABLE ***

 0368   REF   3  LAST 1226   01,2000                          SETLOC   EXECB1
 03685                       01,3425                          BANK

 0369   REF   2 LAST 1226 TO 1232:    138    138*             COUNT*   $$/WAIT
 0370   REF   1              01,3425  23'435 1  LNGCALL2 LXCH     LONGEXIT +1      SAVE THE CORRECT BB FOR RETURN
 0371   REF  61  LAST 1223   01,3426  3 4767 0           CA       TWO              OBTAIN THE RETURN ADDRESS
 0372   REF 274  LAST 1234   01,3427  26 0002 1          ADS      Q
 0373   REF   2  LAST 1234   01,3430  55'434 1           TS       LONGEXIT

 03731  REF   2  LAST 1234   01,3431  11'304 0  LGCLNGTM CCS      LONGTIME         TEST FOR NEG. TIME
 03732  REF   1              01,3432  1 3440 0           TCF      LONGCYCL         HI-ORDER POS...OK
 03733                       01,3433  1 3435 1           TCF      +2                        ZERO..TEST LO-ORDER
 03734  REF   3  LAST 1223   01,3434  1 5247 1           TCF      WATLST0-                  NEG...P00D00
 03735  REF   3  LAST 1234   01,3435  3 1305 0           CA       LONGTIME +1               ZERO..TEST LO-ORDER
 03736                       01,3436  0 0006 1           EXTEND
 03737  REF   4  LAST 1234   01,3437  6 5247 0           BZMF     WATLST0-         LO-ORDER ZERO/NEG...P00D00

R0374               *** WAITLIST TASK LONGCYCL ***
 0375                        01,3440  0 0006 1  LONGCYCL EXTEND                    CAN WE SUCCESFULLY TAKE ABOUT 1.25
 0376   REF   1              01,3441  4 3452 0           DCS      DPBIT14          MINUTES OFF OF LONGTIME
 0377   REF   4  LAST 1234   01,3442  21'305 1           DAS      LONGTIME

 0378   REF   5  LAST 1234   01,3443  11'305 1           CCS      LONGTIME +1      THE REASONIBG BEHIND THIS PART IS
 0379   REF   1              01,3444  1 3462 0           TCF      MUCHTIME         INVOLVED, TAKING INTO ACCOUNT THAT THE
A0380                                                                              WORDS MAY NOT BE SIGNED CORRECTED (DP
A0381                                                                              BASIC INSTRUCTIONS
A0382                                                                              DO NOT SIGN CORRECT) AND THAT WE SUBTRAC
A0383                                                                              TED BIT14 (1 OVER HALF THE POS. VALUE
A0384                                                                              REPRESENTIBLE IN SINGLE WORD)
 0385                        01,3445  13 446 0           NOOP                      CAN:T GET HERE    **********
 0386                        01,3446  1 3447 1           TCF      +1
 0387   REF   6  LAST 1234   01,3447  11'304 0           CCS      LONGTIME
 0388   REF   2  LAST 1234   01,3450  1 3462 0           TCF      MUCHTIME
 0389                         01,3451   00000 1  DPBIT14  OCT     00000
 0390                         01,3452   20000 0           OCT     20000

A0391                                                                                  LONGCALL
 0392   REF  59  LAST 1204    01,3453  3 4753 1  LASTTIME CA      BIT14                GET BACK THE CORRECT DELTA TFOR WAITLIST
 0393   REF   7  LAST 1234    01,3454  27'305 1           ADS     LONGTIME +1
 0395   REF  23  LAST 1088    01,3455  0 5223 1           TC      TWIDDLE
 0396   REF   1               01,3456   03142 0           ADRES   GETCADR              THE ENTRY TO OUR LONGCADR
 0399   REF   2  LAST  385    01,3457  3 5313 0  LONGRTRN CA      TSKOVCDR             SET IT UP SO THAT ONLY THE FIRST EXIT IS
 0400   REF   3  LAST 1234    01,3460  53'435 0           DXCH    LONGEXIT             TO THE CALLER OF LONGCALL
 0401                         01,3461  52 006 0           DTCB                         THE REST ARE TO TASKOVER

 0402   REF  60  LAST 1235    01,3462  3 4753 1  MUCHTIME CA      BIT14                WE HAVE OVER OUR ABOUT 1.25 MINUTES
 0404   REF  27  LAST 1077    01,3463  0 5233 0  WTLTCADR TC      WAITLIST             SET UP ANOTHER CYCLE THRU HERE (=GENADR)
 0405   REF  43  LAST 1234    E3,1400                     EBANK=  LST1
 0406   REF   2  LAST 1234    01,3464   03440 1           2CADR   LONGCYCL
 0406                         01,3465   02063 0

 0408   REF   1               01,3466  1 3457 0           TCF     LONGRTRN             NOW EXIT PROPERLY
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L       LATITUDE LONGITUDE SUBROUTINES                                          USER'S PAGE NO.   1      EQ S3

R0001   SUBROUTINE TO CONVERT RAD VECTOR AT GIVEN TIME TO LAT,LONG AND ALT

R0002   CALLING SEQUENCE

R0003     L-1    CALL
R0004     L             LAT-LONG
R0005   SUBROUTINES USED

R0006    R-TO-RP,ARCTAN,SETGAMMA,SETRE
R0007   ERASABLE INIT. REQ.

R0008     AXO,-AYO,AZO,TEPHEM (SET AT LAUNCH TIME)
R0009   ALPHAV = POSITION VECTOR METERS B-29
R0010     MPAC-- TIME  (CSECS B-28)
R0011    ERADFLAG =1, TO COMPUTE EARTH RADIUS, =0 FOR FIXED EARTH RADIUS
R0012    LUNAFLAG=0 FOR EARTH,1 FOR MOON
R0013   OUTPUT

R0014     LATITUDE IN LAT   (REVS. B-0)
R0015     LONGITUDE IN LONG   (REVS. B-0)
R0016   ALTITUDE IN ALT METERS B-29
 0018   REF   1              13,2000                     SETLOC LATLONG
 0019                        13,2453                     BANK

 0020   REF   1                                          COUNT* $$/LT-LG
 0021   REF  18  LAST   911  E4,1551                     EBANK= ALPHAV
 0022                        13,2453   40220 0  LAT-LONG STQ    SETPD
 0023   REF   2  LAST   542  13,2454   02241 1                  INCORPEX
 0024                        13,2455   00001 0                   0D
 0025                        13,2456   24007 0           STOVL  6D              SAVE TIME IN 6-7D FOR R-TO-RP
 0026   REF  19  LAST  1236  13,2457   02152 0                  ALPHAV
 0027                        13,2460   51406 1           PUSH   ABVAL           0-5D= R FOR R-TO-RP
 0028   REF   2  LAST    93  13,2461   16301 1           STODL  ALPHAM          ABS. VALUE OF R FOR ALT FORMULA BELOW
 0029   REF  16  LAST  1206  13,2462   11762 1                  ZEROVEC         SET MPAC=0 FOR EARTH,NON-ZERO FOR MOON
 0030                        13,2463   71414 0           BOFF   COS             USE COS(0) TO GET NON-ZERO IN MPAC
 0031   REF  20  LAST   911  13,2464   01743 0                  LUNAFLAG        0=EARTH,1=MOON
 0032   REF   1              13,2465   26466 1                  CALLRTRP
 0033                        13,2466   77624 1  CALLRTRP CALL
 0034   REF   3  LAST   617  13,2467   55370 0                  R-TO-RP         RP VECTOR CONVERTED FROM R B-29
 0035                        13,2470   77656 1           UNIT                   UNIT RP B-1
 0036   REF  20  LAST  1236  13,2471   36152 1           STCALL ALPHAV          U2= 1/2 SINL FOR SETRE SUBR BELOW
 0037   REF   1              13,2472   35766 0                  SETGAMMA         SET GAMMA=B2/A2 FOR EARTH,=1 FOR MOON
 0038                        13,2473   77624 1           CALL                    SCALED B-1
 0039   REF   3  LAST   762  13,2474   26654 1                  SETRE           CALC RE METERS B-29
 0040                        13,2475   63545 0           DLOAD  DSQ
 0041   REF  21  LAST  1236  13,2476   02152 0                  ALPHAV
 0042                        13,2477   63525 0           PDDL   DSQ
 0043   REF  22  LAST  1236  13,2500   02154 0                  ALPHAV +2
 0044                        13,2501   75415 0           DAD    SQRT
 0045                        13,2502   76405 1           DMP    SL1R
 0046    REF    1               13,2503   00011 1                GAMRP
 0047    REF    7  LAST  892    13,2504   14021 1         STODL  COSTH              COS(LAT) B-1
 0048    REF   23  LAST 1236    13,2505   02156 1                ALPHAV +4
 0049    REF    7  LAST  892    13,2506   34023 1         STCALL SINTH              SIN(LAT) B-1
 0050    REF    1               13,2507   26614 0                ARCTAN
 0051    REF   12  LAST  911    13,2510   14747 0         STODL  LAT                LAT B0
 0052    REF   24  LAST 1237    13,2511   02152 0                ALPHAV
 0053    REF    8  LAST 1237    13,2512   14021 1         STODL  COSTH              COS(LONG) B-1
 0054    REF   25  LAST 1237    13,2513   02154 0                ALPHAV +2
 0055    REF    8  LAST 1237    13,2514   34023 1         STCALL SINTH              SIN(LONG) B-1
 0056    REF    2  LAST 1237    13,2515   26614 0                ARCTAN
 0057    REF   10  LAST  911    13,2516   14751 1         STODL  LONG               LONG. REVS B-0 IN RANGE -1/2 TO 1/2
 0058    REF    3  LAST 1236    13,2517   02301 1                ALPHAM
 0059                           13,2520   77625 0         DSU                       ALT= R-RE METERS B-29
 0060    REF    9  LAST  814    13,2521   02240 0                ERADM
 0061    REF    8  LAST  762    13,2522   34753 1         STCALL ALT                EXIT WITH ALT METERS B-29
 0062    REF    3  LAST 1236    13,2523   02241 1                INCORPEX
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L         LATITUDE LONGITUDE SUBROUTINES                                                  USER'S PAGE NO.   3       E4 S3

R0063     SUBROUTINE TO CONVERT LAT,LONG,ALT AT GIVEN TIME TO RADIUS VECTOR
R0064     CALLING SEQUENCE

R0065       L-1     CALL
R0066       L                 LALOTORV
R0067     SUBROUTINES USED

R0068      SETGAMMA,SETRE,RP-TO-R
R0069     ERASABLE INIT. REQ.

R0070       AXO,AYO,AZO,TEPHEM  SET AT LAUNCH TIME
R0071       LAT-- LATITUDE  (REVS B0)
R0072       LONG-- LONGITUDE  (REVS B0)
R0073     ALT--ALTITUDE (METERS) B-29
R0074       MPAC-- TIME  (CSECS B-28)
R0075       ERADFLAG =1 TO COMPUTE EARTH RADIUS, =0 FOR FIXED EARTH RADIUS
R0076      LUNAFLAG=0 FOR EARTH,1 FOR MOON
R0077     OUTPUT

R0078     R-VECTOR IN ALPHAV (METERS B-29)
 0079                          13,2524   40220 0  LALOTORV STQ     SETPD              LAT,LONG,ALT TO R VECTOR
 0080     REF   4  LAST 1237   13,2525   02241 1                   INCORPEX
 0081                          13,2526   00001 0                   0D
 0082                          13,2527   34007 1           STCALL  6D                 6-7D= TIME FOR RP-TO-R
 0083     REF   2  LAST 1236   13,2530   35766 0                   SETGAMMA           GAMMA=B2/A2 FOR EARTH,1 FOR MOON B-1
 0084                          13,2531   73545 1           DLOAD   SIN                               COS(LONG)COS(LAT) IN MPAC
 0085     REF  13  LAST 1237   13,2532   00747 0                   LAT                     UNIT RP= SIN(LONG)COS(LAT)     2-3D
 0086                          13,2533   65275 1           DMPR    PDDL               PD 2           GAMMA*SIN(LAT)         0-1D
 0087     REF   2  LAST 1237   13,2534   00011 1                   GAMRP
 0088     REF  14  LAST 1238   13,2535   00747 0                   LAT                         0-1D= GAMMA*SIN(LAT) B-2
 0089                          13,2536   65346 0           COS     PDDL               PD 4      2-3D=COS(LAT) B-1 TEMPORARILY
 0090     REF  11  LAST 1237   13,2537   00751 1                   LONG
 0091                          13,2540   57356 0           SIN     DMPR               PD 2
 0092                          13,2541   71525 0           PDDL    COS                PD 4     2-3D=SIN(LONG)COS(LAT) B-2
 0093     REF  15  LAST 1238   13,2542   00747 0                   LAT
 0094                          13,2543   71525 0           PDDL    COS                PD 6      4-5D=COS(LAT) B-1 TEMPORARILY
 0095     REF  12  LAST 1238   13,2544   00751 1                   LONG
 0096                          13,2545   55475 1           DMPR    VDEF               PD 4    MPAC= COS(LONG)COS(LAT) B-2
 0097                          13,2546   41456 0           UNIT    PUSH               0-5D= UNIT RP FOR RP-TO-R SUBR.
 0098     REF  26  LAST 1237   13,2547   36152 1           STCALL  ALPHAV             ALPHAV +4= SINL FOR SETRE SUBR.
 0099     REF   4  LAST 1236   13,2550   26634 1                   SETRE              RE METERS B-29
 0100                          13,2551   43145 0           DLOAD   BOFF               SET MPAC=0 FOR EARTH,NON-ZERO FOR MOON
 0101     REF  17  LAST 1236   13,2552   11762 1                   ZEROVEC
 0102     REF  21  LAST 1236   13,2553   01743 0                   LUNAFLAG
 0103     REF   1              13,2554   26556 0                   CALLRPRT
 0104                          13,2555   77746 1           COS                        USE COS(0) TO GET NON-ZERO IN MPAC
 0105                          13,2556   77624 1  CALLRPRT CALL
 0106     REF   6  LAST  783   13,2557   55345 0                   RP-TO-R            EXIT WITH UNIT R VECTOR IN MPAC
 0107     REF  27  LAST 1238   13,2560   16152 0           STODL   ALPHAV
 0108     REF  10  LAST 1237   13,2561   02240 0                   ERADM
 0109                        13,2562  74215 1            DAD     VXSC            (RE + ALT)(UNIT R) METERS B-30
 0110   REF   9  LAST 1237   13,2563  00753 0                    ALT
 0111   REF  28  LAST 1238   13,2564  02152 0                    ALPHAV
 0112                        13,2565  77772 0            VSL1                    R METERS B-29
 0113   REF  29  LAST 1239   13,2566  36152 1            STCALL  ALPHAV          EXIT WITH R IN METERS B-29
 0114   REF   5  LAST 1238   13,2567  02241 1                    INCORPEX
R0115   SUBROUTINE TO COMPUTE EARTH RADIUS

R0116   INPUT

R0117     1/2 SIN LAT IN ALPHAV +4

R0118   OUTPUT

R0119     EARTH RADIUS IN ERADM AND MPAC  (METERS B-29)

 0120                        13,2570  63545 0  GETERAD   DLOAD   DSQ
 0121   REF  30  LAST 1239   13,2571  02156 1                    ALPHAV +4       SIN**2(L)
 0122                        13,2572  44352 0            SL1     BDSU
 0123   REF   1              13,2573  11760 0                    DP1/2           COS**2(L)
 0124                        13,2574  44275 1            DMPR    BDSU
 0125   REF   1              13,2575  26611 0                    EE
 0126   REF   2  LAST 1239   13,2576  11760 0                    DP1/2
 0127                        13,2577  75465 1            BDDV    SQRT
 0128   REF   1              13,2600  26605 0                    B2XSC
 0129                        13,2601  77622 1            SR4R
 0130   REF  11  LAST 1238   13,2602  02240 0            STORE   ERADM
 0131                        13,2603  77616 0            RVQ

R01311  THE FOLLOWING CONSTANTS WERE COMPUTED WITH A=6378166,B=6356784 METERS
R01312  B2XSC= B**2 SCALED B-51
R01313  B2/A2= B**2/A**2 SCALED B-1
R01314  EE=(1-B**2/A**2) SCALED B-0
 0132                        13,2604  00446 1  B2XSC     2DEC    .0179450689      B**2 SCALED B-51
 0132                        13,2605  00305 1
 0133   REF   6  LAST 1206   04,3757           DP1/2     =       XUNIT
 0134                        13,2606  17711 0  B2/A2     2DEC    .9933064884 B-1  GAMMA= B**2/A**2 B-1
 0134                        13,2607  05254 1
 0135                        13,2610  00155 0  EE        2DEC    6.6935116 E-3    (1-B**2/A**2) B-0
 0135                        13,2611  25250 1
 0136                        13,2612  00302 0  ERAD      2DEC    6373338 B-29     PAD RADIUS
 0136                        13,2613  17755 0
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1        LATITUDE LONGITUDE SUBROUTINES                                         USER'S PAGE NO.  5     E4 S3

P0137    ARCTAN SUBROUTINE

R0138    CALLING SEQUENCE

R0139      SIN THETA IN SINTH B-1
R0140      COS THETA IN COSTH B-1
R0141      CALL ARCTAN

R0142    OUTPUT
R0143      ARCTAN THETA IN MPAC AND THETA B-0 IN RANGE -1/2 TO +1/2


 0144                          13,2614   77600 1  ARCTAN   BOV
 0145    REF   1               13,2615   26616 1                    CLROVFLW
 0146                          13,2616   63545 0  CLROVFLW DLOAD    DSQ
 0147    REF   9  LAST 1237    13,2617   00023 0                    SINTH
 0148                          13,2620   63525 0           PDDL     DSQ
 0149    REF   9  LAST 1237    13,2621   00021 1                    COSTH
 0150                          13,2622   77615 0           DAD
 0151                          13,2623   75454 0           BZE      SQRT
 0152    REF   1               13,2624   26642 0                    ARCTANXX         ATAN=0/0  SET THETA=0
 0153                          13,2625   40065 0           BDDV     BOV
 0154    REF  10  LAST 1240    13,2626   00023 0                    SINTH
 0155    REF   1               13,2627   26647 0                    ATAN=90
 0156                          13,2630   67542 0           SR1      ASIN
 0157    REF   4  LAST  769    13,2631   00025 0           STORE    THETA
 0158                          13,2632   50125 1           PDDL     BMN
 0159    REF  10  LAST 1240    13,2633   00021 1                    COSTH
 0160    REF   1               13,2634   26636 0                    NEGCOS
 0161                          13,2635   43545 1           DLOAD    RVQ
 0162                          13,2636   57545 1  NEGCOS   DLOAD    DCOMP
 0163                          13,2637   43244 1           BPL      DAD
 0164    REF   1               13,2640   26644 0                    NEGOUT
 0165    REF   3  LAST 1239    13,2641   11760 0                    DP1/2
 0166    REF   5  LAST 1240    13,2642   00025 0  ARCTANXX STORE    THETA
 0167                          13,2643   77616 0           RVQ

 0168                          13,2644   52025 1  NEGOUT   DSU      GOTO
 0169    REF   4  LAST 1240    13,2645   11760 0                    DP1/2
 0170    REF   2  LAST 1240    13,2646   26642 0                    ARCTANXX
 0171                          13,2647   75345 1  ATAN=90  DLOAD    SIGN
 0172    REF   1               13,2650   33412 0                    LODP1/4
 0173    REF  11  LAST 1240    13,2651   00023 0                    SINTH
 0174    REF   6  LAST 1240    13,2652   00025 0           STORE    THETA
 0175                          13,2653   77616 0           RVQ

 0176    REF   2  LAST  751    04,3761            2DZERO   =        DPZERO
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R0177    ..... SETGAMMA SUBROUTINE .....
R0178    SUBROUTINE TO SET GAMMA FOR THE LAT-LONG AND LALOTORV SUBROUTINES

R0179     GAMMA = B**2/A**2 FOR EARTH (B-1)
R0180     GAMMA = 1 FOR MOON (B-1)

R0181    CALLING SEQUENCE
R0182     L          CALL
R0183     L+1              SETGAMMA

R0184    INPUT
R0185     LUNAFLAG=0 FOR EARTH,=1 FOR MOON

R0186    OUTPUT
R0187     GAMMA IN GAMRP  (B-1)

 01875  REF   1             16,2000                       SETLOC LATLONG1
 01876                      16,3766                       BANK
 01877  REF   1                                           COUNT* $$/LT-LG

 0188                       16,3766   43145 0  SETGAMMA DLOAD  BOFF             BRANCH FOR EARTH
 0189   REF   1             16,3767   26607 1                  B2/A2            EARTH GAMMA
 0190   REF  22  LAST 1238  16,3770   01743 0                  LUNAFLAG
 0191   REF   1             16,3771   35774 0                  SETGMEX
 0192                       16,3772   77735 0           SLOAD
 0193   REF   1             16,3773   11760 0                  1B1              MOON GAMMA
 0194   REF   3  LAST 1238  16,3774   00011 1  SETGMEX  STORE  GAMRP
 0195                       16,3775   77616 0           RVQ
 0196                          0010            GAMRP    =      8D
 01961  REF   2  LAST 1238  13,2000                     SETLOC LATLONG
 01962                      13,2654                     BANK
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R0197   .....SETRE SUBROUTINE .....
R0198   SUBROUTINE TO SET RE (EARTH OR MOON RADIUS)

R0199   RE= RM FOR MOON
R0200    RE= RREF FOR FIXED EARTH RADIUS OR COMPUTED RF FOR FISCHER ELLIPSOID

R0201   CALLING SEQUENCE
R0202    L          CALL
R0203    L+1                  SETRE

R0204   SUBROUTINES USED
R0205    GETERAD

R0206   INPUT
R0207    ERADFLAG=0 FOR FIXED RE, 1 FOR COMPUTED RE
R0208    ALPHAV +4= 1/2 SINL IF GETERAD IS CALLED
R0209    LUNAFLAG=0 FOR EARTH,=1 FOR MOON

R0210   OUTPUT
R0211    ERADM= 504RM FOR MOON (METERS B-29)
R0212    ERADM= ERAD OR COMPUTED RF FOR EARTH (METERS B-29)

 0213                           13,2654   71220 1  SETRE    STQ     DLOAD
 0214   REF   1                 13,2655   00051 0                   SETREX
 0215   REF   1                 13,2656   26701 0                   504RM
 0216                           13,2657   71214 0           BON     DLOAD            BRANCH FOR MOON
 0217   REF  23  LAST 1241      13,2660   01703 1                   LUNAFLAG
 0218   REF   1                 13,2661   26671 0                   TSTRLSRM
 0219   REF   1                 13,2662   26613 1                   ERAD
 0220                           13,2663   45014 0           BOFF    CALL             ERADFLAG=0 FOR FIXED RE,1 FOR COMPUTED
 0221   REF  12  LAST  911      13,2664   00742 0                   ERADFLAG
 0222   REF   1                 13,2665   26667 1                   SETRXX
 0223   REF   4  LAST  901      13,2666   26570 1                   GETERAD
 0224   REF  12  LAST 1239      13,2667   36240 1  SETRXX   STCALL  ERADM            EXIT WITH RE OR RM METERS B-29
 0225   REF   2  LAST 1242      13,2670   00051 0                   SETREX
 0226                           13,2671   77214 0  TSTRLSRM BON     VLOAD            ERADFLAG=0,SET R0=RLS
 0227   REF  13  LAST 1242      13,2672   00702 1                   ERADFLAG                 =1     R0=RM
 0228   REF   2  LAST 1242      13,2673   26667 1                   SETRXX
 0229   REF   9  LAST  745      13,2674   02026 1                   RLS
 0230                           13,2675   64446 0           ABVAL   SR2R             SCALE FROM B-27 TO B-29
 0231                           13,2676   77650 1           GOTO
 0232   REF   3  LAST 1242      13,2677   26667 1                   SETRXX
 0233   REF  12  LAST  766         0051            SETREX   =       S2
 0234                           13,2700   00065 1  504RM    2DEC    1738090 B-29     METERS B-29 (MOON RADIUS)
 0234                           13,2701   01265 1
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L       PLANETARY INERTIAL ORIENTATION                                                    USER'S PAGE NO.   1       E0 S3

P0001   ..... RP-TO-R SUBROUTINE .....
R0002   SUBROUTINE TO CONVERT RP (VECTOR IN PLANETARY COORDINATE SYSTEM,EITHER
R0003    EARTH-FIXED OR MOON-FIXED) TO R (SAME VECTOR IN THE BASIC REF. SYSTEM)

R0004    R=MT(T)*(RP+LPXRP)    MT= M MATRIX TRANSPOSE

R0005   CALLING SEQUENCE
R0006    L        CALL
R0007    L+1              RP-TO-R

R0008   SUBROUTINES USED
R0009    EARTHMX,MOONMX,EARTFL

R0010      ITEMS AVAILABLE FROM LAUNCH DATA
R0011       504LM= THE LIBRATION VECTOR L OF THE MOON AT TIME TIMSUBL,EXPRESSED
R0012       IN THE MOON-FIXED COORD. SYSTEM    RADIANS  B0
R0013         ITEMS NECESSARY FOR SUBR. USED (SEE DESCRIPTION OF SUBR.)

R0014   INPUT
R0015    MPAC= 0 FOR EARTH,NON-ZERO FOR MOON
R0016    0-5D= RP VECTOR
R0017    6-7D= TIME

R0018   OUTPUT
R0019    MPAC= R VECTOR METERS B-29 FOR EARTH, B-27 FOR MOON

  0020  REF   1                  26,2000                          SETLOC  PLANTIN
  0021                           26,3345                          BANK

  0022  REF   1                                                   COUNT*  $$/LUROT

  0023                           26,3345   46020 1   RP-TO-R    STQ     BHIZ
  0024  REF   1                  26,3346   00050 1                      RPREXIT
  0025  REF   1                  26,3347   55362 0                      RPTORA
  0026                           26,3350   77624 1              CALL                        COMPUTE M MATRIX FOR MOON
  0027  REF   1                  26,3351   55416 1                      MOONMX              LP=LM FOR MOON  RADIANS B0
  0028                           26,3352   77775 1              VLOAD
  0029  REF   1                  26,3353   02012 0                      504LM
  0030                           26,3354   53235 0   RPTORB     VXV     VAD
  0031  REF   1                  26,3355   00001 0                      504RPR
  0032  REF   2  LAST 1243       26,3356   00001 0                      504RPR
  0033                           26,3357   52105 1              VXM     GOTO
  0034  REF   1                  26,3360   00025 0                      MMATRIX             MPAC=R=MT(T)*(RP+LPXRP)
  0035  REF   1                  26,3361   55406 0                      RPRPXXXX            RESET PUSHLOC TO 0 BEFORE EXITING
  0036                           26,3362   77624 1   RPTORA     CALL                        EARTH COMPUTATIONS
  0037  REF   1                  26,3363   55567 0                      EARTHMX             M MATRIX B-1
 A0039                                                                                      AND L VECTOR RADIANS B0
  0040                           26,3364   76521 0              MXV     VSL1                LP=M(T)*L  RAD B-0
  0041  REF   2  LAST 1243       26,3365   00025 0                      MMATRIX
  0042                           26,3366   77650 1              GOTO
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L       PLANETARY INERTIAL ORIENTATION                                        USER'S PAGE NO.  2      E  59
 L043   REF   1               26,3367   55354 0                    RPTORB
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R0044    ..... R-TO-RP SUBROUTINE .....
R0045    SUBROUTINE TO CONVERT R (VECTOR IN REFERENCE COORD. SYSTEM) TO RP
R0046     (VECTOR IN PLANETARY COORD SYSTEM) EITHER EARTH-FIXED OR MOON-FIXED

R0047     RP=M(T)*(R-LXR)

R0048    CALLING SEQUENCE
R0049     L          CALL
R0050     L+1                  R-TO-RP

R0051    SUBROUTINES USED
R0052     EARTHMX,MOONMX,EARTHL

R0053    INPUT
R0054     MPAC= 0 FOR EARTH,NON-ZERO FOR MOON
R0055     0-5D= R VECTOR
R0056     6-7D= TIME

R0057       ITEMS AVAILABLE FROM LAUNCH DATA
R0058        504LM= THE LIBRATION VECTOR L OF THE MOON AT TIME TIMSUBL,EXPRESSED
R0059        IN THE MOON-FIXED COORD. SYSTEM   RADIANS B0
R0060          ITEMS NECESSARY FOR SUBROUTINES USED (SEE DESCRIPTION OF SUBR.)

R0061    OUTPUT
R0062     MPAC=RP VECTOR METERS B-29 FOR EARTH, B-27 FOR MOON

  0063                         26,3370   46020 1  R-TO-RP   STQ     BHIZ
  0064   REF   2  LAST 1243    26,3371   00050 1                    RPREXIT
  0065   REF   1               26,3372   55412 0                    RTORPA
  0066                         26,3373   77624 1            CALL
  0067   REF   2  LAST 1243    26,3374   55416 1                    MOONMX
  0068                         26,3375   61375 1            VLOAD   VXM
  0069   REF   2  LAST 1243    26,3376   02012 0                    504LM            LP=LM
  0070   REF   3  LAST 1243    26,3377   00025 0                    MMATRIX
  0071                         26,3400   77772 0            VSL1                      L=MT(T)*LP  RADIANS B0
  0072                         26,3401   51235 1  RTORPB    VXV     0VSU
  0073   REF   3  LAST 1243    26,3402   00001 0                    504RPR
  0074   REF   4  LAST 1245    26,3403   00001 0                    504RPR
  0075                         26,3404   77721 0            MXV                      M(T)*(R-LXR) B-2
  0076   REF   4  LAST 1245    26,3405   00025 0                    MMATRIX
  0077                         26,3406   40372 0  RPRPXXXX  VSL1    SETPD
  0078                         26,3407   00001 0                    0D
  0079                         26,3410   77650 1            GOTO
  0080   REF   3  LAST 1245    26,3411   00050 1                    RPREXIT
  0081                         26,3412   77624 1  RTORPA    CALL                     EARTH COMPUTATIONS
  0082   REF   2  LAST 1243    26,3413   55567 0                    EARTHMX
  0085                         26,3414   77650 1            GOTO                     MPAC=L=(-AX,-AY,0) RAD B-0
  0086   REF   1               26,3415   55401 1                    RTORPB
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L        PLANETARY INERTIAL ORIENTATION                                                    USER'S PAGE NO.  4      E0 S3

R0087    ..... MOONMX SUBROUTINE .....
R0088    SUBROUTINE TO COMPUTE THE TRANSFORMATION MATRIX M FOR THE MOON

R0089    CALLING SEQUENCE
R0090     L        CALL
R0091     L+1              MOONMX

R0092    SUBROUTINES USED
R0093     NEWANGLE

R0094    INPUT
R0095     6-7D= TIME
R0096        ITEMS AVAILABLE FROM LAUNCH DATA
R0097         BSUBO,BDOT
R0098         TIMSUBO,NODIO,NODDOT,FSUBO,FDOT
R0099         COSI= COS(I) B-1
R0100         SINI= SIN(I) B-1
R0101           I  IS THE ANGLE BETWEEN THE MEAN LUNAR EQUATORIAL PLANE AND THE
R0102           PLANE OF THE ECLIPTIC  (1 DEGREE  32.1 MINUTES)

R0103    OUTPUT
R0104     MMATRIX= 3X3 M MATRIX B-1   (STORED IN VAC AREA)

R0105                          26,3416   40220 0  MOONMX   STQ     SETPD
R0106    REF   1               26,3417   00051 0                   EARTHMXX
R0107                          26,3420   00011 1                   8D
R0108                          26,3421   77770 1           AXT,1                  B REQUIRES SL 0, SL 5 IN NEWANGLE
R0109                          26,3422   00005 1                   5
R0110                          26,3423   65345 0           DLOAD   PDDL           PD 10D               8-9D=BSUBO
R0111    REF   1               26,3424   15647 0                   BSUBO                               10-11D= BDOT
R0112    REF   1               26,3425   15641 0                   BDOT
R0113                          26,3426   45006 0           PUSH    CALL           PD 12D
R0114    REF   1               26,3427   55543 0                   NEWANGLE       EXIT WITH PD 8D AND MPAC= B  REVS B0
R0115                          26,3430   71406 0           PUSH    COS            PD 10D
R0116    REF   1               26,3431   14041 1           STODL   COB            PD 8D     COS(B) B-1
R0117                          26,3432   77756 0           SIN                              SIN(B) B-1
R0118    REF   1               26,3433   14043 0           STODL   SOB                        SETUP INPUT FOR NEWANGLE
R0119    REF   1               26,3434   15645 1                   FSUBO                              8-9D=FSUBO
R0120                          26,3435   41525 0           PDDL    PUSH           PD 10D THEN 12D   10-11D=FDOT
R0121    REF   1               26,3436   15637 1                   FDOT
R0122                          26,3437   45170 0           AXT,1   CALL           F REQUIRES SL 1, SL 6 IN NEWANGLE
R0123                          26,3440   00004 0                   4
R0124    REF   2  LAST 1246    26,3441   55543 0                   NEWANGLE       EXIT WITH PD 8D AND MPAC= F REVS B0
R0125    REF   1               26,3442   14027 1           STODL   AVECTR +2      SAVE F TEMP
R0126    REF   1               26,3443   15643 1                   NODIO                              8-9D=NODIO
R0127                          26,3444   41525 0           PDDL    PUSH           PD 10D THEN 12D   10-11D=NODDOT
R0128    REF   1               26,3445   15635 0                   NODDOT                             MPAC=T
R0129                          26,3446   45170 0           AXT,1   CALL           NODE REQUIRES SL 0, SL 5 IN NEWANGLE
R0130                          26,3447   00005 1                   5
R0131    REF   3  LAST 1246    26,3450   55543 0                   NEWANGLE       EXIT WITH PD 8D AND MPAC= NODI REVS B0
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 0132                        26,3451   71466 0            PUSH   COS             PD 10D   8-9D= NODI  REVS  B0
 0133                        26,3452   77606 1            PUSH                   PD 12D 10-11D= COS(NODI)  B-1
 0134   REF    2 LAST 1246   26,3453   00025 0            STORE  AVECTR
 0135                        26,3454   76405 1            DMP    SL1R
 0136   REF    2 LAST 1246   26,3455   00041 1                   COB                                     COS(NODI)    B-1
 0137   REF    1             26,3456   14035 1            STODL  BVECTR +2       PD 10D   20-25D=AVECTR= COB*SIN(NODI)
 0138                        26,3457   76405 1            DMP    SL1R                                    SOB*SIN(NODI)
 0139   REF    2 LAST 1246   26,3460   00043 0                   SOB
 0140   REF    2 LAST 1247   26,3461   14037 0            STODL  BVECTR +4       PD 8D
 0141                        26,3462   41556 1            SIN    PUSH            PD 10D                 =SIN(NODI)   B-1
 0142                        26,3463   77676 0            DCOMP                           26-31D=BVECTR= COB*COS(NODI)
 0143   REF    3 LAST 1247   26,3464   14033 1            STODL  BVECTR          PD 8D                   SOB*COS(NODI)
 0144   REF    3 LAST 1247   26,3465   00027 1                   AVECTR +2       MOVE F FROM TEMP LOC. TO 504F
 0145   REF    1             26,3466   14007 0            STODL  504F
 0146                        26,3467   76405 1            DMP    SL1R
 0147   REF    3 LAST 1247   26,3470   00041 1                   COB
 0148   REF    4 LAST 1247   26,3471   14027 1            STODL  AVECTR +2
 0149   REF    1             26,3472   00011 1                   SINNODI         8-9D=SIN(NODI)  B-1
 0150                        26,3473   76405 1            DMP    SL1R
 0151   REF    3 LAST 1247   26,3474   00043 0                   SOB
 0152   REF    5 LAST 1247   26,3475   14031 0            STODL  AVECTR +4                                0
 0153   REF   26 LAST  940   26,3476   15336 0                   HI6ZEROS                8-13D= CVECTR= -SOB  B-1
 0154                        26,3477   57525 1            PDDL   DCOMP           PD 10D                  COB
 0155   REF    4 LAST 1247   26,3500   00043 0                   SOB
 0156                        26,3501   63325 0            PDDL   PDVL            PD 12D THEN PD 14D
 0157   REF    4 LAST 1247   26,3502   00041 1                   COB
 0158   REF    4 LAST 1247   26,3503   00033 1                   BVECTR
 0159                        26,3504   63361 0            VXSC   PDVL            PD 20D         BVECTR*SINI  B-2
 0160   REF    1             26,3505   15633 0                   SINI
 0161   REF    1             26,3506   00011 1                   CVECTR
 0162                        26,3507   53361 0            VXSC   VAD             PD 14D         CVECTR*COSI  B-2
 0163   REF    1             26,3510   15631 1                   COSI
 0164                        26,3511   77772 0            VSL1
 0165   REF    5 LAST 1245   26,3512   24041 1            STOVL  MMATRIX +12D    PD 8D  M2=BVECTR*SINI+CVECTR*COSI  B-1
 0166                        26,3513   63361 0            VXSC   PDVL            PD 14D
 0167   REF    2 LAST 1247   26,3514   15633 0                   SINI                           CVECTR*SINI  B-2
 0168   REF    5 LAST 1247   26,3515   00033 1                   BVECTR
 0169                        26,3516   52361 1            VXSC   VSU             PD 8D          BVECTR*COSI  B-2
 0170   REF    2 LAST 1247   26,3517   15631 1                   COSI
 0171                        26,3520   65372 1            VSL1   PDDL            PD 14D
 0172   REF    2 LAST 1247   26,3521   00007 0                   504F            8-13D=DVECTR=BVECTR*COSI-CVECTR*SINI B-1
 0173                        26,3522   74346 0            COS    VXSC
 0174   REF    1             26,3523   00011 1                   DVECTR
 0175                        26,3524   73525 1            PDDL   SIN             PD 20D  14-19D= DVECTR*COSF  B-2
 0176   REF    3 LAST 1247   26,3525   00007 0                   504F
 0177                        26,3526   52361 1            VXSC   VSU             PD 14D          AVECTR*SINF  B-2
 0178   REF    6 LAST 1247   26,3527   00025 0                   AVECTR
 0179                        26,3530   77772 0            VSL1
 0180   REF    6 LAST 1247   26,3531   14033 1            STODL  MMATRIX +6      M1= AVECTR*SINF-DVECTR*COSF  B-1
 0181   REF    4 LAST 1247   26,3532   00007 0                   504F
 0182                          26,3533   74356 1            SIN    VXSC           PD 8D
 0183                          26,3534   71525 0            PDDL   COS            PD 14D  8-13D=DVECTR*SINF B-2
 0184   REF   5  LAST 1247     26,3535   00007 0                   504F
 0185                          26,3536   53361 0            VXSC   VAD            PD 8D          AVECTR*COSF B-2
 0186   REF   7  LAST 1247     26,3537   00025 0                   AVECTR
 0187                          26,3540   57572 0            VSL1   VCOMP
 0188   REF   7  LAST 1247     26,3541   34025 1            STCALL MMATRIX        M0= -(AVECTR*COSF+DVECTR*SINF)  B-1
 0189   REF   2  LAST 1246     26,3542   00051 0                   EARTHMXX
R0190   COMPUTE X=X0+(XDOT)(T+T0)
R0191   8-9D= X0 (REVS B-0),PUSHLOC SET AT 12D
R0192   10-11D=XDOT (REVS/CSEC) SCALED B+23 FOR WEARTH,B+28 FOR NODDOT AND BDOT
R0193                                AND B+27 FOR FDOT
R0194    X1=DIFFERENCE IN 23 AND SCALING OF XDOT,=0 FOR WEARTH,5 FOR NODDOT AND
R0195                                               BDOT AND 4 FOR FDOT
R0196   6-7D=T (CSEC B-28), TIMSUBO= (CSEC B-42 TRIPLE PREC.)

 0197                          26,3543   54345 1  NEWANGLE DLOAD  SR             ENTER PD 12D
 0198                          26,3544   00007 0                   6D
 0199                          26,3545   20617 0                   14D
 0200                          26,3546   72371 1            TAD    TLOAD          CHANGE MODE TO TP
 0201   REF   1                26,3547   01707 0                   TIMSUBO
 0202   REF 642  LAST 1213     26,3550   00135 0                   MPAC
 0203   REF   1                26,3551   14017 1            STODL  TIMSUBM        T+T0 CSEC B-42
 0204   REF   2  LAST 1248     26,3552   00020 0                   TIMSUBM +1
 0205                          26,3553   77605 1            DMP                   PD 10D  MULT BY XDOT IN 10-11D
 0206                          26,3554   43257 0            SL*    DAD            PD 8D   ADD X0 IN 8-9D AFTER SHIFTING
 0207                          26,3555   20206 1                   5,1                    SUCH THAT SCALING IS B-0
 0208                          26,3556   67206 1            PUSH   TLOAD          PD 10D SAVE PARTIAL (X0+XDOT*T) IN 8-9D
 0209   REF   3  LAST 1248     26,3557   00017 1                   TIMSUBM
 0210                          26,3560   41261 1            SL     DMP
 0211                          26,3561   20212 1                   9D
 0212                          26,3562   00013 0                   10D            XDOT
 0213                          26,3563   43257 0            SL*    DAD            PD 8D   SHIFT SUCH THAT THIS PART OF X
 0214                          26,3564   20213 0                   10D,1                  IS SCALED REVS/CSEC B-0
 02141                         26,3565   43400 1  HERE      BOV    RVQ            TURN OFF OVERFLOW IF SET BY SHIFT
 02142  REF   1                26,3566   55565 1                   HERE                 INSTRUCTION BEFORE EXITING
A0215                                                                             MPAC=X=X0+(XDOT)(T+T0)  REVS B0
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R0216   ..... EARTHMX SUBROUTINE .....
R0217   SUBROUTINE TO COMPUTE THE TRANSFORMATION MATRIX M FOR THE EARTH

R0218   CALLING SEQUENCE
R0219   L        CALL
R0220   L+1              EARTHMX

R0221   SUBROUTINES USED
R0222    NEWANGLE

R0223   INPUT
R0224      INPUT AVAILABLE FROM LAUNCH DATA     AZ0  REVS B-0
R0225                                           TEPHEM  CSEC B-42
R0226    6-7D= TIME CSEC B-28

R0227   OUTPUT
R0228    MMATRIX= 3X3 M MATRIX B-1   (STORED IN VAC AREA)

 0229                           26,3567   40220 0  EARTHMX  STQ     SETPD          SET   8-9D=AZ0
 0230   REF   3  LAST 1248      26,3570   00051 0                   EARTHMXX
 0231                           26,3571   00011 1                   8D             10-11D=WEARTH
 0232                           26,3572   77770 1           AXT,1                  FOR SL 5, AND SL 10  IN NEWANGLE
 0233                           26,3573   00000 1                   0
 0234                           26,3574   65345 0           DLOAD   PDDL             LEAVING PD SET AT 12D FOR NEWANGLE
 0235   REF   1                 26,3575   15653 0                   AZ0
 0236   REF   1                 26,3576   15651 1                   WEARTH
 0237                           26,3577   45006 0           PUSH    CALL
 0238   REF   4  LAST 1246      26,3600   55543 0                   NEWANGLE
 0239                           26,3601   41401 1           SETPD   PUSH           18-19D=504AZ
 0240                           26,3602   00023 0                   18D                          COS(AZ) SIN(AZ) 0
 0241                           26,3603   65346 0           COS     PDDL           20-37D=  MMATRIX= -SIN(AZ) COS(AZ) 0 B-1
 0242   REF   1                 26,3604   00023 0                   504AZ                           0       0     1
 0243                           26,3605   65356 1           SIN     PDDL
 0244   REF  27  LAST 1247      26,3606   15336 0                   HI6ZEROS
 0245                           26,3607   73525 1           PDDL    SIN
 0246   REF   2  LAST 1249      26,3610   00023 0                   504AZ
 0247                           26,3611   65276 1           DCOMP   PDDL
 0248   REF   3  LAST 1249      26,3612   00023 0                   504AZ
 0249                           26,3613   63346 0           COS     PDVL
 0250   REF  28  LAST 1249      26,3614   15336 0                   HI6ZEROS
 0251                           26,3615   41525 0           PDDL    PUSH
 0252   REF  11  LAST  889      26,3616   15334 1                   HIDPHALF
R0253   FALL INTO EARTHL
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L         PLANETARY INERTIAL ORIENTATION                                                    USER'S PAGE NO.   8       E0 S3

P0255     ..... EARTHL SUBROUTINE .....
R0256     SUBROUTINE TO COMPUTE L VECTOR FOR EARTH

R0257     CALLING SEQUENCE
R0258      L          CALL
R0259      L+1                  EARTHL

R0260     INPUT
R0261      AXO,AYO SET AT LAUNCH TIME WITH AYO IMMEDIATELY FOLLOWING AXO IN CORE

R0262     OUTPUT
R0263                  -AX
R0264       MPAC=      -AY     RADIANS B-0
R0265                   0

 0266                               26,3617   71201 1  EARTHL    SETPD  DLOAD
 0267                               26,3620   00017 1                   14D
 0268     REF  29  LAST 1249        26,3621   15336 0                   HI6ZEROS
 0269                               26,3622   65325 0            PDDL   PDDL
 0270     REF   2  LAST  634        26,3623   01712 1                   -AYO
 0271     REF   2  LAST  634        26,3624   01714 1                   AXO
 0272                               26,3625   55476 1            DCOMP  VDEF
 0273                               26,3626   77650 1            GOTO
 0274     REF   4  LAST 1249        26,3627   00051 0                   EARTHMXX
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L         PLANETARY INERTIAL ORIENTATION                                           USER'S PAGE NO.   9        EO S3

P0275     CONSTANTS AND ERASABLE ASSIGNMENTS
 0276     REF   5  LAST 1240  04,3757              1B1         =        DP1/2              1  SCALED B-1
 0277                         26,3630   17775 1   COSI       2DEC*   9.996417320 E-1 B-1*     COS (5521.5 SEC.)
 0277                         26,3631   02052 1
 0278                         26,3632   00333 1   SINI       2DEC*   2.676579050 E-2 B-1*     SIN (5521.5 SEC.)
 0278                         26,3633   10374 0
 0279     REF  35  LAST 1193     0050              RPREXIT     =        S1                 R-TO-RP AND RP-TO-R SUBR EXIT
 0280     REF  13  LAST 1242     0051              EARTHMXX    =        S2                 EARTHMX,MOONMX SUBR. EXITS
 0281                            0000              504RPR      =        0D                 6 REGS  R OR RP VECTOR
 0282                            0010              SINNODI     =        8D                 2       SIN(NODI)
 0283                            0010              DVECTR      =        8D                 6       D VECTOR MOON
 0284                            0010              CVECTR      =        8D                 6       C VECTR MOON
 0285                            0022              504AZ       =        18D                2     AZ
 0286                            0016              TIMSUBM     =        14D                3       TIME SUB M (MOON) T+T0 IN GETAZ
 0287                            0016              504LPL      =        14D                6       L OR LP VECTOR
 0288                            0024              AVECTR      =        20D                6       A VECTOR (MOON)
 0289                            0032              BVECTR      =        26D                6       B VECTOR (MOON)
 0290                            0024              MMATRIX     =        20D                18      M MATRIX
 0291                            0040              COB         =        32D                2       COS(B) B-1
 0292                            0042              SOB         =        34D                2       SIN(B) B-1
 0293                            0006              504F        =        6D                 2       F (MOON)
 0297                         26,3634   77665 1   NODDOT     2DEC*   -1.703706128 E-11 B28*                     REV/CS.
 0297                         26,3635   42175 1
 0298                         26,3636   22211 0   FDOT       2DEC*   +4.253263471 E-9  B27*                     REV/CS.
 0298                         26,3637   00636 1
 0299                         26,3640   77777 0   BDOT       2DEC*   -1.145531390 E-16 B28*                     REV/CS.
 0299                         26,3641   77767 1
 0300                         26,3642   34076 1   NODIO      2DEC*   +8.788308600 E-1  B 0*                     REV.
 0300                         26,3643   30363 1
 0301                         26,3644   24760 0   FSUBO      2DEC*   +6.552737750 E-1  B 0*                     REV.
 0301                         26,3645   00133 0
 0302                         26,3646   02052 1   ESUBO      2DEC*   +6.511941688 E-2  B 0*                     REV.
 0302                         26,3647   35250 0
 0303                         26,3650   37116 0   WEARTH     2DEC*   +1.160576171 E-7  B23* REV/CS.
 0303                         26,3651   32631 1
 0304                         26,3652   30576 0   AZO        2DEC*   +7.733314844 E-1  B 0*                     REVS.
 0304                         26,3653   10326 1
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L       MEASUREMENT INCORPORATION                                                          USER'S PAGE NO.   1      E0 S3

R0001     INCORP1--PERFORMS THE SIX DIMENSIONAL STATE VECTOR DEVIATION FOR POSITI
R0002   ON AND VELOCITY OR THE NINE DIMENSIONAL DEVIATION OF POSITION,VELOCITY,A
R0003   ND RADAR OR LANDMARK BIAS.THE OUTPUT OF THE BVECTOR ROUTINE ALONG WITH T
R0004   HE ERROR TRANSITION MATRIX(W) ARE USED AS INPUT TO THE ROUTINE.THE DEVIA
R0005   TION IS OBTAINED BY COMPUTING AN ESTIMATED TRACKING MEASUREMENT FROM THE
R0006   CURRENT STATE VECTOR AND COMPARING IT WITH AN ACTUAL TRACKING MEASUREMEN
R0007   T AND APPLYING A STATISTICAL WEIGHTING VECTOR.
R0008   INPUT
R0009      DMENFLG = 0 6DIMENSIONAL BVECTOR  1= 9DIMENSIONAL
R0010             W = ERROR TRANSITION MATRIX 6X6 OR 9X9
R0011      VARIANCE = VARIANCE (SCALAR)
R0012        DELTAQ = MEASURED DEVIATION(SCALAR)
R0013       BVECTOR = 6 OR 9 DIMENSIONAL BVECTOR

R0014   OUTPUT
R0015        DELTAX = STATE VECTOR DEVIATIONS 6 OR 9 DIMENSIONAL
R0016            ZI = VECTOR USED FOR THE INCORPORATION 6 OR 9 DIMENSIONAL
R0017       GAMMA = SCALAR
R0018       OMEGA = OMEGA WEIGHTING VECTOR 6 OR 9 DIMENTIONAL
R0019   CALLING SEQUENCE
R0020      L  CALL INCORP1

R0021   NORMAL EXIT

R0022      L+1 OF CALLING SEQUENCE

 0024   REF   1                36,2000                         SETLOC MEASINC
 0025                          36,3260                         BANK

 0026   REF   1                                                COUNT* $$/INCOR

 0027   REF  46  LAST  641     E5,1400                         EBANK= W

 0028                          36,3260   77620 0   INCORP1     STQ
 0029   REF  10  LAST  588     36,3261   02310 1                      EGRESS
 0030                          36,3262   66370 0               AXT,1  SSP
 0031                          36,3263   00066 1                      54D
 0032   REF  36  LAST 1251     36,3264   00051 0                      S1
 0033                          36,3265   00022 1                      18D            IX1 = 54  S1= 18
 0034                          36,3266   66374 1               AXT,2  SSP
 0035                          36,3267   00022 1                      18D
 0036   REF  14  LAST 1251     36,3270   00052 0                      S2
 0037                          36,3271   00006 1                      6              IX2 = 18  S2=6
 0038                          36,3272   63775 1   Z123        VLOAD  MXV*
 0039   REF  20  LAST  631     36,3273   03502 0                      BVECTOR        BVECTOR (0)
 0040   REF  47  LAST 1252     36,3274   02467 0                      W +54D,1
 0041   REF   1                36,3275   12731 1               STORE  ZI +18D,2
 0042                          36,3276   77775 1               VLOAD
 0043   REF  21  LAST 1252     36,3277   03510 0                      BVECTOR +6     BVECTOR (1)
 0044                          36,3300   52717 1               MXV*   VAD*
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L        MEASUREMENT INCORPORATION                                                                   USER'S PAGE NO.   2       E5 53

  0045   REF  48  LAST 1252    36,3301    02555 0                       W +108D,1
  0046   REF   2  LAST 1252    36,3302    75046 1                       ZI +18D,2
  0047   REF   3  LAST 1253    36,3303    12731 1              STORE    ZI +18D,2
  0048                         36,3304    77775 1              VLOAD
  0049   REF  22  LAST 1252    36,3305    03516 0                       BVECTOR +12D      BVECTOR (2)
  0050                         36,3306    52717 1              MXV*     VAD*
  0051   REF  49  LAST 1253    36,3307    02643 1                       W +162D,1
  0052   REF   4  LAST 1253    36,3310    75046 1                       ZI +18D,2         B(0)*W+B(1)*(W+54)+B(2)*(W+108)FIRST PAS
  0053   REF   5  LAST 1253    36,3311    12731 1              STORE    ZI +18D,2         ZI THEN Z2 THEN Z3
  0054                         36,3312    77700 0              TIX,1
  0055   REF   1               36,3313    75314 0                       INCOR1
  0056                         36,3314    43104 0   INCOR1     TIX,2    BON
  0057   REF   1               36,3315    75272 1                       Z123              LOOP FOR Z1,Z2,Z3
  0058   REF   7  LAST  631    36,3316    02706 1                       DMENFLG
  0059   REF   1               36,3317    75323 1                       INCOR1A
  0060                         36,3320    77775 1              VLOAD
  0061   REF  36  LAST  898    36,3321    15336 0                       ZEROVECS
  0062   REF   6  LAST 1253    36,3322    02723 0              STORE    ZI +12D
  0063                         36,3323    77201 1   INCOR1A    SETPD    VLOAD
  0064                         36,3324    00001 0                       0
  0065   REF   7  LAST 1253    36,3325    02707 0                       ZI
  0066                         36,3326    47036 1              VSQ      RTB
  0067   REF   7  LAST  927    36,3327    45657 1                       TPMODE
  0068                         36,3330    47515 0              PDVL     VSQ
  0069   REF   8  LAST 1253    36,3331    02715 0                       ZI +6
  0070                         36,3332    76234 0              RTB      TAD
  0071   REF   8  LAST 1253    36,3333    45657 1                       TPMODE
  0072                         36,3334    47515 0              PDVL     VSQ
  0073   REF   9  LAST 1253    36,3335    02723 0                       ZI +12D
  0074                         36,3336    76234 0              RTB      TAD
  0075   REF   9  LAST 1253    36,3337    45657 1                       TPMODE
  0076                         36,3340    77171 0              TAD      AXT,2
  0077   REF  12  LAST  631    36,3341    03526 0                       VARIANCE
  0078                         36,3342    00000 1                       0
  0079   REF   1               36,3343    01114 1              STORE    TRIPA             ZI*2 + Z2*2 + Z3*2 + VARIANCE
  0080                         36,3344    40151 0              TLOAD    BOV
  0081   REF  13  LAST 1253    36,3345    03526 0                       VARIANCE          CLEAR OVFIND
  0082                         36,3346    75347 0                       +1
  0083   REF   1               36,3347    01117 1              STORE    TEMPVAR           TEMP STORAGE FOR VARIANCE
  0084                         36,3350    77654 0              BZE
  0085   REF   1               36,3351    75360 0                       INCOR1C
  0086                         36,3352    40112 1   INCOR1B    SL2      BOV
  0087   REF   2  LAST 1253    36,3353    75360 0                       INCOR1C
  0088   REF   2  LAST 1253    36,3354    01117 1              STORE    TEMPVAR
  0089                         36,3355    52114 1              INCR,2   GOTO
  0090                         36,3356    00001 0              DEC      1
  0091   REF   1               36,3357    75352 1                       INCOR1B
  0092                         36,3360    61551 1   INCOR1C    TLOAD    ROUND
  0093   REF   2  LAST 1253    36,3361    01114 1                       TRIPA
  0094                         36,3362    75405 1              DMP      SQRT
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L       MEASUREMENT INCORPORATION                                                         USER'S PAGE NO.  3      E5 S3

 0095   REF   3  LAST 1253   36,3363   01117 1                        TEMPVAR
 0096                        36,3364   76257 0               SL*      TAD
 0097                        36,3365   57576 1                        0,2
 0098   REF   3  LAST 1253   36,3366   01114 1                        TRIPA
 0099                        36,3367   63101 1               NORM     INCR,2
 0100   REF  30  LAST 1122   36,3370   00050 1                        X2
 0101                        36,3371   77775 1               DEC      -2
 0102                        36,3372   77134 1               SXA,2    AXT,2
 0103   REF   2  LAST   93   36,3373   02214 1                        NORMGAM      NORMALIZATION COUNT -2 FOR GAMMA
 0104                        36,3374   00242 0                        162D
 0105                        36,3375   40265 1               BDDV     SETPD
 0106   REF   9  LAST  938   36,3376   15326 1                        DP1/4TH
 0107                        36,3377   00001 0                        0
 0108   REF   2  LAST  125   36,3400   03436 0               STORE    GAMMA
 0109                        36,3401   60351 0               TLOAD    NORM
 0110   REF   4  LAST 1254   36,3402   01114 1                        TRIPA
 0111   REF  54  LAST 1193   36,3403   00047 1                        X1
 0112                        36,3404   65345 0               DLOAD    PDDL         PD 0-1 = NORM (A)
 0113   REF 643  LAST 1248   36,3405   00155 0                        MPAC
 0114   REF   5  LAST  631   36,3406   03524 1                        DELTAQ
 0115                        36,3407   77701 1               NORM
 0116   REF  37  LAST 1252   36,3410   00051 0                        S1
 0117                        36,3411   70460 1               XSU,1    SR1
 0118   REF  38  LAST 1254   36,3412   00050 1                        S1
 0119                        36,3413   41471 0               DDV      PUSH         PD 0-1 = DELTAQ/A
 01193                       36,3414   77650 1               GOTO
 01196  REF   1              36,3415   63705 0                        NEWZCOMP
 0120                        36,3416   77731 1     -3        SSP
 0121   REF  15  LAST 1252   36,3417   00052 0                        S2
 0122                        36,3420   00066 1                        54D
 0123                        36,3421   60775 1   INCOR2      VLOAD    VXM*         COMPUTE OMEGA1,2,3
 0124   REF  10  LAST 1253   36,3422   02707 0                        ZI
 0125   REF  50  LAST 1253   36,3423   75134 0                        W +162D,2
 0126                        36,3424   77206 0               PUSH     VLOAD
 0127   REF  11  LAST 1254   36,3425   02715 0                        ZI +6
 0128                        36,3426   53303 1               VXM*     VAD
 0129   REF  51  LAST 1254   36,3427   75112 1                        W +180D,2
 0130                        36,3430   77206 0               PUSH     VLOAD
 0131   REF  12  LAST 1254   36,3431   02723 0                        ZI +12D
 0132                        36,3432   53303 1               VXM*     VAD
 0133   REF  52  LAST 1254   36,3433   75070 1                        W +198D,2
 0134                        36,3434   61006 0               PUSH     TIX,2        PD 2-7=OMEGA1,8-13=OMEGA2,14-19=OMEGA3
 0135   REF   1              36,3435   75421 1                        INCOR2
 0136                        36,3436   45575 1               VLOAD    STADR
 0137   REF   2  LAST  125   36,3437   74303 1               STORE    OMEGA +12D
 0138                        36,3440   45575 1               VLOAD    STADR
 0139   REF   3  LAST 1254   36,3441   74311 1               STORE    OMEGA +6
 0140                        36,3442   45575 1               VLOAD    STADR
 0141   REF   4  LAST 1254   36,3443   74317 1               STORE    OMEGA
 0142                        36,3444   77214 0               BON      VLOAD
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L        MEASUREMENT INCORPORATION                                                    USER'S PAGE NO.   4      E5 S3

 0143    REF   8  LAST 1253    36,3445    02706 1                        OMENFLG
 0144    REF   1               36,3446    75451 0                        INCOR2AB
 0145    REF  37  LAST 1253    36,3447    15336 0                        ZEROVECS
 0146    REF   5  LAST 1254    36,3450    03474 0                STORE   OMEGA +12D
 0147                          36,3451    66374 1   INCOR2AB AXT,2   SSP
 0148                          36,3452    00022 1                        18D
 0149    REF  16  LAST 1254    36,3453    00052 0                        S2
 0150                          36,3454    00006 1                        6
 0151                          36,3455    77773 1   INCOR3     VLOAD*
 0152    REF   6  LAST 1255    36,3456    74275 1                        OMEGA +18D,2
 0153                          36,3457    53761 1                VXSC    VSL*
 0154                          36,3460    00001 0                        0                  DELTAQ/A
 0155                          36,3461    20201 0                        0,1
 0156    REF  13  LAST  632    36,3462    11136 0                STORE   DELTAX +18D,2
 0157                          36,3463    77304 0                TIX,2   VLOAD
 0158    REF   1               36,3464    75455 1                        INCOR3
 0159    REF  14  LAST 1255    36,3465    01122 1                        DELTAX +6
 0160                          36,3466    77732 1                VSL3
 0161    REF  15  LAST 1255    36,3467    01122 1                STORE   DELTAX +6
 0162                          36,3470    77650 1                GOTO
 0163    REF  11  LAST 1252    36,3471    02310 1                        EGRESS
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R0164     INCORP2 -INCORPORATES THE COMPUTED STATE VECTOR DEVIATIONS INTO THE
R0165    ESTIMATED STATE VECTOR. THE STATE VECTOR UPDATED MAY BE FOR EITHER THE
R0166    LEM OR THE CSM.DETERMINED BY FLAG VEHUPFLG.(ZERO = LEM) (1 = CSM)
R0167    INPUT
R0168       PERMANENT STATE VECTOR FOR EITHER THE LEM OR CSM
R0169       VEHUPFLG = UPDATE VEHICLE 0=LEM  1=CSM
R0170       W =        ERROR TRANSITION MATRIX
R0171       DELTAX  =  COMPUTED STATE VECTOR DEVIATIONS
R0172       DMENFLG =  SIZE OF W MATRIX (ZERO =6X6) (1=9X9)
R0173       GAMMA   =  SCALAR FOR INCORPORATION
R0174       ZI      =  VECTOR USED IN INCORPORATION
R0175       OMEGA   =  WEIGHTING VECTOR

R0176    OUTPUT
R0177       UPDATED PERMANENT STATE VECTOR

R0178    CALLING SEQUENCE
R0179       L  CALL INCORP2

R0180    NORMAL EXIT
R0181       L+1 OF CALLING SEQUENCE

 0182    REF   1                36,2000                           SETLOC MEASINC1
 0183                           36,3472                           BANK

 0184    REF   2 LAST 1252 TO 1256:    138    138*                COUNT* $$/INCOR

 0185                           36,3472   45020 1  INCORP2  STQ    CALL
 0186    REF  12  LAST 1255     36,3473   02310 1                  EGRESS
 0187    REF  20  LAST  922     36,3474   27516 0                  INTSTALL
 0188                           36,3475   74375 0           VLOAD  VXSC            CALC. GAMMA * OMEGA1,2,3
 0189    REF   7  LAST 1255     36,3476   03460 0                  OMEGA
 0190    REF   3  LAST 1254     36,3477   03456 0                  GAMMA
 0191    REF   2  LAST  101     36,3500   26643 1           STOVL  OMEGAM1
 0192    REF   8  LAST 1256     36,3501   03466 0                  OMEGA +6
 0193                           36,3502   77761 1           VXSC
 0194    REF   4  LAST 1256     36,3503   03456 0                  GAMMA
 0195    REF   2  LAST  101     36,3504   26651 1           STOVL  OMEGAM2
 0196    REF   9  LAST 1256     36,3505   03474 0                  OMEGA +12D
 0197                           36,3506   77761 1           VXSC
 0198    REF   5  LAST 1256     36,3507   03456 0                  GAMMA
 0199    REF   2  LAST  101     36,3510   02657 1           STORE  OMEGAM3
 0200                           36,3511   77776 1           EXIT
 0201    REF   1                36,3512  3 3763 0           CAF    54DD            INITIAL IX 1 SETTING FOR W MATRIX
 0202    REF   2  LAST   79     36,3513  55'107 1           TS     WIXA
 0203    REF   2  LAST   79     36,3514  55'110 1           TS     WIXB
 0204    REF 246  LAST 1231     36,3515  3 4772 1           CAF    ZERO
 0205    REF   2  LAST   79     36,3516  55'111 0           TS     ZIXA            INITIAL IX 2 SETTING FOR Z COMPONENT
 0206    REF   2  LAST   79     36,3517  55'112 0           TS     ZIXB
 0207    REF  95  LAST 1081     36,3520  0 5402 1  FAZA     TC     PHASCHNG
 0208                         36,3521   04022 0              OCT     04022
 0209    REF  67  LAST 1015   36,3522  0 5547 1              TC      UPFLAG
 0210    REF   2  LAST  515   36,3523   00230 0              ADRES   REINTFLG
 0212    REF   3  LAST 1256   36,3524  3 1110 0   FAZA1      CA      WIXB                START FIRST PHASE OF INCORP2
 0213    REF   3  LAST 1256   36,3525  55'107 1              TS      WIXA                 TO UPDATE 6 OR 9 DIM. W MATRIX IN TEMP
 0214    REF   3  LAST 1256   36,3526  3 1112 1              CA      ZIXB
 0215    REF   3  LAST 1256   36,3527  55'111 0              TS      ZIXA
 0216    REF 228  LAST 1129   36,3530  0 6006 1              TC      INTPRET
 0217                         36,3531   75150 1              LXA,1   LXA,2
 0218    REF   4  LAST 1257   36,3532   01107 0                      WIXA
 0219    REF   4  LAST 1257   36,3533   01111 1                      ZIXA
 0220                         36,3534   70731 0              SSP     DLOAD*
 0221    REF  39  LAST 1254   36,3535   00051 0                      S1
 0222                         36,3536   00006 1                      6
 0223    REF  13  LAST 1254   36,3537   75070 1                      ZI,2
 0224                         36,3540   60276 1              DCOMP   NORM                CALC UPPER 3X9 PARTITION OF W MATRIX
 0225    REF  17  LAST 1255   36,3541   00052 0                      S2
 0226                         36,3542   45161 0              VXSC    CALL
 0227    REF   3  LAST 1256   36,3543   02643 1                      OMEGAM1
 0228    REF   1              36,3544   75753 1                      FAZA2
 0235                         36,3545   77653 1              VAD*
 0236    REF  53  LAST 1254   36,3546   02467 0                      W +54D,1
 0237    REF   2  LAST  101   36,3547   02665 0              STORE   HOLDW
 0238                         36,3550   57543 1              DLOAD*  DCOMP               CALC MIDDLE 3X9 PARTITION OF W MATRIX
 0239    REF  14  LAST 1257   36,3551   75070 1                      ZI,2
 0240                         36,3552   74301 0              NORM    VXSC
 0241    REF  18  LAST 1257   36,3553   00052 0                      S2
 0242    REF   3  LAST 1256   36,3554   02651 1                      OMEGAM2
 0243                         36,3555   77624 1              CALL
 0244    REF   2  LAST 1257   36,3556   75753 1                      FAZA2
 0250                         36,3557   77653 1              VAD*
 0251    REF  54  LAST 1257   36,3560   02555 0                      W +108D,1
 0252    REF   3  LAST 1257   36,3561   02673 1              STORE   HOLDW +6
 0253                         36,3562   77614 1              BOFF
 0254    REF   9  LAST 1255   36,3563   02746 0                      DMENFLG             BRANCH IF 6 DIMENSIONAL
 0255    REF   1              36,3564   75577 0                      FAZB
 0256                         36,3565   57543 1              DLOAD*  DCOMP               CALC LOWER 3X9 PARTITION OF W MATRIX
 0257    REF  15  LAST 1257   36,3566   75070 1                      ZI,2
 0258                         36,3567   74301 0              NORM    VXSC
 0259    REF  19  LAST 1257   36,3570   00052 0                      S2
 0260    REF   3  LAST 1256   36,3571   02657 1                      OMEGAM3
 0261                         36,3572   77624 1              CALL
 0262    REF   3  LAST 1257   36,3573   75753 1                      FAZA2
 0268                         36,3574   77653 1              VAD*
 0269    REF  55  LAST 1257   36,3575   02643 1                      W +162D,1
 0270    REF   4  LAST 1257   36,3576   02701 0              STORE   HOLDW +12D
 0271                         36,3577   77624 1   FAZB       CALL
 0272    REF  22  LAST  631   36,3600   22327 1                      GRP2PC
 0273                         36,3601   77776 1              EXIT
 0274    REF   5  LAST 1257   36,3602  3 1107 0   FAZB1      CA      WIXA                START 2ND PHASE OF INCORP2 TO TRANSFER
 0275   REF   1                36,3603  6 3764 1            AD      6DD          TEMP REG TO PERM W MATRIX
 0276   REF   4  LAST 1257     36,3604  55'110 1            TS      WIXB
 0277   REF   5  LAST 1257     36,3605  3 1111 1            CA      ZIXA
 0278   REF   1                36,3606  6 7701 0            AD      MINUS2
 0279   REF   4  LAST 1257     36,3607  55'112 0            TS      ZIXB
 0280   REF 229  LAST 1257     36,3610  0 6006 1            TC      INTPRET
 0281                          36,3611   66350 1            LXA,1   SSP
 0282   REF   6  LAST 1257     36,3612   01107 0                    WIXA
 0283   REF  40  LAST 1257     36,3613   00051 0                    S1
 0284                          36,3614   00006 1                    6
 0285                          36,3615   77775 1            VLOAD
 0286   REF   5  LAST 1257     36,3616   02665 0                    HOLDW
 0287   REF  56  LAST 1257     36,3617   06467 1            STORE   W +54D,1
 0288                          36,3620   77775 1            VLOAD
 0289   REF   6  LAST 1258     36,3621   02673 1                    HOLDW +6
 0290   REF  57  LAST 1258     36,3622   06555 1            STORE   W +108D,1
 0291                          36,3623   77214 0            BOFF    VLOAD
 0292   REF  10  LAST 1257     36,3624   02746 0                    DMENFLG
 0293   REF   1                36,3625   75635 0                    FAZB5
 0294   REF   7  LAST 1258     36,3626   02701 0                    HOLDW +12D
 0295   REF  58  LAST 1258     36,3627   06643 0            STORE   W +162D,1
 0296                          36,3630   52100 1  FAZB2     TIX,1   GOTO
 0297                          36,3631   75633 0                    +2
 0298   REF   1                36,3632   75643 1                    FAZC         DONE WITH W MATRIX. UPDATE STATE VECTOR
 0299                          36,3633   77634 0            RTB
 0300   REF   1                36,3634   75520 1                    FAZA
 0301                          36,3635   43335 0  FAZB5     SLOAD   DAD
 0302   REF   5  LAST 1258     36,3636   01113 0                    ZIXB
 0303   REF   1                36,3637   35766 0                    12DD
 0304                          36,3640   52030 0            BHIZ    GOTO
 0305   REF   2  LAST 1258     36,3641   75643 1                    FAZC
 0306   REF   1                36,3642   75630 0                    FAZB2
 0307                          36,3643   77624 1  FAZC      CALL
 0308   REF  23  LAST 1257     36,3644   22327 1                    GRP2PC
 0309                          36,3645   53375 0            VLOAD   VAD          START 3RD PHASE OF INCORP2
 0310   REF   8  LAST  618     36,3646   01701 0                    X789         7TH,8TH,9TH,COMPONENT OF STATE VECTOR
 0311   REF  16  LAST 1255     36,3647   01130 1                    DELTAX +12D  INCORPORATION FOR X789
 0312   REF   2  LAST  125     36,3650   03450 0            STORE   TX789
 0313                          36,3651   47014 1            BON     RTB
 0314   REF  10  LAST  632     36,3652   00707 1                    VEHUPFLG
 0315   REF   1                36,3653   75743 0                    DOCSM
 0316   REF   1                36,3654   27070 0                    MOVEPLEM
 0317                          36,3655   77004 0  FAZAB     BOVB    AXT,2
 0318   REF   9  LAST  933     36,3656   57544 0                    TCDANZIG
 0319                          36,3657   00000 1                    0
 0320                          36,3660   77014 1            BOFF    AXT,2
 0321   REF   7  LAST  584     36,3661   04343 1                    MOONTHIS
 0322                          36,3662   75664 1                    +2
 0323                          36,3663   00002 0                    2
 0324                          36,3664   53775 1            VLOAD   VSR*
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L        MEASUREMENT INCORPORATION                                                              USER'S PAGE NO.   8      E5 S3

 0325   REF  17  LAST 1258   36,3665   01114 1                      DELTAX         B27 IF MOON ORBIT, B29 IF EARTH
 0326                        36,3666   57205 1                      0 -7,2
 0327                        36,3667   40055 0             VAD      BOV
 0328   REF   4  LAST  301   36,3670   01521 0                      TDELTAV
 0329   REF   1              36,3671   75703 1                      FAZAB1
 0330   REF   5  LAST 1259   36,3672   25521 0             STOVL    TDELTAV
 0331   REF  18  LAST 1259   36,3673   01122 1                      DELTAX +6      B5 IF MOON ORBIT, B7 IF EARTH
 0332                        36,3674   53257 1             VSR*     VAD
 0333                        36,3675   57202 0                      0 -4,2
 0334   REF   4  LAST  302   36,3676   01527 0                      TNUV
 0335                        36,3677   77600 1             BOV
 0336   REF   1              36,3700   75707 0                      FAZAB2
 0337   REF   5  LAST 1259   36,3701   35527 1             STCALL   TNUV
 0338   REF   1              36,3702   75716 0                      FAZAB3
 0339                        36,3703   53375 0   FAZAB1    VLOAD    VAD
 0340   REF  13  LAST  922   36,3704   01535 0                      RCV
 0341   REF  19  LAST 1259   36,3705   01114 1                      DELTAX
 0342   REF  14  LAST 1259   36,3706   01535 0             STORE    RCV
 0343                        36,3707   53375 0   FAZAB2    VLOAD    VAD
 0344   REF  12  LAST  922   36,3710   01543 1                      VCV
 0345   REF  20  LAST 1259   36,3711   01122 1                      DELTAX +6
 0346   REF  13  LAST 1259   36,3712   01543 1             STORE    VCV
 0347                        36,3713   45134 0             SXA,2    CALL
 0348   REF   3  LAST  274   36,3714   02150 1                      PBODY
 0349   REF   1              36,3715   23420 0                      RECTIFY
 03491                       36,3716   77624 1   FAZAB3    CALL
 03492  REF  24  LAST 1258   36,3717   22327 1                      GRP2PC
 0350                        36,3720   47014 1             BON      RTB
 0351   REF  11  LAST 1258   36,3721   00707 1                      VEHUPFLG
 0352   REF   1              36,3722   75746 0                      DOCSM1
 0353   REF   1              36,3723   27047 1                      MOVEALEM
 0354                        36,3724   77624 1             CALL
 0355   REF   2  LAST  274   36,3725   20264 0                      SVDWN2         STORE DOWNLINK STATE VECTOR
 0356                        36,3726   77624 1   FAZAB4    CALL
 0357   REF  25  LAST 1259   36,3727   22327 1                      GRP2PC         PHASE CHANGE
 0358                        36,3730   77214 0             BOFF     VLOAD
 0359   REF  11  LAST 1258   36,3731   02746 0                      DMENFLG
 0360   REF   1              36,3732   75735 1                      FAZAB5         6 DIMENSIONAL
 0361   REF   3  LAST 1258   36,3733   03450 0                      TX789          9 DIMENSIONAL
 0362   REF   9  LAST 1258   36,3734   01701 0             STORE    X789
 0363                        36,3735   66150 0   FAZAB5    LXA,1    SXA,1
 0364   REF  13  LAST 1256   36,3736   02310 1                      EGRESS
 0365   REF   8  LAST 1196   36,3737   00052 0                      QPRET
 0366                        36,3740   77776 1             EXIT
 0367   REF  55  LAST 1068   36,3741 0 4655 0              TC       POSTJUMP       EXIT
 0368   REF   2  LAST  642   36,3742   27527 1             CADR     INTWAKE
 0369                        36,3743   52034 1   DOCSM     RTB      GOTO
 0370   REF   1              36,3744   27023 0                      MOVEPCSM
 0371   REF   1              36,3745   75655 0                      FAZAB
 0372                        36,3746   45034 1   DOCSM1    RTB      CALL
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  0373    REF   2  LAST   35   36,3747   26774 1                    MOVEACSM
  0374    REF   2  LAST  274   36,3750   20240 0                    SVDWN1            STORE DOWNLINK STATE VECTOR
  0375                         36,3751   77650 1           GOTO
  0376    REF   1              36,3752   75726 0                    FAZAB4
  03761                        36,3753   71124 0  FAZA2    XCHX,2 LXC,2
  03762   REF  20  LAST 1257   36,3754   00051 0                    S2
  03763   REF  31  LAST 1254   36,3755   00047 1                    X2
  03764                        36,3756   53674 1           XAD,2    VSL*
  03765   REF   3  LAST 1254   36,3757   02214 1                    NORMGAM
  03766                        36,3760   57576 1                    0,2
  03767                        36,3761   43524 0           XCHX,2 RVQ
  03768   REF  21  LAST 1260   36,3762   00051 0                    S2
  0377    REF  38  LAST 1255   26,3335            ZEROD    =        ZEROVECS
  0378                         36,3763   00066 1  54DD     DEC      54
  0379                         36,3764   77771 0  6DD      DEC      -6
  0380                         36,3765   00014 1  12DD     DEC      12
R0400


  04005   REF   1              31,2000                     SETLOC MEASINC3
  0401                         31,3705                     BANK
  0402    REF   1                                          COUNT* $$/INCOR

  0403                         31,3705   51575 1  NEWZCOMP VLOAD    ABVAL
  0404    REF  16  LAST 1257   31,3706   02707 0                    ZI
  0405    REF   1              31,3707   24045 0           STOVL    NORMZI
  0406    REF  17  LAST 1260   31,3710   02715 0                    ZI +6
  0407                         31,3711   41446 1           ABVAL    PUSH
  0408                         31,3712   50025 0           DSU      BMN
  0409    REF   2  LAST 1260   31,3713   00045 0                    NORMZI
  0410                         31,3714   63717 0                    +3
  0411                         31,3715   45545 1           DLOAD    STADR
  0412    REF   3  LAST 1260   31,3716   77732 1           STORE    NORMZI
  0413                         31,3717   51575 1           VLOAD    ABVAL
  0414    REF  18  LAST 1260   31,3720   02723 0                    ZI +12D
  0415                         31,3721   45206 1           PUSH     DSU
  0416    REF   4  LAST 1260   31,3722   00045 0                    NORMZI
  0417                         31,3723   71240 1           BMN      DLOAD
  0418    REF   1              31,3724   63730 0                    NEWZCMP1
  04185                        31,3725   77626 0           STADR
  0419    REF   5  LAST 1260   31,3726   43732 0           STCALL NORMZI            LARGEST ABVAL
  0420    REF   2  LAST 1260   31,3727   63730 0                    NEWZCMP1

  0423                         31,3730   66145 1  NEWZCMP1 DLOAD    SXA,1
  0424    REF   6  LAST 1260   31,3731   00045 0                    NORMZI
  0425    REF   7  LAST 1260   31,3732   00044 1                    NORMZI            SAVE X1
  0426                         31,3733   62101 0           NORM     INCR,1
  0427    REF  55  LAST 1254   31,3734   00047 1                    X1
  0428                         31,3735   00002 0           DEC      2
  0429                         31,3736   53775 1           VLOAD    VSL*
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0430  REF 19  LAST 1260   31,3737   02707 0                    ZI
0431                      31,3740   20201 0                    0,1
0432  REF 20  LAST 1261   31,3741   26707 0             STOVL  ZI
0433  REF 21  LAST 1261   31,3742   02715 0                    ZI +6
0434                      31,3743   77657 0             VSL*
0435                      31,3744   20201 0                    0,1
0436  REF 22  LAST 1261   31,3745   26715 0             STOVL  ZI +6
0437  REF 23  LAST 1261   31,3746   02723 0                    ZI +12D
0438                      31,3747   66057 0             VSL*   SXA,1
0439                      31,3750   20201 0                    0,1
0440  REF  8  LAST 1260   31,3751   00045 0                    NORMZI +1         SAVE SHIFT
0441  REF 24  LAST 1261   31,3752   02723 0             STORE  ZI +12D
0442                      31,3753   54150 1             LXA,1  XSU,1
0443  REF  4  LAST 1260   31,3754   02214 1                    NORMGAM
0444  REF  9  LAST 1261   31,3755   00045 0                    NORMZI +1
0445                      31,3756   77660 1             XSU,1
0446  REF 10  LAST 1261   31,3757   00045 0                    NORMZI +1
0447                      31,3760   70130 1             SXA,1  LXC,1
0448  REF  5  LAST 1261   31,3761   02214 1                    NORMGAM
0449  REF 11  LAST 1261   31,3762   00045 0                    NORMZI +1
0450                      31,3763   40276 0             XAD,1  SETPD
0451  REF 12  LAST 1261   31,3764   00044 1                    NORMZI
0452                      31,3765   00003 1                    2D
0453                      31,3766   77650 1             GOTO
0454  REF  2  LAST 1254   31,3767   75416 0                    INCOR2 -3
0455                          0044           NORMZI     =      36D
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L      CONIC SUBROUTINES                                                     USER'S PAGE NO.   1      E0 S3

R0001  PROGRAM DESCRIPTION - ENTIRE CONIC SUBROUTINE LOG SECTION                    DATE - 1 SEPTEMBER 1967
R0003  MOD NO. - 0                                                                  LOG SECTION - CONIC SUBROUTINES
R0005  MOD BY KRAUSE                                                                ASSEMBLY - COLOSSUS REVISION 88
R0007

R0008  FUNCTIONAL DESCRIPTION -

R0009       THE FOLLOWING SET OF SUBROUTINES SOLVE VARIOUS PROBLEMS INVOLVING THE TRAJECTORY PRODUCED BY A CENTRAL
R0011  INVERSE-SQUARE FORCE ACTING ON A POINT MASS, AS OUTLINED IN THE CMC AND LGC LUNAR LANDING MISSION GSOP, SECTION
R0013  5.5.1.2.  A GENERAL USAGE POINT-OF-VIEW WAS TAKEN IN FORMULATING, MECHANIZING, AND SCALING THE SUBROUTINES,
R0015  RATHER THAN OPTIMIZING EACH FOR A PARTICULAR USE.  THEREFORE, MULTIPLE USAGE CAN BE MADE OF THE SUBROUTINES
R0017  INVOLVING ANY REALISTIC SET OF CONSTRAINTS.  IT SHOULD BE NOTED THAT ONLY ONE SET OF CODING IS USED, WHETHER THE
R0019  EARTH, MOON, OR ANY OTHER CELESTIAL BODY IS SPECIFIED AS THE CENTRAL BODY OF THE PROBLEM, PROVIDED ONE OBSERVES
R0021  THE INHERENT SCALE CHANGE REQUIRED IN POSITION, VELOCITY, MU, AND TIME, AS OUTLINED IN MISSION PROGRAMMING
R0023  DEFINITION MEMO NO. 10.  THIS CAN BE ACCOMPLISHED BY SIMPLY ADDING TO THE MUTABLE AND INITIALIZING THE SUBROU-
R0025  TINES APPROPRIATELY.
R0026       DUE TO THE UNIFORMITY OF THE EQUATIONS INVOLVED, CODING WAS MINIMIZED BY TREATING INDIVIDUAL EQUATIONS AND
R0028  BLOCKS OF EQUATIONS AS SUBROUTINES OF LOWER RANK WHENEVER POSSIBLE.  AS A RESULT, THREE BY-PRODUCTS SUBROUTINES,
R0030  DIRECTLY USABLE AS INDEPENDENT SUBROUTINES, WERE GENERATED.

R0031  RESTRICTIONS -

R0032       THE ONLY LIMITATION IN THE SCOPE OF PROBLEM WHICH CAN BE SOLVED BY A PARTICULAR SUBROUTINE IS THE SCALING
R0034  LIMIT OF EACH PARAMETER AS SPECIFIED IN THE GSOP.  THESE SCALING LIMITS WERE CHOSEN SO THAT ALL FEASIBLE TRAJEC-
R0036  TORIES COULD BE HANDLED.
R0037       SINCE THE SUBROUTINES (EXCEPT KEPLER) USE COMMON SUBROUTINES OF LOWER RANK WHICH USE ERASABLE OTHER THAN
R0039  THE PUSHLIST (DUE TO ITS LIMITED SIZE) AND COMMON INTERPRETIVE SWITCHES, THE CONIC SUBROUTINES CANNOT BE ALLOWED
R0041  TO INTERRUPT EACH OTHER.  IT IS UP TO THE USER TO GUARANTEE THIS CONDITION.
R0043
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R0044   PROGRAM DESCRIPTION - KEPLER SUBROUTINE                                DATE - 11 OCTOBER 1967
R0046   MOD NO. -1                                                                LOG SECTION - CONIC SUBROUTINES
R0048   MOD BY KRAUSE                                                          ASSEMBLY - COLOSSUS 103 AND SUNDANCE 222
R0050   MOD NO. - 2  (AUGUST 1968) BY ROBERTSON: TO PERMIT BACKDATING BY MORE THAN ONE ORBITAL PERIOD.

R00502  MOD NO. - 3  (DEC 1968) BY ROBERTSON: SUPPRESSION OF X-MODULO-ING

R00503  MOD. NO. - 4  (JAN 1969) BY ROBERTSON: CLEAR OVFIND AT KEPLER ENTRY

R0051   FUNCTIONAL DESCRIPTION -
R0052        THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR AND THE DESIRED TRANSFER TIME THROUGH WHICH THE STATE IS TO
R0054   BE UPDATED ALONG A CONIC TRAJECTORY, COMPUTES THE NEW, UPDATED STATE VECTOR.  THE TRAJECTORY MAY BE ANY CONIC
R0056   SECTION - CIRCULAR, ELLIPTIC, PARABOLIC, HYPERBOLIC, OR RECTILINEAR WITH RESPECT TO THE EARTH OR THE MOON.  THE
R0058   USE OF THE SUBROUTINE CAN BE EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT
R0060   INTRODUCING ANY CODING CHANGES, ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.  AN ITERA-
R0062   TION TECHNIQUE IS UTILIZED IN THE COMPUTATION.
R0063        IF A NEGATIVE TIME-OF-FLIGHT IS INPUT, THE PROGRAM WILL SOLVE FOR THE STATE WHICH WOULD BE PRODUCED BY
R0065   EXTRAPOLATING THE POSITION BACKWARD IN TIME.
R00651       IF THE ABSOLUTE VALUE OF THE DESIRED TRANSFER TIME EXCEEDS THE ORBITAL PERIOD, THE SUBROUTINE, THROUGH A
R00653  MODULAR TECHNIQUE, WILL COMPUTE THE STATE CORRESPONDING TO THE DESIRED TIME (WHETHER POSITIVE OR NEGATIVE).
R0066

R0067   THE RESTRICTIONS ARE -
R0068        1. (PREVIOUS RESTRICTION ON THE NEGATIVE DESIRED TRANSFER TIME IS NOW DELETED.)
R0071        2.  THE PARAMETERS IN THE PROBLEM CANNOT EXCEED THEIR SCALING LIMITS AS SPECIFIED IN THE GSOP.  IF
R0073   ANY OF THESE LIMITS ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.
R0075

R0076        THE NUMBER OF ITERATIONS AND, THEREFORE, THE COMPUTATION SPEED IS DEPENDENT ON THE ACCURACY OF THE
R0078   GUESS, XKEPNEW.  THE AGC COMPUTATION TIME IS APPROXIMATELY .061 SECONDS FOR INITIALIZATION, .065 SECONDS FOR THE
R0080   FINAL COMPUTATIONS, PLUS .083 SECONDS FOR EACH ITERATION.
R0081


R0082   REFERENCES -
R0083        R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP, SECTION 5.5, SGA
R0085   MEMO 67-4.
R0086


R0087   INPUT - ERASABLE INITIALIZATION REQUIRED

R0088            * SCALE FACTOR *
R0089   VARIABLE*IN POWERS OF 2*                          DESCRIPTION AND REMARKS
R0090   --------*--------------*                          -----------------------
R0091   RRECT    * +29 FOR EARTH*UP INITIAL POSITION VECTOR IN METERS
R0092            * +27 FOR MOON *
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R0093   VRECT   * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
R0094           * +5 FOR MOON  *
R0095   X1 (38D)* NONE         *INDEX REGISTER SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0097           *              *RESPECTIVELY, IS THE CENTRAL BODY
R0098   TAU.    * +28          *DESIRED TRANSFER TIME IN CENTISECONDS (DP)
R00987          *              *    MAY BE POS OR NEG AND ABSOLUTE VALUE MAY BE GREATER OR LESS THAN ONE ORBITAL PERIOD.
R0099   XKEPNEW * +17 FOR EARTH*DP GUESS OF ROOT X OF KEPLERS EQN IN SQRT(METERS). SIGN SHOULD AGREE WITH THAT OF TAU.
R0100           * +16 FOR MOON *    AND ABS VALUE SHOULD BE LESS THAN THAT CORRESPONDING TO A PERIOD,VIZ, 2PI SQRT(SEMI-
R0101           *              *    MAJOR AXIS),FOR SPEED OF CONVERGENCE,BUT IF EITHER CONDITION FAILS, XKEPNEW IS RESET
R01017          *              *    BY KEPLER TO A POOR BUT VALID GUESS.
R0102   TC      * +28          *DP PREV. VALUE OF TIME IN CENTISECS.  MUST BE LESS THAN ONE ORBITAL PERIOD.
R0103   XPREV   * +17 FOR EARTH*DP PREV. VALUE OF X IN SQRT(METERS).  MUST BE LESS THAN AN X CORRESPONDING TO ONE
R0105           * +16 FOR MOON *    ORBITAL PERIOD,VIZ,2PI SQRT(SEMI-MAJOR AXIS)
R0106

R0107   SUBROUTINES CALLED -
R0108        DELTIME
R0109

R0110   CALLING SEQUENCE AND NORMAL EXIT MODES -

R0111   KEPRTN-2 GOTO                       MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0113   KEPRTN-1          KEPLER            RETURNS WITH XPREV IN MPAC. PL IS AT 0.
R0114   KEPRTN   ...                        CONTINUE

R0115   KEPLER MUST NOT BE CALLED DIRECTLY SINCE AN INTERRUPTION OF IT WOULD DESTROY THE ERASABLES IT NEEDS TO COMPLETE
R0117   THE INTERRUPTED JOB.  THEREFORE THE USER MUST CALL CSMCONIC OR LEMCONIC WHICH GUARANTEES NO INTERRUPTS AND WHICH
R0119   ALSO CALLS KEPPREP TO COMPUTE A GUESS OF XKEPNEW.
R0120

R0121   ABORT EXIT MODES -
R0122        NONE
R0123

R0124   OUTPUT -

R0125           * SCALE FACTOR *
R0126   VARIABLE*IN POWERS OF 2*                            DESCRIPTION AND REMARKS
R0127   --------*--------------*                            -----------------------
R0128   RCV     * +29 FOR EARTH*DP TERMINAL POSITION VECTOR IN METERS
R0129           * +27 FOR MOON *
R0130   VCV     * +7 FOR EARTH *DP TERMINAL VELOCITY VECTOR IN METERS/CENTISEC
R0131           * +5 FOR MOON  *
R0132   TC      * +28          *DP TRANSFER TIME IN CENTISECS TO WHICH KEPLER CONVERGED. ALWAYS LESS THAN ONE PERIOD.
R0134   XPREV   * +17 FOR EARTH*DP VALUE OF X IN SQRT(METERS) TO WHCIH KEPLER CONVERGED. ALWAYS LESS THAN THE X
R0136           * +16 FOR MOON *    CORRESPONDING TO ONE PERIOD.
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R0137   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0138

R0139   DEBRIS -

R0140        PARAMETERS WHICH MAY BE OF USE -

R0141           * SCALE FACTOR *
R0142   VARIABLE*IN POWERS OF 2*                        DESCRIPTION AND REMARKS
R0143   --------*--------------*                        -----------------------
R0144   URRECT  * +1           *DP UNIT VECTOR OF INITIAL POSITION
R0145   R1      * +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION IN METERS
R0146           * +27 FOR MOON *
R0147   ALPHA   * -22 FOR EARTH*DP INVERSE OF SEMIMAJOR AXIS IN 1/METERS
R0148           * -20 FOR MOON *
R01481  TMODULO * +28          *DP INTEGRAL NUMBER OF PERIODS IN  CENTISECS. WHICH WAS SUBTRACTED FROM TAU. TO PRODUCE A
R01483          *              *TAU. OF LESS THAN ONE PERIOD.

R0149        PARAMETERS OF NO USE -
R0150   DP PARAMETERS - EPSILONT, DELX, DELT, RCNORM, XMODULO, PLUS PUSHLIST REGISTERS 0 THROUGH 39D.
R0152
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R0153   PROGRAM DESCRIPTION - LAMBERT SUBROUTINE                                        DATE - 1 SEPTEMBER 1967
R0155   MOD NO. - 0                                                                     LOG SECTION - CONIC SUBROUTINES
R0157   MOD BY KRAUSE                                                                   ASSEMBLY - COLOSSUS REVISION 88
R0159

R0160   FUNCTIONAL DESCRIPTION -

R0161        THIS SUBROUTINE CALCULATES THE INITIAL VELOCITY REQUIRED TO TRANSFER A POINT-MASS ALONG A CONIC TRAJECTORY
R0163   FROM AN INITIAL POSITION TO A TERMINAL POSITION IN A PRESCRIBED TIME INTERVAL.  THE RESULTING TRAJECTORY MAY BE
R0165   A SECTION OF A CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON.  THE USE OF THE
R0167   SUBROUTINE CAN BE EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY
R0169   CODING CHANGES, ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.  AN ITERATION TECHNIQUE IS
R0171   UTILIZED IN THE COMPUTATION.
R0172

R0173   THE RESTRICTIONS ARE -
R0174        1. RECTILINEAR TRAJECTORIES CANNOT BE COMPUTED.
R0175        2. AN ACCURACY DEGRADATION OCCURS AS THE COSINE OF THE TRUE ANOMALY DIFFERENCE APPROACHES +1.0.
R0177        3. THE ANGLE BETWEEN ANY POSITION VECTOR AND ITS VELOCITY VECTOR MUST BE GREATER THAN 1 DEGREE 47.5 MINUTES
R0179   AND LESS THAN 178 DEGREES 12.5 MINUTES.
R0180        4. NEGATIVE TRANSFER TIME IS AMBIGUOUS AND WILL RESULT IN NO SOLUTION.
R0182        5. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP.  IF THE
R0184   LIMITS ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.
R0185        THE NUMBER OF ITERATIONS AND, THEREFORE, THE COMPUTATIONS SPEED IS DEPENDENT ON THE ACCURACY OF THE FIRST
R0187   GUESS OF THE INDEPENDENT VARIABLE, COGA.                               THE AGC COMPUTATION TIME IS APPROXIMATE-
R0189   LY .105 SECONDS FOR INITIALIZATION, .069 SECONDS FOR FINAL COMPUTATIONS, PLUS .205 SECONDS FOR EACH ITERATION.
R0191

R0192   REFERENCES -
R0193        R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5, SGA MEMO 67-8,
R0195   SGA MEMO 67-4.
R0196

R0197   INPUT - ERASABLE INITIALIZATION REQUIRED

R0198           * SCALE FACTOR *
R0199   VARIABLE*IN POWERS OF 2*                                DESCRIPTION AND REMARKS
R0200   --------*---------------*                               -----------------------
R0201   R1VEC   * +29 FOR EARTH*DP INITIAL POSITION VECTOR IN METERS
R0202           * +27 FOR MOON *
R0203   R2VEC   * +29 FOR EARTH*DP TARGET OR TERMINAL POSITION VECTOR IN METERS
R0204           * +27 FOR MOON *
R0205   TDESIRED* +28          *DP DESIRED TRANSFER TIME IN CENTISECONDS
R0206   X1 (38D)* NONE         *INDEX REGISTER SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0208           *              *RESPECTIVELY, IS THE CENTRAL BODY
R0209   GEOMSGN * NONE         *SP +.5 IF DESIRED TRANSFER ANGLE IS LESS THAN 180 DEGREES, -.5 IF GREATER THAN 180 DEG.
R0211   GUESSW  * NONE         *AN INTERPRETER SWITCH TO BE SET IF NO GUESS OF COGA IS AVAILABLE, CLEAR IF A GUESS OF
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R0213             *                 *COGA IS TO BE USED BY LAMBERT
R0214   COGA      * +5              *DP GUESS OF COTANGNT OF FLIGHT PATH ANGLE (MEASURED FROM VERTICAL).  THIS WILL BE
R0216                               *IGNORED IF GUESSW IS SET.
R0217   NORMSW    * NONE            *AN INTERPRETER SWITCH TO BE SET IF UN IS TO BE AN INPUT TO THE SUBROUTINE, CLEAR IF
R0219             *                 *LAMBERT IS TO COMPUTE ITS OWN NORMAL (UN).
R0220   UN        * +1              *DP UNIT  NORMAL TO THE DESIRED ORBIT PLANE IN THE DIRECTION OF THE RESULTING ANGULAR
R0222             *                 *MOMENTUM VECTOR.  THIS WILL BE IGNORED IF NORMSW IS CLEAR.
R0224   VTARGTAG* NONE              *A S.P. TAG TO BE SET TO ZERO IF LAMBERT IS TO COMPUTE THE VELOCITY AT R2VEC AS WELL AS
R0226             *                 *AT R1VEC.
R0227


R0228   SUBROUTINES CALLED -
R0229        GEOM, GETX, DELTIME, ITERATOR, LAMENTER (PART OF NEWSTATE)
R0230


R0231   CALLING SEQUENCE AND NORMAL EXIT MODES -

R0232   L          CALL                       MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0234   L+1                LAMBERT            RETURNS WITH PL AT 0 AND WITH VVEC IN MPAC IF VTARGTAG WAS NON-ZERO OR VTARGET
R0236                                         IN MPAC IF VTARGTAG WAS ZERO
R0237   L+2        BON                        CONTINUE IF SOLNSW CLEAR SINCE SOLUTION IS ACCEPTABLE
R0239   L+3                SOLNSW
R0240   L+4                LAMABORT
R0241        IF A LAMBERT RESULT IS TO BE A FIRST GUESS FOR THE NEXT LAMBERT CALCULATION, COGA MUST BE PRESERVED AND
R0243   GUESSW MUST BE CLEAR FOR EACH SUCCEEDING LAMBERT CALL.
R0244


R0245   ABORT EXIT MODES -
R0246        IF SOLNSW WAS SET UPON EXITING, EITHER LAMBERT WAS ASKED TO COMPUTE A TRANSFER TOO NEAR 0 OR 360 DEG, OR T
R0248   WAS TOO SMALL TO PRODUCE A REALISTIC TRANSFER BETWEEN R1VEC AND R2VEC.  IN EITHER CASE THE FIX MUST BE MADE
R0250   ACCORDING TO THE NEEDS OF THE PARTICULAR USER.  THE ABORT EXIT MODE MAY BE CODED AS ...
R0252   LAMABORT DLOAD  ABS                  A MEASURE OF PROXIMITY TO 0 OR
R0253                   1-CSTH               360 DEGREES.
R0254            DSU    BMN
R0255                   ONEBIT
R0256                   CHANGER2             CHANGE R2VEC DIRECTION SLIGHTLY.
R0257            DLOAD  DAD
R0258                   TDESIRED
R0259                   SOMETIME
R0260            STCALL TDESIRED             INCREASE TDESIRED
R0261                   LAMBERT
R0262


R0263   OUTPUT -
R0264             * SCALE FACTOR *
R0265   VARIABLE*IN POWERS OF 2*                     DESCRIPTION AND REMARKS
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R0266   --------*--------------*                         -----------------------
R0267   VVEC    * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND REQUIRED TO SATISFY THE BOUNDARY VALUE
R0269           * +5 FOR MOON  *PROBLEM.
R0270   VTARGET * +7 FOR EARTH *DP RESULTANT VELOCITY VECTOR AT R2VEC IN METERS/CENTISECOND.
R0272           * +5 FOR MOON  *
R0273   SOLNSW  * NONE         *INTERPRETER SWITCH WHICH IS SET IF THE SUBROUTINE CANNOT SOLVE THE PROBLEM, CLEAR IF THE
R0275           *              *SOLUTION EXISTS.
R0276   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0277


R0278   DEBRIS -
R0279        PARAMETERS WHICH MAY BE OF USE -

R0280           * SCALE FACTOR *
R0281   VARIABLE*IN POWERS OF 2*                         DESCRIPTION AND REMARKS
R0282   --------*--------------*                         -----------------------
R0283   SNTH    * +1           *DP SIN OF ANGLE BETWEEN R1VEC AND R2VEC
R0284   CSTH    * +1           *DP COSINE OF ANGLE
R0285   1-CSTH  * +2           *DP 1-CSTH
R0286   COGA    * +5           *DP COTAN OF INITIAL REQUIRED FLIGHT PATH ANGLE MEASURED FROM VERTICAL
R0289   P       * +4           *DP RATIO  OF SEMILATUS RECTUM TO INITIAL RADIUS
R0290   R1A     * +6           *DP RATIO OF INITIAL RADIUS TO SEMIMAJOR AXIS
R0291   R1 (32D)* +29 FOR EARTH*DP INITIAL RADIUS IN METERS
R0292           * +27 FOR MOON *
R0293   UR1     * +1           *DP UNIT VECTOR OF R1VEC
R0294   U2      * +1           *DP UNIT VECTOR OF R2VEC

R0295        PARAMETERS OF NO USE
R0296   DP PARAMETERS - EPSILONL, CSTH-RHO, TPREV, TERRLAMB, R2, RTNLAMB (SP),  PLUS PUSHLIST REGISTER 0 THROUGH 41D
R0298   ADDITIONAL INTERPRETIVE SWITCHES USED - INFINFLG, 360SW, SLOPESW, ORDERSW
R0300
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L        CONIC SUBROUTINES                                                                USER'S PAGE NO.   8       EC 53

R0301    PROGRAM DESCRIPTION - TIME-THETA SUBROUTINE                                          DATE - 1 SEPTEMBER 1967
R0303    MOD NO. - 0                                                                          LOG SECTION - CONIC SUBROUTINES
R0305    MOD BY KRAUSE                                                                        ASSEMBLY - COLOSSUS REVISION 88
R0307


R0308    FUNCTIONAL DESCRIPTION -

R0309          THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR AND A DESIRED TRUE-ANOMALY-DIFFERENCE THROUGH WHICH THE
R0311    STATE IS TO BE UPDATED ALONG A CONIC TRAJECTORY, CALCULATES THE CORRESPONDING TIME-OF-FLIGHT AND, IN ADDITION,
R0313    PROVIDES THE OPTION OF COMPUTING THE NEW UPDATED STATE VECTOR.  THE RESULTING TRAJECTORY MAY BE A SECTION OF A
R0315    CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON.  THE USE OF THE SUBROUTINE CAN BE
R0317    EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY CODING CHANGES,
R0319    ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.
R0320

R0321    THE RESTRICTIONS ARE -
R0322          1. THE ANGLE BETWEEN ANY POSITION VECTOR AND ITS VELOCITY VECTOR MUST BE GREATER THAN 1 DEGREE 47.5 MINUTES
R0324    AND LESS THAN 178 DEGREES 12.5 MINUTES.
R0325          2. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP.  IF THE LIMITS
R0327    ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.

R0328          THE AGC COMPUTATION TIME IS APPROXIMATELY .292 SECONDS.
R0329


R0330    REFERENCES -
R0331          R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5, SGA MEMO 67-8.
R0333


R0334    INPUT - ERASABLE INITIALIZATION REQUIRED

R0335             * SCALE FACTOR *
R0336    VARIABLE*IN POWERS OF 2*                           DESCRIPTION AND REMARKS
R0337    --------*---------------*                          -----------------------
R0338    RVEC    * +29 FOR EARTH*DP INITIAL POSITION VECTOR IN METERS
R0339            * +27 FOR MOON *
R0340    VVEC    * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
R0341            * +5 FOR MOON  *
R0342    SNTH    * +1           *DP SINE OF TRUE-ANOMALY-DIFFERENCE THROUGH WHICH THE STATE IS TO BE UPDATED
R0344    CSTH    * +1           *DP COSINE OF THE ANGLE
R0345    RVSW    * NONE         *AN INTERPRETIVE SWITCH TO BE SET IF ONLY TIME IS TO BE AN OUTPUT, CLEAR IF THE NEW STATE
R0347            *              *IS TO BE COMPUTED ALSO.
R0348    X1 (38D)*NONE          *INDEX REGISTER TO BE SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0350            *              *RESPECTIVELY, IS THE CENTRAL BODY.
R0351


R0352    SUBROUTINES CALLED -
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R0353           PARAM, GEOM, GETX, DELTIME, NEWSTATE
R0354

R0355   CALLING SEQUENCE AND NORMAL EXIT MODES -

R0356       IF ONLY TIME IS DESIRED AS OUTPUT -
R0357   L            SET    CALL            MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0359   L+1                 RVSW
R0360   L+2                 TIMETHET        RETURN WITH PL AT 0 AND T IN MPAC
R0361   L+3          ...                    CONTINUE
R0362

R0363       IF THE UPDATE STATE VECTOR IS DESIRED AS WELL -
R0364   L            CLEAR  CALL            MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0366   L+1                 RVSW
R0367   L+2                 TIMETHET        RETURNS WITH PL AT 6.  THE INITIAL POSITION VECTOR IS IN 0D OF THE PUSHLIST AND
R0369                                       THE INITIAL VELOCITY VECTOR IN MPAC.
R0370   L+3          STOVL  NEWVVEC
R0371   L+4          STADR
R0372   L+5          STORE  NEWRVEC                   NEWVVEC AND NEWRVEC ARE SYMBOLIC REPRESENTATIONS OF THE USERS LOCATIONS.
R0374   L+6          ...                              CONTINUE
R0375


R0376   ABORT EXIT MODES -
R0377            IF COGAFLAG AND/OR INFINFLG IS SET AT THE EXIT TO TIME-THETA, TIME-THETA WILL TRANSFER TO POODOO WITH
R0379            AN ALARM CODE (ORIGINALLY 00607), AND NOT RETURN TO THE CALLING PROGRAM. (PCR 692 AND 721).
R0386


R0387   OUTPUT -
R0388            * SCALE FACTOR *
R0389   VARIABLE*IN POWERS OF 2*                          DESCRIPTION AND REMARKS
R0390   --------*---------------*                         ----------------------
R0391   T (30D) * +28           *DP TRANSFER TIME IN CENTISECONDS
R0392   INFINFLG* NONE          *AN INTERPRETIVE SWITCH WHICH IS SET IF THE TRANSFER ANGLE REQUIRES CLOSURE THROUGH
R0394           *               *INFINITY (NO SOLUTION), CLEAR IF A PHYSICAL SOLUTION IS POSSIBLE.
R0396   COGAFLAG* NONE          *AN INTERPRETIVE SWITCH WHICH IS SET IF RESTRICTION 1 HAS BEEN VIOLATED (NO SOLUTION),
R0398           *               *CLEAR IF NOT.

R0399   IN ADDITION, IF RVSW IS CLEAR, THE FOLLOWING ARE OUTPUT-

R0400   MPAC -  * +7 FOR EARTH *DP TERMINAL VELOCITY VECTOR IN METERS/CENTISEC.
R0401    MPAC +5* +5 FOR MOON  *
R0402   0D - 5D * +29 FOR EARTH*DP TERMINAL POSITION VECTOR IN METERS (PL AT 6D)
R0403           * +27 FOR MOON *

R0404   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0405
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R0406   DEBRIS -

R0407        PARAMETERS WHICH MAY BE OF USE -

R0408           * SCALE FACTOR *
R0409   VARIABLE*IN POWERS OF 2*                         DESCRIPTION AND REMARKS
R0410   --------*--------------*                         -----------------------
R0411   R1 (32D)* +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION VECTOR, RVEC, IN METERS
R0413           * +27 FOR MOON *
R0414   RIA     * +6           *DP RATIO OF R1 TO SEMIMAJOR AXIS (NEG. FOR HYPERBOLIC TRAJECTORIES)
R0416   P       * +4           *DP RATIO OF SEMILATUS RECTUM TO R1
R0417   COGA    * +5           *DP COTAN OF ANGLE BETWEEN RVEC AND VVEC
R0419   UR1     * +1           *DP UNIT VECTOR OF RVEC
R0420   U2      * +1           *DP UNIT VECTOR OF VVEC
R0421   UN      * +1           *DP UNIT VECTOR OF UR1*U2
R0422

R0423        PARAMETERS OF NO USE -
R0424   SP PARAMETERS -  RTNTT, GEOMSGN, RTNPRM, MAGVEC2=R2 (DP), PLUS PUSHLIST LOCATIONS 0-11D, 14D-21D, 24D-39D, 41D
R0426   ADDITIONAL INTERPRETIVE SWITCHES USED - NORMSW, 360SW
R0427
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R0428   PROGRAM DESCRIPTION - TIME-RADIUS SUBROUTINE                              DATE - 11 OCTOBER 1967
R0430   MOD NO. -1                                                                        LOG SECTION - CONIC SUBROUTINES
R0432   MOD BY KRAUSE                                                                     ASSEMBLY - COLOSSUS REVISION 88
R0434

R0435   FUNCTIONAL DESCRIPTION -

R0436        THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR AND A DESIRED RADIUS TO WHICH THE
R0438   STATE IS TO BE UPDATED ALONG A CONIC TRAJECTORY, CALCULATES THE CORRESPONDING TIME-OF-FLIGHT AND, IN ADDITION,
R0440   PROVIDES THE OPTION OF COMPUTING THE NEW UPDATED STATE VECTOR.  THE RESULTING TRAJECTORY MAY BE A SECTION OF A
R0442   CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON.  THE USE OF THE SUBROUTINE CAN BE
R0444   EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY CODING CHANGES,
R0446   ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.
R0447        IF THE DESIRED RADIUS IS BEYOND THE RADIUS OF APOCENTER OF THE CONIC OR BELOW THE RADIUS OF PERICENTER,
R0449   APSESW WILL BE SET AND THE SUBROUTINE WILL RETURN THE APOCENTER OR PERICENTER SOLUTION, RESPECTIVELY.
R0451

R0452   THE RESTRICTIONS ARE -
R0453        1. THE ANGLE BETWEEN ANY POSITION VECTOR AND ITS VELOCITY VECTOR MUST BE GREATER THAN 1 DEGREE 47.5 MINUTES
R0455   AND LESS THAN 178 DEGREES 12.5 MINUTES.
R0456        2. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP.  IF THE LIMITS
R0458   ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.
R04581       3. AN ACCURACY DEGRADATION OCCURS AS THE SENSITIVITIES OF TIME AND UPDATED STATE VECTOR TO CHANGES IN
R04583  RDESIRED INCREASE.  THIS WILL OCCUR NEAR EITHER APSIS OF THE CONIC AND WHEN THE CONIC IS NEARLY CIRCULAR.  IN
R04585  PARTICULAR, IF THE CONIC IS AN EXACT CIRCLE, THE PROBLEM IS UNDEFINED AND THE SUBROUTINE WILL ABORT.
R04587

R0459        THE AGC COMPUTATION TIME IS APPROXIMATELY .363 SECONDS
R0460

R0461   REFERENCES -
R0462        R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5, SGA MEMO 67-8.
R0464

R0465   INPUT - ERASABLE INITIALIZATION REQUIRED

R0466           * SCALE FACTOR *
R0467   VARIABLE*IN POWERS OF 2*                           DESCRIPTION AND REMARKS
R0468   --------*---------------*                          -----------------------
R0469   RVEC    * +29 FOR EARTH*DP INITIAL POSITION VECTOR IN METERS
R0470           * +27 FOR MOON *
R0471   VVEC    * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
R0472           * +5 FOR MOON  *
R0473   RDESIRED* +29 FOR EARTH*DP TERMINAL RADIAL DISTANCE ON CONIC TRAJECTORY FOR WHICH TRANSFER TIME IS TO BE
R0475           * +27 FOR MOON *COMPUTED.
R0476   SGNRDOT * NONE          *SP TAG SET TO +.5 OR -.5 ACCORDING TO WHETHER THE RADIAL VELOCITY AT RDESIRED IS TO BE
R0478           *               *POSITIVE OR NEGATIVE, RESPECTIVELY.  THIS TAG REDUCES THE DOUBLE-VALUED PROBLEM TO A
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L        CONIC SUBROUTINES                                                          USER'S PAGE NO. 12       E0 53

R0480              *              *SINGLE-VALUED PROBLEM.
R0481    X1 (38D)*NONE            *INDEX REGISTER TO BE SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0483              *              *RESPECTIVELY, IS THE CENTRAL BODY.
R0484    RVSW      * NONE         *AN INTERPRETIVE SWITCH TO BE SET IF ONLY TIME IS TO BE AN OUTPUT, CLEAR IF THE NEW STATE
R0486              *              *IS TO BE COMPUTED ALSO.
R0487


R0488    SUBROUTINES CALLED -
R0489          PARAM, GEOM, GETX, DELTIME, NEWSTATE
R0490


R0491    CALLING SEQUENCE AND NORMAL EXIT MODES -

R0492        IF ONLY TIME IS DESIRED AS OUTPUT -
R0493    L          SET    CALL             MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0495    L+1               RVSW
R0496    L+2               TIMERAD          RETURN WITH PL AT 0 AND T IN MPAC
R0497    L+3        ...                     CONTINUE
R0498

R0499        IF THE UPDATE STATE VECTOR IS DESIRED AS WELL -
R0500    L          CLEAR  CALL             MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0502    L+1               RVSW
R0503    L+2               TIMERAD          RETURNS WITH PL AT 6.  THE INITIAL POSITION VECTOR IS IN 0D OF THE PUSHLIST AND
R0505                                       THE INITIAL VELOCITY VECTOR IN MPAC.
R0506    L+3        STOVL  NEWVVEC
R0507    L+4        STADR
R0508    L+5        STORE  NEWRVEC                    NEWVVEC AND NEWRVEC ARE SYMBOLIC REPRESENTATIONS OF THE USERS LOCATIONS.
R0510    L+6        ...                               CONTINUE
R0511


R0512    ABORT EXIT MODES -
R0513               IF SOLNSW AND/OR COGAFLAG AND/OR INFINFLG IS SET AT THE EXIT TO TIME-RADIUS, TIME-RADIUS WILL TRANSFER
R0515               TO POODOO WITH AN ALARM CODE (ORIGINALLY 00607), AND NOT RETURN TO THE CALLING PROGRAM. (PCR 692 & 721)
R0522


R0523    OUTPUT -
R0524             * SCALE FACTOR *
R0525    VARIABLE*IN POWERS OF 2*                               DESCRIPTION AND REMARKS
R0526    --------*--------------*                               -----------------------
R0527    T (30D) * +28            *DP TRANSFER TIME IN CENTISECONDS
R0528    INFINFLG* NONE           *AN INTERPRETIVE SWITCH WHICH IS SET IF RDESIRED AND SGNRDOT REQUIRE CLOSURE THROUGH
R0530              *              *INFINITY (NO SOLUTION), CLEAR IF A PHYSICAL SOLUTION IS POSSIBLE.
R0532    COGAFLAG* NONE           *AN INTERPRETIVE SWITCH WHICH IS SET IF RESTRICTION 1 HAS BEEN VIOLATED (NO SOLUTION),
R0534              *              *CLEAR IF NOT.
R0535    APSESW  * NONE           *AN INTERPRETIVE SWITCH WHICH IS SET IF RDESIRED WAS GREATER THAN RADIUS OF APOCENTER OR
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R0537         *           *LESS THAN RADIUS OF PERICENTER.  THE APOCENTER OR PERICENTER SOLUTION, RESPECTIVELY,
R0539         *           *WILL THEN BE RETURNED.  THE SWITCH IS CLEAR IF RDESIRED WAS BETWEEN PERICENTER AND
R0541         *           *APOCENTER.
R05411 SCLKSW * NONE      *AN INTERPRETIVE SWITCH WHICH IS SET IF THE CONIC IS SO CLOSE TO A CIRCLE THAT THE TERMIN
R05413                    *POINT IS AMBIGUOUS, VIOLATING RESTRICTION 3.  IF ECCENTRICITY IS GREATER THAN 2-TO-THE-
R05415                    *MINUS-18, THE SWITCH IS CLEAR.
R0542

R0543  IN ADDITION, IF RVSW IS CLEAR, THE FOLLOWING ARE OUTPUT-

R0544  MPAC -  * +7 FOR EARTH *DP TERMINAL VELOCITY VECTOR IN METERS/CENTISEC.
R0545   MPAC +5* +5 FOR MOON  *
R0546  0D - 5D * +29 FOR EARTH*DP TERMINAL POSITION VECTOR IN METERS (PL AT 6D)
R0547          * +27 FOR MOON *

R0548  FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0549


R0550  DEBRIS -

R0551      PARAMETERS WHICH MAY BE OF USE -

R0552          * SCALE FACTOR *
R0553  VARIABLE*IN POWERS OF 2*                    DESCRIPTION AND REMARKS
R0554  --------*---------------*                    -----------------------
R0555  R1 (32D)* +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION VECTOR, RVEC, IN METERS
R0557          * +27 FOR MOON *
R0558  R1A     * +6           *DP RATIO OF R1 TO SEMIMAJOR AXIS (NEG. FOR HYPERBOLIC TRAJECTORIES)
R0560  P       * +4           *DP RATIO OF SEMILATUS RECTUM TO R1
R0561  COGA    * +5           *DP COTAN OF ANGLE BETWEEN RVEC AND VVEC
R0563  UR1     * +1           *DP UNIT VECTOR OF RVEC
R0564  U2      * +1           *DP UNIT VECTOR OF VVEC
R0565  UN      * +1           *DP UNIT VECTOR OF UR1*U2
R0566  CSTH    * +1           *DP COSINE OF TRUE ANOMALY DIFFERENCE BETWEEN RVEC AND RDESIRED.
R0568  SNTH    * +1           *DP SINE OF TRUE ANOMALY DIFFERENCE.
R0569

R0570      PARAMETERS OF NO USE -
R0571  SP PARAMETERS -  RTNTT, GEOMSGN, RTNPRM, MAGVEC2=R2 (DP), PLUS PUSHLIST LOCATIONS 0-11D, 14D-21D, 24D-39D, 41D
R0573  ADDITIONAL INTERPRETIVE SWITCHES USED - NORMSW, 360SW
R0574
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L        CONIC SUBROUTINES                                                       USER'S PAGE NO. 14      E0 S3

R0575    PROGRAM DESCRIPTION - APSIDES SUBROUTINE                                  DATE - 1 SEPTEMBER 1967
R0577    MOD NO. - 0                                                               LOG SECTION - CONIC SUBROUTINES
R0579    MOD BY KRAUSE                                                             ASSEMBLY - COLOSSUS REVISION 88
R0581

R0582    FUNCTIONAL DESCRIPTION -

R0583         THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR CALCULATES THE RADIUS OF PERICENTER AND OF APOCENTER AND THE
R0585    ECCENTRICITY OF THE RESULTING CONIC TRAJECTORY, WHICH MAY BE A STRAIGHT LINE,
R0587    CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON.  THE USE OF THE SUBROUTINE CAN BE
R0589    EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY CODING CHANGES,
R0591    ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.
R0592

R0593    THE RESTRICTIONS ARE -
R0594         1. IF APOCENTER IS BEYOND THE SCALING OF POSITION, THE SCALE FACTOR LIMIT (536,870,910 METERS WITH RESPECT
R0596    TO THE EARTH OR 134,217,727.5 METERS WITH RESPECT TO THE MOON) WILL BE RETURNED.
R0598         2. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP.  IF THE LIMITS
R0600    ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.

R0601         THE AGC COMPUTATION TIME IS APPROXIMATELY .103 SECONDS.
R0602

R0603    REFERENCES -
R0604         MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5
R0606

R0607    INPUT - ERASABLE INITIALIZATION REQUIRED

R0608             * SCALE FACTOR *
R0609    VARIABLE*IN POWERS OF 2*                       DESCRIPTION AND REMARKS
R0610    --------*---------------*                       -----------------------
R0611    RVEC     * +29 FOR EARTH*DP INITIAL POSITION VECTOR IN METERS
R0612             * +27 FOR MOON *
R0613    VVEC     * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
R0614             * +5 FOR MOON  *
R0615    XI (38D)*NONE           *INDEX REGISTER TO BE SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0617             *               *RESPECTIVELY, IS THE CENTRAL BODY.
R0618

R0619    SUBROUTINES CALLED -
R0620         PARAM, GEOM
R0621

R0622    CALLING SEQUENCE AND NORMAL EXIT MODES -
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R0623       IF ONLY TIME IS DESIRED AS OUTPUT -
R0624   L        CALL                   MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0626   L+1             APSIDES         RETURNS WITH PL AT 0, RADIUS OF APOCENTER IN MPAC AND RADIUS OF PERICENTER IN 0D
R0628   L+2      STODL  APOAPSE
R0629   L+3             0D
R0630   L+4      STORE  PERIAPSE                APOAPSE AND PERIAPSE ARE SYMBOLIC REPRESENTATIONS OF THE USERS LOCATIONS
R0632   L+5      ...                    CONTINUE
R0633

R0634   OUTPUT -
R0635           * SCALE FACTOR *
R0636   VARIABLE*IN POWERS OF 2*                                  DESCRIPTION AND REMARKS
R0637   --------*---------------*                                 -----------------------
R0638   MPAC    * +29 FOR EARTH*DP RADIUS OF APOCENTER IN METERS
R0639           * +27 FOR MOON *
R0640   0D-1D   * +29 FOR EARTH*DP RADIUS OF PERICENTER IN METERS
R0641           * +27 FOR MOON *
R0642   ECC     * +3           *DP ECCENTRICITY OF CONIC TRAJECTORY.

R0643   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0644


R0645   DEBRIS -

R0646        PARAMETERS WHICH MAY BE OF USE -

R0647           * SCALE FACTOR *
R0648   VARIABLE*IN POWERS OF 2*                                  DESCRIPTION AND REMARKS
R0649   --------*---------------*                                 -----------------------
R0650   R1 (32D)* +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION VECTOR, RVEC, IN METERS
R0652           * +27 FOR MOON *
R0653   R1A     * +6           *DP RATIO OF R1 TO SEMIMAJOR AXIS (NEG. FOR HYPERBOLIC TRAJECTORIES)
R0655   P       * +4           *DP RATIO OF SEMILATUS RECTUM TO R1
R0656   COGA    * +5           *DP COTAN OF ANGLE BETWEEN RVEC AND VVEC
R0658   UR1     * +1           *DP UNIT VECTOR OF RVEC
R0659   U2      * +1           *DP UNIT VECTOR OF VVEC
R0660   UN      * +1           *DP UNIT VECTOR OF UR1*U2
R0661   MAGVEC2 * +7 FOR EARTH *DP MAGNITUDE OF VVEC
R0662           * +5 FOR MOON  *
R0663

R0664        PARAMETERS OF NO USE -
R0665   SP PARAMETERS - RTNAPSE, GEOMSGN, RTNPRM, PLUS PUSHLIST LOCATIONS 0-5,10D-11D, 14D-21D, 31D-38D.
R0667   ADDITIONAL INTERPRETIVE SWITCHES USED - NORMSW
R0668


 0669   REF   1             12,2000                       SETLOC CONICS
 0670                         12,2077                     BANK

 0671   REF   1                                           COUNT* $$/CONIC
 0672   REF   2  LAST  100    E5,1723                     EBANK= UR1
 0685                         12,2077   77624 1  KEPLERN  CALL
 0686   REF   1               12,2100   24577 1                  COMSETUP
 0687                         12,2101   53575 0           VLOAD  UNIT
 0688   REF   3  LAST  515    12,2102   01503 0                  RRECT
 0689   REF   2  LAST  100    12,2103   16647 0           STODL  URRECT
 0690                         12,2104   00045 0                  36D
 0691   REF   5  LAST  915    12,2105   24041 1           STOVL  R1
 0692   REF   4  LAST 1277    12,2106   01503 0                  RRECT
 0693                         12,2107   76441 1           DOT    SL1R
 0694   REF   2  LAST   89    12,2110   01511 0                  VRECT
 0695                         12,2111   76405 1           DMP    SL1R
 0696   REF   1               12,2112   00023 0                  1/ROOTMU         1/ROOTMU (-17 OR -14)
 0697   REF   1               12,2113   24043 0           STOVL  KEPC1            C1=R.V/ROOTMU (+17 OR +16)

 0698   REF   3  LAST 1277    12,2114   01511 0                  VRECT
 0699                         12,2115   57236 1           VSQ    DMPR
 0700   REF   1               12,2116   00017 1                  1/MU             1/MU (-34 OR -28)
 0701                         12,2117   52405 1           DMP    SL3
 0702   REF   6  LAST 1277    12,2120   00041 1                  R1
 0703                         12,2121   61425 0           DSU    ROUND
 0704   REF   1               12,2122   33410 1                  D1/64
 0705   REF   1               12,2123   00045 0           STORE  KEPC2            C2=RV.V/MU -1 (+6)

 0706                         12,2124   74421 0           BDSU   SR1R
 0707   REF   2  LAST 1277    12,2125   33410 1                  D1/64
 0708                         12,2126   77671 1           DDV
 0709   REF   7  LAST 1277    12,2127   00041 1                  R1
 0710   REF   1               12,2130   00011 1           STORE  ALPHA            ALPHA=(1-C2)/R1 (-22 OR -20)

 0711                         12,2131   71244 0           BPL    DLOAD            MAXIMUM X DEPENDS ON TYPE OF CONIC
 0712   REF   1               12,2132   24141 0                  1REV
 0713   REF   1               12,2133   33426 1                  -50SC            -50SC (+12)
 0714                         12,2134   40071 0           DDV    BCV
 0715   REF   2  LAST 1277    12,2135   00011 1                  ALPHA
 0716   REF   1               12,2136   24145 1                  STOREMAX
 0717                         12,2137   52166 1           SQRT   GOTO
 0718   REF   2  LAST 1277    12,2140   24145 1                  STOREMAX

 0719                         12,2141   55366 1  1REV     SQRT   BDDV
 0720   REF   4  LAST  677    12,2142   33430 0                  2PISC            2PISC (+6)
 0721                         12,2143   77600 1           BOV
 0722   REF   3  LAST 1277    12,2144   24145 1                  STOREMAX
 0723   REF   1               12,2145   00013 0  STOREMAX STORE  XMAX
 0724                         12,2146   65205 0           DMP    PDDL
 0725   REF   2  LAST 1277    12,2147   00023 0                  1/ROOTMU
 0726   REF   3  LAST 1277   12,2150   00011 1                       ALPHA
 0727                        12,2151   65301 0             NORM      PODL
 0728   REF  56  LAST 1260   12,2152   00047 1                       X1
 0729                        12,2153   56257 1             SL*       DDV
 0730                        12,2154   20173 0                       0 -6,1
 0731                        12,2155   50000 1             BOV       BMN
 0732   REF   1              12,2156   24172 0                       MODDONE
 0733   REF   2  LAST 1278   12,2157   24172 0                       MODDONE         MPAC=PERIOD
 0734                        12,2160   51525 1   PERIODCH  PDDL      ABS             0D=PERIOD
 0735   REF   2  LAST   93   12,2161   02303 0                       TAU.
 0736                        12,2162   50025 0             DSU       BMN
 0737                        12,2163   00001 0                       0D
 0738   REF   3  LAST 1278   12,2164   24172 0                       MODDONE
 0739                        12,2165   77765 0             SIGN
 0740   REF   3  LAST 1278   12,2166   02303 0                       TAU.
 0741   REF   4  LAST 1278   12,2167   16303 0             STODL     TAU.
 0750                        12,2170   77650 1             GOTO
 0751   REF   1              12,2171   24160 0                       PERIODCH
 0752                        12,2172   71201 1   MODDONE   SETPD     DLOAD
 0753                        12,2173   00001 0                       0
 0754   REF   2  LAST   93   12,2174   02277 1                       XKEPNEW
 0755   REF   1              12,2175   00025 0             STORE     X
 07555                       12,2176   53165 0             SIGN      BZE
 0756   REF   5  LAST 1278   12,2177   02303 0                       TAU.
 07565  REF   1              12,2200   24347 1                       BADX
 0757                        12,2201   51440 0             BMN       ABS
 07575  REF   2  LAST 1278   12,2202   24347 1                       BADX
 0758                        12,2203   51025 1             DSU       BPL
 07585  REF   2  LAST 1277   12,2204   00013 0                       XMAX
 0759   REF   3  LAST 1278   12,2205   24347 1                       BADX
 07595                       12,2206   51145 0   STORBNDS  DLOAD     BPL
 0760   REF   6  LAST 1278   12,2207   02303 0                       TAU.
 07605  REF   1              12,2210   24217 0                       STOREMIN
 0761                        12,2211   57545 1             DLOAD     DCOMP
 07615  REF   3  LAST 1278   12,2212   00013 0                       XMAX
 0762   REF   1              12,2213   14015 0             STODL     XMIN
 07625  REF   1              12,2214   11762 1                       KEPZERO
 0763   REF   4  LAST 1278   12,2215   34013 1             STCALL    XMAX
 0764   REF   1              12,2216   24222 0                       DXCOMP
 07645                       12,2217   77745 1   STOREMIN  DLOAD
 0765   REF   2  LAST 1278   12,2220   11762 1                       KEPZERO
 07655  REF   2  LAST 1278   12,2221   00015 0             STORE     XMIN
 0766                        12,2222   57345 1   DXCOMP    DLOAD     DMP
 0767   REF   7  LAST 1278   12,2223   02303 0                       TAU.
 0768   REF   1              12,2224   33421 0                       BEE22
 07685                       12,2225   77646 0             ABS
 0769   REF   1              12,2226   15026 1             STODL     EPSILONT
 0770   REF   1              12,2227   01553 0                       XPREV
 0779                        12,2230   77621 1   XDIFF     BDSU
 0780   REF   2  LAST 1278   12,2231   00025 0                       X
 0781   REF   2  LAST  100   12,2232   02643 1              STORE  DELX


 0782                        12,2233   63545 0  KEPLOOP  DLOAD  DSQ
 0783   REF   3  LAST 1278   12,2234   00025 0                  X                        X=XKEP
 0784                        12,2235   41501 0           NORM   PUSH                     0D=XSQ (+34 OR +32 -N1)      PL AT 2
 0785   REF  57  LAST 1278   12,2236   00047 1                  X1
 0786                        12,2237   53605 1           DMP    SRR*
 0787   REF   4  LAST 1278   12,2240   00011 1                  ALPHA
 0788                        12,2241   21573 0                  0 -6,1
 0789   REF   1              12,2242   34031 1           STCALL XI                       XI=ALPHA XSQ (+6)
 0790   REF   1              12,2243   24462 1                  DELTIME
 0791                        12,2244   44200 0           BOV    BDSU
 0792   REF   1              12,2245   24355 1                  TIMEOVFL                 UNLIKELY
 0793   REF   8  LAST 1278   12,2246   02303 0                  TAU
 0794   REF   2  LAST  100   12,2247   02645 1           STORE  DELT                     DELT=DELINDEP
 0795                        12,2250   44246 1           ABS    BDSU
 0796   REF   2  LAST 1278   12,2251   01026 1                  EPSILONT
 0797                        12,2252   71244 0           BPL    DLOAD
 0798   REF   1              12,2253   24375 0                  KEPCONVG
 0799   REF   6  LAST  917   12,2254   00037 0                  T
 0800                        12,2255   60225 1           DSU    NORM
 0801   REF   2  LAST   89   12,2256   01551 1                  TC
 0802   REF  58  LAST 1279   12,2257   00047 1                  X1
 0803                        12,2260   60325 0           PDDL   NORM
 0804   REF   3  LAST 1279   12,2261   02643 1                  DELX
 0805   REF  32  LAST 1260   12,2262   00050 1                  X2
 0806                        12,2263   41260 0           XSU,1  DMP
 0807   REF  33  LAST 1279   12,2264   00047 1                  X2
 0808   REF   3  LAST 1279   12,2265   02645 1                  DELT
 0809                        12,2266   56257 1           SLR*   DDV
 0810                        12,2267   21202 1                  1,1
 0811                        12,2270   41542 1           SR1    PUSH                     0D=TRIAL DELX                PL AT 2
 0812                        12,2271   71244 0           BPL    DLOAD
 0813   REF   1              12,2272   24313 0                  POSDELX
 0814   REF   4  LAST 1279   12,2273   00025 0                  X
 0815   REF   5  LAST 1278   12,2274   00013 0           STORE  XMAX                     MOVE MAX BOUND IN
 0816                        12,2275   45221 1           BDSU   DSU                                                   PL AT 0
 0817   REF   3  LAST 1278   12,2276   00015 0                  XMIN
 0818                        12,2277   51000 0           BOV    BPL
 0819   REF   1              12,2300   24305 1                  NOXCHNGE
 0820   REF   2  LAST 1279   12,2301   24305 1                  NOXCHNGE
 0821                        12,2302   52145 0           DLOAD  GOTO
 0822                        12,2303   00001 0                  0D
 0823   REF   1              12,2304   24325 0                  NEWDELX


 0824                        12,2305   45345 1  NOXCHNGE DLOAD  DSU
 0825   REF   4  LAST 1279   12,2306   00015 0                  XMIN
 0826   REF   5  LAST 1279   12,2307   00025 0                  X
 0827                        12,2310   52075 1            DMPR     GOTO               TO FORCE MPAC +2 TO ZERO
 0828   REF    1             12,2311   33424 0                     DP9/10
 0829   REF    2  LAST 1279  12,2312   24325 0                     NEWDELX


 0830                        12,2313   77745 1  POSDELX   DLOAD
 0831   REF    6  LAST 1279  12,2314   00025 0                      X
 0832   REF    5  LAST 1279  12,2315   00015 0            STORE    XMIN               MOVE MIN BOUND IN
 0833                        12,2316   45221 1            BDSU     DSU                                                 PL AT 0
 0834   REF    6  LAST 1279  12,2317   00013 0                     XMAX
 0835                        12,2320   50000 1            BOV      BMN
 0836   REF    1             12,2321   24341 1                     PDXCHNGE
 0837   REF    2  LAST 1280  12,2322   24341 1                     PDXCHNGE
 0838                        12,2323   77745 1            DLOAD
 0839                        12,2324   00001 0                     0D
 0840   REF    4  LAST 1279  12,2325   02643 1  NEWDELX   STORE    DELX
 0841                        12,2326   43254 0            BZE      DAD
 0842   REF    2  LAST 1279  12,2327   24375 0                     KEPCONVG
 0843   REF    7  LAST 1280  12,2330   00025 0                     X
 0844   REF    8  LAST 1280  12,2331   14025 0            STODL    X
 0845   REF    7  LAST 1279  12,2332   00037 0                     T
 0846   REF    3  LAST 1279  12,2333   01551 1            STORE    TC
 0847                        12,2334   46034 1  BRNCHCTR  RTB      BHIZ
 0848   REF    1             12,2335   24716 1                     CHECKCTR
 0849   REF    3  LAST 1280  12,2336   24375 0                     KEPCONVG
 0850                        12,2337   77650 1            GOTO
 0851   REF    1             12,2340   24233 0                     KEPLOOP            ITERATE


 0852                        12,2341   45345 1  PDXCHNGE  DLOAD    DSU
 0853   REF    7  LAST 1280  12,2342   00013 0                     XMAX
 0854   REF    9  LAST 1280  12,2343   00025 0                     X
 0855                        12,2344   52075 1            DMPR     GOTO               TO FORCE MPAC +2 TO ZERO
 0856   REF    2  LAST 1280  12,2345   33424 0                     DP9/10
 0857   REF    3  LAST 1280  12,2346   24325 0                     NEWDELX


 0858                        12,2347   70545 1  BADX      DLOAD    SR1
 0859   REF    8  LAST 1280  12,2350   00013 0                     XMAX
 0860                        12,2351   77765 0            SIGN
 0861   REF    9  LAST 1279  12,2352   02303 0                     TAU.
 0862   REF   10  LAST 1280  12,2353   34025 1            STCALL   X
 0864   REF    1             12,2354   24206 0                     STORBNDS
 0879                        12,2355   50145 1  TIMEOVFL  DLOAD    BMN                X WAS TOO BIG
 0880   REF   11  LAST 1280  12,2356   00025 0                     X
 08805  REF    1             12,2357   24373 0                     NEGTOVFL
 0881   REF    9  LAST 1280  12,2360   00013 0            STORE    XMAX
 0882                        12,2361   70545 1  CMNTOVFL  DLOAD    SR1
 0883   REF    5  LAST 1280  12,2362   02643 1                     DELX
 0884   REF    6  LAST 1280  12,2363   02643 1            STORE    DELX
 0885                          12,2364   44254 1             BZE     BDSU
 08855  REF   1                12,2365   02267 0                     KEPRTN
 0886   REF  12  LAST 1280     12,2366   00025 0                     X
 0887   REF  13  LAST 1281     12,2367   14025 0             STODL   X
 0888   REF   4  LAST 1280     12,2370   01551 1                     TC
 0889   REF   8  LAST 1280     12,2371   34037 1             STCALL  T
 0891   REF   1                12,2372   24334 0                     BRNCHCTR
 08911  REF   6  LAST 1280     12,2373   34015 1   NEGTOVFL  STCALL  XMIN
 08913  REF   1                12,2374   24361 0                     CMNTOVFL
 0892                          12,2375   44545 0   KEPCONVG  DLOAD   SR4R
 0893   REF   6  LAST 1277     12,2376   00041 1                     R1
 0894                          12,2377   74225 1             DSU     VXSC
 0895   REF   1                12,2400   00035 1                     XSQC(XI)
 0896   REF   3  LAST 1277     12,2401   02647 0                     URRECT
 0897                          12,2402   65372 1             VSL1    PDDL                 0D=(R1-XSQC(XI))URRECT (+33 OR +31)
 0898   REF  14  LAST 1281     12,2403   00025 0                     X
 0899                          12,2404   60316 0             DSQ     NORM
 0900   REF  59  LAST 1279     12,2405   00047 1                     X1
 0901                          12,2406   57275 0             DMPR    DMPR
 0902   REF   3  LAST 1277     12,2407   00023 0                     1/ROOTMU
 0903   REF  15  LAST 1281     12,2410   00025 0                     X
 0904                          12,2411   53605 1             DMP     SRR*
 0905   REF   1                12,2412   00033 1                     S(XI)
 0906                          12,2413   21572 1                     0 -7,1
 0907                          12,2414   77621 1             BDSU
 0908   REF   9  LAST 1281     12,2415   00037 0                     T
 0909                          12,2416   74352 0             SL1     VXSC
 0910   REF   4  LAST 1277     12,2417   01511 0                     VRECT
 0911                          12,2420   53372 1             VSL1    VAD                                                        PL AT 0
 0912                          12,2421   77712 0             VSL4
 0913   REF  15  LAST 1259     12,2422   01535 0             STORE   RCV                  RCV (+29 OR +27)


 0914                          12,2423   60246 1             ABVAL   NORM
 0915   REF  34  LAST 1279     12,2424   00050 1                     X2
 0916   REF   2  LAST  100     12,2425   16655 0             STODL   RCNORM
 0917   REF   2  LAST 1279     12,2426   00031 0                     XI
 0918                          12,2427   45275 0             DMPR    DSU
 0919   REF   2  LAST 1281     12,2430   00033 1                     S(XI)
 0920   REF   1                12,2431   33406 0                     D1/128
 0921                          12,2432   76405 1             DMP     SL1R
 0922   REF   1                12,2433   00021 1                     ROOTMU
 0923                          12,2434   53605 1             DMP     SLR*
 0924   REF  16  LAST 1281     12,2435   00025 0                     X
 0925                          12,2436   56601 0                     0 -3,2
 0926                          12,2437   74271 0             DDV     VXSC
 0927   REF   3  LAST 1281     12,2440   02655 0                     RCNORM
 0928   REF   4  LAST 1281     12,2441   02647 0                     URRECT
 0929                          12,2442   65372 1             VSL1    PDDL                 0D=URRECT(XI S(XI)-1)X ROOTMU/RCV (+15
 0930   REF   2  LAST 1281     12,2443   00035 1                     XSQC(XI)             OR +13)                     PL AT 6
 0931                              12,2444   56257 1          SLR*    DDV
 0932                              12,2445   56602 0                  0 -4,2
 0933   REF   4  LAST 1281         12,2446   02655 0                  RCNORM
 0934                              12,2447   74221 0          BDSU    VXSC
 0935   REF   1                    12,2450   33422 0                  D1/256
 0936   REF   5  LAST 1281         12,2451   01511 0                  VRECT
 0937                              12,2452   42455 0          VAD     VSL8                                         PL AT 0
 0938                              12,2453   77626 0          STADR
 0939   REF  14  LAST 1259         12,2454   62234 0          STODL   VCV                VCV (+7 OR +5)
 0940   REF  10  LAST 1281         12,2455   00037 0                  T
 0943   REF   5  LAST 1281         12,2456   15551 1          STODL   TC
 0944   REF  17  LAST 1281         12,2457   00025 0                  X
 0947   REF   2  LAST 1278         12,2460   35553 1          STCALL  XPREV
 0949   REF   2  LAST 1281         12,2461   02267 0                  KEPRTN
 0950                        12,2462   77776 1  DELTIME  EXIT                         MPAC=XI (+6), 0D=XSQ (+34 OR +32 -N1)
 0951   REF    7  LAST 1190  12,2463 0 7171 1            TC       POLY
 0952                        12,2464   00010 0           DEC      8
 0953                        12,2465   02525 1           2DEC     .083333334
 0953                        12,2466   12526 0
 0954                        12,2467   67356 0           2DEC     -.266666684
 0954                        12,2470   75666 0
 0955                        12,2471   15001 1           2DEC     .406349155
 0955                        12,2472   23771 1
 0956                        12,2473   64342 0           2DEC     -.361198675
 0956                        12,2474   43674 0
 0957                        12,2475   06563 1           2DEC     .210153242
 0957                        12,2476   04645 1
 0958                        12,2477   75173 0           2DEC     -.086221951
 0958                        12,2500   52672 0
 0959                        12,2501   00656 1           2DEC     .026268812
 0959                        12,2502   14331 0
 0960                        12,2503   77633 1           2DEC     -.006163316
 0960                        12,2504   40512 0
 0961                        12,2505   00023 0           2DEC     .001177342
 0961                        12,2506   11210 1
 0962                        12,2507   77774 0           2DEC     -.000199055
 0962                        12,2510   67506 0
 0963   REF  230  LAST 1258  12,2511 0 6006 1            TC       INTPRET
 0964   REF    3  LAST 1281  12,2512   14033 1           STODL    S(XI)
 0965   REF    3  LAST 1281  12,2513   00031 0                    XI
 0966                        12,2514   77776 1           EXIT
 0967   REF    8  LAST 1283  12,2515 0 7171 1            TC       POLY
 0968                        12,2516   00010 0           DEC      8
 0969                        12,2517   01000 0           2DEC     .031250001
 0969                        12,2520   00000 1
 0970                        12,2521   72525 0           2DEC     -.166666719
 0970                        12,2522   52506 0
 0971                        12,2523   13301 1           2DEC     .355555413
 0971                        12,2524   15337 1
 0972                        12,2525   62776 0           2DEC     -.406347410
 0972                        12,2526   54733 1
 0973                        12,2527   11176 1           2DEC     .288962094
 0973                        12,2530   13267 0
 0974                        12,2531   73410 0           2DEC     -.140117394
 0974                        12,2532   51674 0
 0975                        12,2533   01446 0           2DEC     .049247387
 0975                        12,2534   33641 1
 0976                        12,2535   77451 1           2DEC     -.013081923
 0976                        12,2536   65233 0
 0977                        12,2537   00055 1           2DEC     .002806389
 0977                        12,2540   37266 1
 0978                        12,2541   77767 1           2DEC     -.000529414
 0978                        12,2542   52336 0
 0979   REF  231  LAST 1283  12,2543 0 6006 1            TC       INTPRET
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L         CONIC SUBROUTINES                                                                USER'S PAGE NO. 23       E5 S3

 0980                            12,2544   53605 1           DMP     SRR*                                           PL AT 0
 0981                            12,2545   00001 0                   0D
 0982                            12,2546   21574 1                   0 -5,1
 0983     REF   3  LAST 1281     12,2547   00035 1           STORE   XSQC(XI)         XSQC(XI) (+33 OR +31)
 0984                            12,2550   72405 0           DMP     SL1
 0985     REF   2  LAST 1277     12,2551   00043 0                   KEPC1
 0986                            12,2552   65234 1           RTB     PDDL             XCH WITH PL. 0D=C1 XSQ C(XI) (+49 OR +46
 0987     REF  10  LAST 1253     12,2553   45657 1                   TPMODE                                         PL AT 0,3
 0988                            12,2554   53605 1           DMP     SRR*
 0989     REF   4  LAST 1283     12,2555   00033 1                   S(XI)
 0990                            12,2556   21574 1                   0 -5,1
 0991                            12,2557   72405 0           DMP     SL1
 0992     REF   2  LAST 1277     12,2560   00045 0                   KEPC2
 0993                            12,2561   65234 1           RTB     PDDL             3D=C2 XSQ S(XI) (+35 OR +33)  PL AT 6
 0994     REF  11  LAST 1284     12,2562   45657 1                   TPMODE
 0995     REF   9  LAST 1281     12,2563   00041 1                   R1
 0996                            12,2564   76261 0           SR      TAD                                            PL AT 3
 0997                            12,2565   20607 1                   6
 0998                            12,2566   41301 0           NORM    DMP              TO PRESERVE SIGNIF.
 0999     REF  60  LAST 1281     12,2567   00047 1                   X1
 1000     REF  18  LAST 1282     12,2570   00025 0                   X
 1001                            12,2571   76257 0           SR*     TAD              X(C2 XSQ S(XI) +R1) (+49 OR +46) PL AT 0
 1002                            12,2572   20576 1                   0 -3,1
 1003                            12,2573   57232 0           SL4R    DMPR
 1004     REF   4  LAST 1281     12,2574   00023 0                   1/ROOTMU
 1005     REF  11  LAST 1282     12,2575   00037 0           STORE   T
 1006                            12,2576   77616 0           RVQ
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L         CONIC SUBROUTINES                                                                          USER'S PAGE NO. 24       E5 S3

  100605                          12,2577   40001 1  COMSETUP SETPD  BOV
  10061                           12,2600   00001 0                  0D
  100615                          12,2601   24602 0                  +1
  10062                           12,2602   76731 0           SSP    VLOAD*
  100625 REF   1                  12,2603   00027 1                  ITERCTR
  10063                           12,2604   00024 1                  20D
  100635 REF   4  LAST  653       12,2605   22301 0                  MUTABLE,1
  10064  REF   2  LAST 1277       12,2606   00017 1           STORE  17/MU
  100645                          12,2607   77616 0           RVQ

  1007                            12,2610   71214 0  ITERATOR BONCLR DLOAD
  1008   REF   1                  12,2611   00614 1                  SLOPESW
  1009   REF   1                  12,2612   24660 1                  FIRSTIME
  1010   REF   1                  12,2613   00037 0                  DEP
  1011                            12,2614   60225 1           DSU    NORM
  1012   REF   2  LAST  100       12,2615   02764 0                  DEPREV
  1013   REF  61  LAST 1284       12,2616   00047 1                  X1
  1014                            12,2617   60325 0           PDDL   NORM
  1015   REF   1                  12,2620   00015 0                  DELINDEP
  1016   REF  35  LAST 1281       12,2621   00050 1                  X2
  1017                            12,2622   41260 0           XSU,1  DMP
  1018   REF  36  LAST 1285       12,2623   00047 1                  X2
  1019   REF   3  LAST  100       12,2624   02762 0                  DELDEP
  1020                            12,2625   56257 1           SLR*   DDV                                          PL UP 2
  1021                            12,2626   21202 1                  1,1
  1022                            12,2627   43142 1           SR1    BOFF
  1023   REF   1                  12,2630   04351 1                  ORDERSW
  1024   REF   1                  12,2631   24634 0                  SGNCHECK
  1025                            12,2632   75246 0           ABS    SIGN         IN CASE 2ND DERIV. CHANGED SIGN, MUST
  1026   REF   4  LAST 1285       12,2633   02762 0                  DELDEP       DISREGARD IT TO FIND MIN.

  1027                            12,2634   51006 0  SGNCHECK PUSH   BPL          TRIAL DELINDEP                  PL DOWN 2
  1028   REF   1                  12,2635   24672 1                  POSDEL
  1029                            12,2636   43145 0           DLOAD  BON
  1030   REF   1                  12,2637   03770 1                  INDEP
  1031   REF   2  LAST 1285       12,2640   04311 0                  ORDERSW
  1032   REF   1                  12,2641   24643 0                  MINCHECK
  1033   REF   1                  12,2642   00017 1           STORE  MAX          IF NOT 2ND ORDER, CAN MOVE MAX BOUND IN.

  1034                            12,2643   45221 1  MINCHECK BDSU   DSU
  1035   REF   1                  12,2644   00011 1                  MIN
  1036                            12,2645   51000 0           BOV    BPL
  1037   REF   1                  12,2646   24652 0                  MOONGDEL
  1038   REF   2  LAST 1285       12,2647   24652 0                  MOONGDEL
  1039                            12,2650   77650 1           GOTO
  1040   REF   1                  12,2651   24704 1                  DELOK


  1041                            12,2652   45345 1  MOONGDEL DLOAD  DSU          TRIAL DELINDEP WOULD EXCEED MIN BOUND
  1042   REF   2  LAST 1285       12,2653   00011 1                  MIN
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 1043    REF    2  LAST 1285   12,2654   03770 1                      INDEP
 1044                          12,2655   52005 0             DMP      GOTO
 1045    REF    3  LAST 1280   12,2656   33424 0                      DP9/10
 1046    REF    1              12,2657   24706 0                      NEWDEL


 1047                          12,2660   41335 1  FIRSTIME SLOAD      DMP
 1048    REF    1              12,2661   00051 0                      TWEEKIT
 1049    REF    3  LAST 1285   12,2662   00011 1                      MIN
 1050                          12,2663   67206 1             PUSH     SLOAD
 1052    REF    2  LAST 1286   12,2664   00051 0                      TWEEKIT
 1053                          12,2665   45205 1             DMP      DSU
 10535   REF    2  LAST 1285   12,2666   00017 1                      MAX
 1054                          12,2667   52165 1             SIGN     GOTO
 1055    REF    5  LAST 1285   12,2670   02762 0                      DELDEP
 1056    REF    2  LAST 1285   12,2671   24634 0                      SGNCHECK


 1057                          12,2672   43145 0  POSDEL     DLOAD    BON
 1058    REF    3  LAST 1286   12,2673   03770 1                      INDEP
 1059    REF    3  LAST 1285   12,2674   04311 0                      ORDERSW
 1060    REF    1              12,2675   24677 1                      MAXCHECK
 1061    REF    4  LAST 1286   12,2676   00011 1             STORE    MIN                IF NOT 2ND ORDER, CAN MOVE MIN BOUND IN.

 1062                          12,2677   45221 1  MAXCHECK BDSU       DSU
 1063    REF    3  LAST 1286   12,2700   00017 1                      MAX
 1064                          12,2701   50000 1             BOV      EMN
 1065    REF    1              12,2702   24710 1                      MODPSDEL
 1066    REF    2  LAST 1286   12,2703   24710 1                      MODPSDEL
 1067                          12,2704   77745 1  DELOK      DLOAD
 1068                          12,2705   00001 0                      0
 1069    REF    2  LAST 1285   12,2706   00015 0  NEWDEL     STORE    DELINDEP
 1070                          12,2707   77616 0             RVQ


 1071                          12,2710   45345 1  MODPSDEL DLOAD      DSU
 1072    REF    4  LAST 1286   12,2711   00017 1                      MAX
 1073    REF    4  LAST 1286   12,2712   03770 1                      INDEP
 1074                          12,2713   52005 0             DMP      GOTO
 1075    REF    4  LAST 1286   12,2714   33424 0                      DP9/10
 1076    REF    2  LAST 1286   12,2715   24706 0                      NEWDEL


 1077    REF 147  LAST 1230    12,2716   4 4770 1  CHECKCTR CS        ONE
 1078    REF  34  LAST 1213    12,2717   50 120 1            INDEX    FIXLOC
 1079    REF   2  LAST 1285    12,2720   26 026 1            ADS      ITERCTR
 1082    REF 644  LAST 1254    12,2721   54 154 0            TS       MPAC
 1083    REF  63  LAST 1199    12,2722   0 6030 1            TC       DANZIG
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L          CONIC SUBROUTINES                                                                 USER'S PAGE NO.  26       E5 S3

  1084                             12,2723   44545 0  NEWSTATE DLOAD  SR4R
  1085    REF  10  LAST 1284       12,2724   00041 1                  R1
  1089                             12,2725   74225 1           DSU    VXSC
  1090    REF   4  LAST 1284       12,2726   00035 1                  XSQC(XI)
  1091    REF   3  LAST 1277       12,2727   02724 1                  UR1
  1092                             12,2730   65372 1           VSL1   PDDL              0D=(R1-XSQC(XI))UR1 (+33 OR 31) PL AT 6
  1093    REF  19  LAST 1284       12,2731   00025 0                  X
  1094                             12,2732   60316 0           DSQ    NORM
  1095    REF  62  LAST 1285       12,2733   00047 1                  X1
  1096                             12,2734   57275 0           DMPR   DMPR
  1097    REF   5  LAST 1284       12,2735   00023 0                  1/ROOTMU
  1098    REF  20  LAST 1287       12,2736   00025 0                  X
  1099                             12,2737   53605 1           DMP    SRR*
  1100    REF   5  LAST 1284       12,2740   00033 1                  S(XI)
  1101                             12,2741   21572 1                  0 -7,1
  1102                             12,2742   77621 1           BDSU
  1103    REF  12  LAST 1284       12,2743   00037 0                  T
  1104                             12,2744   74352 0           SL1    VXSC
  1105    REF  14  LAST  917       12,2745   02746 0                  VVEC
  1106                             12,2746   53372 1           VSL1   VAD                                                PL AT 0
  1107                             12,2747   41512 1           VSL4   PUSH
  1108                             12,2750   77646 0           ABVAL
  1109                             12,2751   77701 1  LAMENTER NORM
  1110    REF  63  LAST 1287       12,2752   00047 1                  X1
  1111    REF   1                  12,2753   16722 1           STODL  R2
  1112    REF   4  LAST 1283       12,2754   00031 0                  X1
  1113                             12,2755   45205 1           DMP    DSU
  1114    REF   6  LAST 1287       12,2756   00033 1                  S(XI)
  1115    REF   2  LAST 1281       12,2757   33406 0                  D1/128
  1116                             12,2760   76405 1           DMP    SL1R
  1117    REF   2  LAST 1281       12,2761   00021 1                  ROOTMU
  1118                             12,2762   53605 1           DMP    SLR*
  1119    REF  21  LAST 1287       12,2763   00025 0                  X
  1120                             12,2764   21176 1                  0 -3,1
  1121                             12,2765   74271 0           DDV    VXSC
  1122    REF   2  LAST 1287       12,2766   02722 1                  R2
  1123    REF   4  LAST 1287       12,2767   02724 1                  UR1
  1124                             12,2770   65372 1           VSL1   PDDL              0D=V2VEC PART (+15 OR 13)        PL AT 12
  1125    REF   5  LAST 1287       12,2771   00035 1                  XSQC(XI)
  1126                             12,2772   56257 1           SLR*   DDV
  1127                             12,2773   21175 1                    -4,1
  1128    REF   3  LAST 1287       12,2774   02722 1                  R2
  1129                             12,2775   77621 1           BDSU
  1130    REF   2  LAST 1282       12,2776   33422 0                  D1/256
  1131                             12,2777   53361 0           VXSC   VAD                                                PL AT 6
  1132    REF  15  LAST 1287       12,3000   02746 0                  VVEC
  1133                             12,3001   43412 1           VSL8   RVQ
R 1134
```

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  1135   REF   1                15,2000                   SETLOC  CONICS1
  1136                          15,3402                   BANK

  1137   REF   1                                          COUNT* $$/CONIC
 R1138   DO NOT DISTURB THE ORDER OF THESE CDS, OVERLAYS HAVE BEEN MADE.
  1139                          15,3402   00000 1  BEE17     DEC     0                       KEEP WITH D1/8 2DEC 1.0B-17 (0000004000)
  1140                          15,3403   04000 0  D1/8      2DEC    1.0 B-3
  1140                          15,3404   00000 1
  1141                          15,3405   00200 0  D1/128    2DEC    1.0 B-7
  1141                          15,3406   00000 1
  1142                          15,3407   00400 0  D1/64     2DEC    1.0 B-6
  1142                          15,3410   00000 1
  1143                          15,3411   10000 0  D1/4      2DEC    1.0 B-2
  1143                          15,3412   00000 1
  1144                          15,3413   02000 0  D1/16     2DEC    1.0 B-4
  1144                          15,3414   00000 1
  1145                          15,3415   01000 0  D1/32     2DEC    1.0 B-5
  1145                          15,3416   00000 1
  1146                          15,3417   00020 0  D1/1024   2DEC    1.0 B-10
  1146                          15,3420   00000 1
  1147                          15,3421   00100 0  D1/256    2DEC    1.0 B-8
  1147                          15,3422   00000 1
  1148                          15,3423   34631 1  DP9/10    2DEC    .9
  1148                          15,3424   23146 0
  1149   REF   4  LAST  731     04,3761            KEPZERO   EQUALS  LO6ZEROS
  1150                          15,3425   77467 1  -50SC     2DEC    -50.0 B-12
  1150                          15,3426   77777 0
  1151                          15,3427   03110 1  2PISC     2DEC    6.28318530 B-6
  1151                          15,3430   17665 1
  1152   REF   2  LAST  653     15,3414            BEE19     EQUALS  D1/32 -1            2DEC 1.0 B-19 (00000 01000)
  1153   REF   3  LAST 1287     15,3420            BEE22     EQUALS  D1/256 -1           2DEC 1.0 B-22 (00000 00100)
  1154                          15,3431   00000 1  ONEBIT    2DEC    1.0 B-28
  1154                          15,3432   00001 0
  1155                          15,3433   37767 0  COGUPLIM  2DEC    .999511597
  1155                          15,3434   37737 0
  1156                          15,3435   40010 1  COGLOLIM  2DEC    -.999511597
  1156                          15,3436   40040 1
 R1157
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  1158    REF    2  LAST 1276   12,2000                            SETLOC CONICS
  1159                          12,3002                            BANK

  1160    REF    2 LAST 1277 TO 1288:    451    451*               COUNT* $$/CONIC
  1161                          12,3002    45020 1  TIMETHET STQ    CALL
  1162    REF    1              12,3003    02712 1                  RTNTT
  1163    REF    1              12,3004    25763 1                  PRAMSET
  1167                          12,3005    77624 1           CALL
  1168    REF    2  LAST  915   12,3006    37727 1                  PARAM
  1169                          12,3007    45000 0           BOV    CALL                                             PL AT 0
  1170    REF    1              12,3010    25027 0                  COGAOVFL
  1171    REF    1              12,3011    25032 1                  GETX
  1172                          12,3012    43145 0  COMMNOUT DLOAD  BON
  1173    REF    5  LAST 1287   12,3013    00031 0                  X1
  1174    REF    1              12,3014    04310 1                  INFINFLG
  1175    REF    1              12,3015    25760 1                  ABTCONIC
  1176                          12,3016    45014 0           CLEAR  CALL
  1177    REF    1              12,3017    04273 0                  COGAFLAG
  1178    REF    2  LAST 1279   12,3020    24462 1                  DELTIME
  1179                          12,3021    45014 0           BON    CALL
  1180    REF   10  LAST  917   12,3022    03706 0                  RVSW
  1181    REF    2  LAST 1289   12,3023    02712 1                  RTNTT
  1182    REF    1              12,3024    24723 1                  NEWSTATE
  1183                          12,3025    77650 1           GOTO
  1184    REF    3  LAST 1289   12,3026    02712 1                  RTNTT


  1185                          12,3027    77614 1  COGAOVFL SETGO
  1186    REF    2  LAST 1289   12,3030    04033 0                  COGAFLAG
  1187    REF    2  LAST 1289   12,3031    25760 1                  ABTCONIC
  11874   REF    1              17,2000                    SETLOC CONICS2
  11876                         17,3727                    BANK
  11878   REF    1                                         COUNT* $$/CONIC
  1188                          17,3727    43020 1  PARAM    STQ    CLEAR      MPAC=V1VEC, 00=R1VEC          PL AT 6
  1189    REF    2  LAST  100   17,3730    02755 1                  RTNPRM
  1190    REF    6  LAST  905   17,3731    03665 1                  NORMSW
  11901                         17,3732    77614 1           CLEAR
  11902   REF    3  LAST 1289   17,3733    04273 0                  COGAFLAG
  1191                          17,3734    45131 0           SSP    CALL
  1192    REF    3  LAST  492   17,3735    02675 1                  GEOMSGN
  1193                          17,3736    27777 0                  37777      GAMMA ALWAYS LESS THAN 180DEG
  1194    REF    1              17,3737    13717 1                  GEOM       MPAC=SNGA (+1), 00=CSGA (+1) PL AT 2
  1195                          17,3740    14045 0           STODL  360        360=SIN GAMMA (+1)            PL AT 0
  1196                          17,3741    56261 1           SR     00V
  1197                          17,3742    20606 0                  5

  1198                          17,3743    00045 0                  360
  1199    REF    4  LAST  915   17,3744    33770 1           STOVL* COGA
  1200    REF    5  LAST 1285   17,3745    22301 0                  MUTABLE,1
  1201    REF    3  LAST 1285   17,3746    14017 1           STODL  1/MU
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 1202   REF   3  LAST  100   17,3747   02722 1                  MAGVEC2
 1203                        17,3750   60316 0          DSQ     NORM
 1204   REF  64  LAST 1287   17,3751   00047 1                  X1
 1205                        17,3752   41275 1          DMPR    DMP
 1206   REF   4  LAST 1289   17,3753   00017 1                  1/MU
 1207   REF  11  LAST 1287   17,3754   00041 1                  R1
 1208                        17,3755   77657 0          SRR*
 1209                        17,3756   21576 0                  0 -3,1
 1210                        17,3757   44206 0          PUSH    BDSU             00=R1 V1SQ/MU (+6)            PL AT 2
 1211   REF   3  LAST 1288   17,3760   33416 1                  D1/32
 1212   REF   4  LAST  915   17,3761   16744 1          STODL   R1A              R1A (+6)                      PL AT 0

 1213                        17,3762   60205 0          DMP     NORM
 1214                        17,3763   00045 0                  36D
 1215   REF  65  LAST 1290   17,3764   00047 1                  X1
 1216                        17,3765   53605 1          DMP     SR*
 1217                        17,3766   00045 0                  36D
 1218                        17,3767   20575 1                  0 -4,1
 1219   REF   5  LAST  915   17,3770   36742 0          STCALL  P                P (+4)
 1221   REF   3  LAST 1289   17,3771   02755 1                  RTNPRM
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L          CONIC SUBROUTINES                                                                USER'S PAGE NO.  30        E5 S3

  1222    REF    1                   05,2000                              SETLOC CONICS4
  1223                               05,3717                              BANK

  1224    REF    1                                                        COUNT* $$/CONIC
  1225                               05,3717    77656 1  GEOM             UNIT                       MPAC=V2VEC, 00=R1VEC              PL AT 6
  1226    REF    2  LAST  100        05,3720    16714 1                   STODL  U2                  U2 (+1)
  1227                               05,3721    00045 0                          36D
  1228    REF    4  LAST 1290        05,3722    26722 1                   STOVL  MAGVEC2                                              PL AT 0
  1229                               05,3723    77656 1                   UNIT
  1230    REF    5  LAST 1287        05,3724    02724 1                   STORE  UR1                 UR1 (+1)
  1231                               05,3725    72441 0                   DOT    SL1
  1232    REF    3  LAST 1291        05,3726    02714 1                          U2
  1233                               05,3727    77725 1                   PDDL                       00=CSTH (+1)                      PL AT 2
  1234                               05,3730    00045 0                          36D
  1235    REF   12  LAST 1290        05,3731    24041 1                   STOVL  R1                  R1 (+29 OR +27)
  1236    REF    6  LAST 1291        05,3732    02724 1                          UR1
  1237                               05,3733    76435 1                   VXV    VSL1
  1238    REF    4  LAST 1291        05,3734    02714 1                          U2
  1239                               05,3735    75214 1                   BON    SIGN
  1240    REF    7  LAST 1289        05,3736    03705 0                          NORMSW
  1241    REF    1                   05,3737    13751 0                          HAVENORM
  1242    REF    4  LAST 1289        05,3740    02675 1                          GEOMSGN
  1243                               05,3741    40056 0                   UNIT   BOV
  1244    REF    1                   05,3742    13747 1                          COLINEAR
  1245    REF    4  LAST  491        05,3743    16676 1  UNITNORM STODL  UN                  UN (+1)
  1246                               05,3744    00045 0                          36D
  1247                               05,3745    43565 0                   SIGN   RVQ                 MPAC=SNTH (+1), 34D=SNTH.SNTH (+2)
  1248    REF    5  LAST 1291        05,3746    02675 1                          GEOMSGN


  1249                               05,3747    52162 0  COLINEAR VSR1   GOTO
  1250    REF    1                   05,3750    13743 0                          UNITNORM


  1251                               05,3751    75246 0  HAVENORM ABVAL  SIGN
  1252    REF    6  LAST 1291        05,3752    02675 1                          GEOMSGN
  1253                               05,3753    77616 0                   RVQ                        MPAC=SNTH (+1), 34D=SNTH.SNTH (+2)
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 1255    REF    3  LAST 1289   12,2000                         SETLOC CONICS
 1256                          12,3032                         BANK

 12565   REF    3 LAST 1289 TO 1289:      24   475*            COUNT* $$/CONIC
 1257                          12,3032   66374 1   GETX        AXT,2  SSP               ASSUMES P (+4) IN MPAC
 1258                          12,3033   00003 1                      3
 1259    REF   22  LAST 1260   12,3034   00052 0                      S2
 1260                          12,3035   00001 0                      1
 1261                          12,3036   77614 1               CLEAR
 1262    REF    1              12,3037   04276 0                      360SW
 1263                          12,3040   65366 1               SQRT   PDDL              0D=SQRT(P)                    PL AT 2
 1264    REF    7  LAST  904   12,3041   02734 0                      CSTH
 1265                          12,3042   44342 1               SR1    BDSU
 1266    REF    3  LAST  671   12,3043   33412 0                      D1/4
 1267                          12,3044   54325 1               PDDL   SRR                                            PL AT 4D
 1268    REF    9  LAST  904   12,3045   02732 0                      SNTH
 1269                          12,3046   21607 0                      6
 1270                          12,3047   77671 1               DDV                                                   PL AT 2
 1271                          12,3050   77600 1               BOV
 1272    REF    1              12,3051   25165 1                      360CHECK
 1273                          12,3052   41225 1               DSU    DMP
 1274    REF    5  LAST 1289   12,3053   03770 1                      COGA                                              PL AT 0
 1275                          12,3054   40132 0               SL2R   BOV
 1276    REF    2  LAST 1292   12,3055   25165 1                      360CHECK
 1277                          12,3056   63406 0   WLOOP       PUSH   DSQ               0D=W (+5)                       PL AT 2
 1278                          12,3057   65351 0               TLOAD  PDDL              2D=WSQ (+10)                    PL AT 5
 1279    REF 645   LAST 1286   12,3060   00155 0                      MPAC
 1280    REF    5  LAST 1290   12,3061   02744 1                      R1A
 1281                          12,3062   76202 0               SR4    TAD                                            PL AT 2
 1282                          12,3063   75440 0               BMN    SQRT
 1283    REF    1              12,3064   25250 1                      INFINITY
 1284                          12,3065   43306 0               ROUND  DAD                                            PL AT 0D
 1285                          12,3066   61000 0               BOV    TIX,2
 1286    REF    1              12,3067   25163 1                      RESETX2
 1287    REF    1              12,3070   25056 0                      WLOOP


 1288                          12,3071   40065 0               BDDV   BOV
 1289    REF    3  LAST 1287   12,3072   33406 0                      D1/128
 1290    REF    2  LAST 1292   12,3073   25250 1                      INFINITY
 1291                          12,3074   41440 1   POLYCOEF BMN       PUSH              0D=1/W (+2) OR 16/W (+6)     PL AT 2
 1292    REF    3  LAST 1292   12,3075   25250 1                      INFINITY
 1293                          12,3076   77716 1               DSQ
 1294                          12,3077   41301 0               NORM   DMP
 1295    REF   66  LAST 1290   12,3100   00047 1                      X1
 1296    REF    6  LAST 1292   12,3101   02744 1                      R1A
 1297                          12,3102   77457 1               SRR*   EXIT
 1298                          12,3103   21567 0                      0 -10D,1
 1299    REF    9  LAST 1283   12,3104   07171 1               TC     POLY
 1300                          12,3105   00005 1               DEC    5
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  1301                             12,3106   20000 0            2DEC    .5
  1301                             12,3107   00000 1
  1302                             12,3110   72525 0            2DEC    -.166666770
  1302                             12,3111   52471 1
  1303                             12,3112   03146 1            2DEC    .100000392
  1303                             12,3113   15003 0
  1304                             12,3114   75556 0            2DEC    -.071401086
  1304                             12,3115   45210 0
  1305                             12,3116   01615 1            2DEC    .055503292
  1305                             12,3117   13553 0
  1306                             12,3120   76371 0            2DEC    -.047264098
  1306                             12,3121   63777 0
  1307                             12,3122   01232 0            2DEC    .040694204
  1307                             12,3123   27367 0
  1308   REF 232  LAST 1283        12,3124  0 6006 1            TC      INTPRET
  1309                             12,3125   76405 1            DMP     SL1R                                      PL AT 0D
  1310                             12,3126   43006 0            PUSH    BON
  1311   REF   2  LAST 1292        12,3127   04316 1                    360SW
  1312   REF   1                   12,3130   25235 1                    TRUE360X
  1313                             12,3131   60316 0  XCOMMON   DSQ     NORM
  1314   REF  67  LAST 1292        12,3132   00047 1                    X1
  1315                             12,3133   53605 1            DMP     SRR*
  1316   REF   7  LAST 1292        12,3134   02744 1                    X1A
  1317                             12,3135   21565 1                    0 -12D,1
  1318   REF   6  LAST 1289        12,3136   14031 0            STODL   X1              X1 (+6)


  1319   REF  13  LAST 1291        12,3137   00041 1                    R1
  1320                             12,3140   75542 0            SR1     SQRT
  1321                             12,3141   41306 1            ROUND   DMP
  1322                             12,3142   77632 0            SL4R                                              PL AT 0
  1323   REF  22  LAST 1287        12,3143   00025 0            STORE   X               X (+17 OR +16)


  1324                             12,3144   60316 0            DSQ     NORM
  1325   REF  68  LAST 1293        12,3145   00047 1                    X1
  1326                             12,3146   41325 0            PDDL    DMP             0D=XSQ (+34 OR +32 -N1)   PL AT 2
  1327   REF   6  LAST 1290        12,3147   02742 1                    P
  1328   REF  14  LAST 1293        12,3150   00041 1                    R1
  1329                             12,3151   75452 0            SL3     SQRT
  1330                             12,3152   56405 0            DMP     SL3R
  1331   REF   6  LAST 1292        12,3153   03770 1                    COGA
  1332   REF   3  LAST 1284        12,3154   14043 0            STODL   KEPC1
  1333   REF   8  LAST 1293        12,3155   02744 1                    R1A
  1334                             12,3156   43021 0            BDSU    CLEAR
  1335   REF   3  LAST 1277        12,3157   33410 1                    D1/64
  1336   REF   2  LAST 1289        12,3160   04270 0                    INFINFLG
  1337   REF   3  LAST 1284        12,3161   00045 0            STORE   KEPC2
  1338                             12,3162   77616 0            RVQ
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 1339                        12,3163   77774 0  RESETX2  AXT,2
 1340                        12,3164   00003 1                    3

 1341                        12,3165   51001 1  360CHECK SETPD   BPL
 1342                        12,3166   00001 0                    0D
 1343   REF   1              12,3167   25172 1                    INVRSEQN
 1344                        12,3170   77614 1           SET
 1345   REF   3  LAST 1293   12,3171   04076 1                    360SW

 1346                        12,3172   75545 1  INVRSEQN DLOAD   SQRT
 1347   REF   7  LAST 1293   12,3173   02742 1                    P
 1348                        12,3174   41325 0           PDDL     DMP         0D=SQRT(P)  (+2)              PL AT 2
 1349   REF  10  LAST 1292   12,3175   02732 0                    SNTH
 1350   REF   7  LAST 1293   12,3176   03770 1                    COGA
 1351                        12,3177   65352 0           SL1      PDDL        2D=SNTH COGA (+5)             PL AT 4
 1352   REF   8  LAST 1292   12,3200   02734 0                    CSTH
 1353                        12,3201   43202 0           SR4      DAD
 1354   REF   4  LAST 1290   12,3202   33416 1                    D1/32
 1355                        12,3203   41225 1           DSU      DMP                                     PL AT 2,0
 1356                        12,3204   55301 0           NORM     BDDV
 1357   REF  69  LAST 1293   12,3205   00047 1                    X1
 1358   REF  11  LAST 1294   12,3206   02732 0                    SNTH
 1359                        12,3207   51457 0           SLR*     ABS         NOTE: NEAR 360 CASE TREATED DIFFERENTLY
 1360                        12,3210   21174 0                    0 -5,1
 1361                        12,3211   63406 0           PUSH     DSQ         0D=1/W (-1)                 PL AT 2
 1362                        12,3212   14043 0           STODL    34D
 1363   REF   1              12,3213   33414 0                    D1/16
 1364                        12,3214   63406 0  1/WLOOP  PUSH     DSQ         2D=G (+4)                     PL AT 4
 1365                        12,3215   65234 1           RTB      PDDL                                    PL AT 7
 1366   REF  12  LAST 1284   12,3216   45657 1                    TPMODE
 1367   REF   9  LAST 1293   12,3217   02744 1                    R1A
 1368                        12,3220   40405 1           DMP      SR4
 1369                        12,3221   00043 0                    34D
 1370                        12,3222   77771 0           TAD                                                PL AT 4
 1371                        12,3223   75440 0           BMN      SQRT
 1372   REF   4  LAST 1292   12,3224   25250 1                    INFINITY
 1373                        12,3225   77615 0           DAD                                              PL AT 2
 1374                        12,3226   60304 0           TIX,2    NORM
 1375   REF   1              12,3227   25214 1                    1/WLOOP
 1376   REF  70  LAST 1294   12,3230   00047 1                    X1
 1377                        12,3231   77665 1           BDDV                                               PL AT 0
 1378                        12,3232   52057 1           SLR*     GOTO
 1379                        12,3233   21172 0                    0 -7,1
 1380   REF   1              12,3234   25074 0                    POLYCOEF

 1381                        12,3235   50145 1  TRUE360X DLOAD   BMN
 1382   REF  10  LAST 1294   12,3236   02744 1                    R1A
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L          CONIC SUBROUTINES                                                                   USER'S PAGE NO.  34       E5 S3

  1383    REF    5  LAST 1294   12,3237    25250 1                        INFINITY
  1384                          12,3240    60366 1             SQRT       NORM
  1385    REF   71  LAST 1294   12,3241    00047 1                        X1
  1386                          12,3242    53665 1             BDDV       SL*
  1387    REF    5  LAST 1277   12,3243    33430 0                        2PISC
  1388                          12,3244    20176 0                        0  -3,1
  1389                          12,3245    41425 1             DSU        PUSH              0D=2PI/SQRT(R1A) -X          PL AT 0,2
  1390                          12,3246    77650 1             GOTO
  1391    REF    1              12,3247    25131 0                        XCOMMON
  1392                          12,3250    40001 1   INFINITY  SETPD      BOV               NO SOLUTION EXISTS SINCE CLOSURE THROUGH
  1393                          12,3251    00001 0                        0                 INFINITY IS REQUIRED
  1394    REF    1              12,3252    25253 1                        OVFLCLR
  1395                          12,3253    43414 1   OVFLCLR   SET        RVQ
  1396    REF    3  LAST 1293   12,3254    04070 1                        INFINFLG
  1397                           12,3255   45020 1  LAMBERT  STQ    CALL
  1398    REF   5  LAST  100     12,3256   02712 1                  RTNLAMB
  1399    REF   2  LAST 1277     12,3257   24577 1                  COMSETUP
  1405                           12,3260   57345 1           DLOAD  DMPR
  1406    REF   3  LAST  491     12,3261   02673 1                  TDESIRED
  1407    REF   1                12,3262   33415 1                  BEE19
  1408    REF   1                12,3263   03772 0           STORE  EPSILONL
  1409                           12,3264   77214 0           SET    VLOAD
  1410    REF   2  LAST 1285     12,3265   00474 0                  SLOPESW
  1411    REF   7  LAST  492     12,3266   02657 1                  R1VEC
  1412                           12,3267   45115 0           PDVL   CALL               0D=R1VEC (+29 OR +27)          PL AT 6
  1413    REF  10  LAST  493     12,3270   02665 0                  R2VEC              MPAC=R2VEC (+29 OR +27)
  1414    REF   2  LAST 1289     12,3271   13717 1                  GEOM
  1415    REF  12  LAST 1294     12,3272   16732 0           STODL  SNTH               0D=CSTH (+1)                   PL AT 2
  1416    REF   5  LAST 1291     12,3273   02722 1                  MAGVEC2
  1417                           12,3274   65301 0           NORM   PDDL                                              PL AT 4
  1418    REF  72  LAST 1295     12,3275   00047 1                  X1
  1419    REF  15  LAST 1293     12,3276   00041 1                  R1
  1420                           12,3277   56342 1           SR1    DDV                                               PL AT 2
  1421                           12,3300   65257 1           SL*    PDDL               DXCH WITH 0D, 0D=R1/R2 (+7)    PL AT 0,2
  1422                           12,3301   20173 0                  0 -6,1
  1423                           12,3302   77626 0           STADR
  1424    REF   9  LAST 1294     12,3303   75043 1           STORE  CSTH               CSTH (+1)
  1425                           12,3304   44342 1           SR1    BDSU
  1426    REF   4  LAST 1292     12,3305   33412 0                  D1/4
  1427    REF   2  LAST  100     12,3306   02736 1           STORE  1-CSTH             1-CSTH (+2)

  1428                           12,3307   53106 0           ROUND  BZE
  1429    REF   1                12,3310   25524 0                  360LAMB
  1430                           12,3311   65301 0           NORM   PDDL                                              PL AT 4
  1431    REF  73  LAST 1296     12,3312   00047 1                  X1
  1432                           12,3313   00001 0                  0D
  1433                           12,3314   56342 1           SR1    DDV                                               PL AT 2
  1434                           12,3315   75457 0           SL*    SQRT
  1435                           12,3316   20176 0                  0 -3,1
  1436                           12,3317   54325 1           PDDL   SR                 2D=SQRT(2R1/R2(1-CSTH)) (+5)   PL AT 4
  1437    REF  13  LAST 1296     12,3320   02732 0                  SNTH
  1438                           12,3321   20607 1                  6
  1439                           12,3322   43271 1           DDV    DAD                                               PL AT 2
  1440    REF   3  LAST 1296     12,3323   02736 1                  1-CSTH
  14401                          12,3324   77626 0           STADR
  14402   REF   1                12,3325   77760 0           STORE  COGAMAX
  1441                           12,3326   50000 1           BOV    BMN                IF OVFL, COGAMAX=COGUPLIM
  1442    REF   1                12,3327   25334 1                  UPLIM              IF NEG, USE EVEN IF LT COGLOLIM, SINCE
  14421   REF   1                12,3330   25337 1                  MAXCOGA              THIS WOULD BE RESET IN LAMBLOOP
  14422                          12,3331   50025 0           DSU    BMN                IF COGAMAX GT COGUPLIM, COGAMAX=COGUPLIM
  14423   REF   1                12,3332   33434 1                  COGUPLIM
  14424   REF   2  LAST 1296     12,3333   25337 1                  MAXCOGA            OTHERWISE OK, SO GO TO MAXCOGA
  14425                          12,3334   77745 1  UPLIM    DLOAD
  14426   REF   2  LAST 1296     12,3335   33434 1                  COGUPLIM           COGUPLIM=.999511597 = MAX VALUE OF COGA
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14427  REF   2  LAST 1296    12,3336   00017 1            STORE  COGAMAX         NOT CAUSING OVFL IN R1A CALCULATION
1443                         12,3337   54345 1  MAXCOGA   DLOAD  SR
1444   REF  10  LAST 1296    12,3340   02734 0                   CSTH
1445                         12,3341   20607 1                   6
1446                         12,3342   45425 0            DSU    STADR
1448   REF   2  LAST  100    12,3343   61037 1            STODL  CSTH-RHO
1449   REF   7  LAST 1291    12,3344   02675 1                   GEOMSGN
1450                         12,3345   71240 1            BMN    DLOAD
1451   REF   1               12,3346   25543 1                   LOLIM
1452   REF   3  LAST 1297    12,3347   02740 0                   CSTH-RHO
1453                         12,3350   56352 0            SL1    DDV
1454   REF  14  LAST 1296    12,3351   02732 0                   SNTH
1455                         12,3352   77600 1            BOV
1456   REF   2  LAST 1297    12,3353   25543 1                   LOLIM
1457   REF   1               12,3354   00011 1  MINCOGA   STORE  COGAMIN        COGAMIN (+5)
1458                         12,3355   66214 0            BON    SSP
1459   REF   4  LAST  729    12,3356   00715 1                   GUESSW
1460   REF   1               12,3357   25530 0                   NOGUESS
1461   REF   3  LAST 1286    12,3360   00051 0                   TWEEKIT
1462                         12,3361   00001 0                   00001
1463                         12,3362   77745 1            DLOAD
1464   REF   8  LAST 1294    12,3363   03770 1                   COGA


1465                         12,3364   77605 1  LAMBLOOP  DMP
1466   REF  15  LAST 1297    12,3365   02732 0                   SNTH
1467                         12,3366   45342 0            SR1    DSU
1468   REF   4  LAST 1297    12,3367   02740 0                   CSTH-RHO
1469                         12,3370   65301 0            NORM   PDDL           OD=SNTH COGA-(CSTH-RHO) (+7+C(X1)) PL=2
1470   REF  74  LAST 1296    12,3371   00047 1                   X1
1471   REF   4  LAST 1296    12,3372   02736 1                   1-CSTH
1472                         12,3373   56257 1            SL*    DDV            1-CSTH  (+2)                   PL AT 0
1473                         12,3374   20170 0                   0 -9D,1
1474                         12,3375   53040 0            BMN    BZE
1475   REF   1               12,3376   25462 0                   NEGP
1476   REF   2  LAST 1297    12,3377   25462 0                   NEGP
1477   REF   8  LAST 1294    12,3400   16742 1            STODL  P              P=(1-CSTH)/(SNTH COGA-(CSTH-RHO)) (+4)
1478   REF   9  LAST 1297    12,3401   03770 1                   COGA
1479                         12,3402   43316 1            DSQ    DAD
1480   REF   2  LAST  671    12,3403   33420 1                   D1/1024
1481                         12,3404   41301 0            NORM   DMP
1482   REF  75  LAST 1297    12,3405   00047 1                   X1
1483   REF   9  LAST 1297    12,3406   02742 1                   P
1484                         12,3407   44257 1            SR*    BDSU
1485                         12,3410   20571 0                   0 -8D,1
1486   REF   5  LAST 1294    12,3411   33416 1                   D1/32
1487   REF  11  LAST 1294    12,3412   16744 1            STODL  R1A            R1A=2-P(1+COGA COGA) (+6)

1488   REF  10  LAST 1297    12,3413   02742 1                   P
1489                         12,3414   45000 0            BOV    CALL
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  1490   REF   1               12,3415   25465 1                            HIENERGY
  1491   REF   2  LAST 1289    12,3416   25032 1                            GETX
  1492                         12,3417   77745 1                   DLOAD
  1493   REF  13  LAST 1287    12,3420   00037 0                            T
  1494   REF   1               12,3421   16764 0                   STODL    TPREV
  1495   REF   7  LAST 1293    12,3422   00031 0                            XI
  1496                         12,3423   45014 0                   BON      CALL
  1497   REF   4  LAST 1295    12,3424   04310 1                            INFINFLG
  1498   REF   3  LAST 1297    12,3425   25462 0                            NEGP                  HAVE EXCEEDED THEORETICAL BOUNDS
  1499   REF   3  LAST 1289    12,3426   24462 1                            DELTIME
  1500                         12,3427   44200 0                   BOV      BDSU
  1501   REF   1               12,3430   25501 1                            BIGTIME
  1502   REF   4  LAST 1296    12,3431   02673 1                            TDESIRED
  1503   REF   1               12,3432   02762 0                   STORE    TERRLAMB
  1504                         12,3433   44246 1                   ABS      BDSU
  1505   REF   2  LAST 1296    12,3434   03772 0                            EPSILONL
  1506                         12,3435   47044 1                   BPL      RTB
  1507   REF   1               12,3436   25546 1                            INITV
  1508   REF   2  LAST 1280    12,3437   24716 1                            CHECKCTR
  1509                         12,3440   43030 0                   BHIZ     BON
  15091  REF   1               12,3441   25511 0                            SUFFCHEK
  15092  REF   3  LAST 1296    12,3442   00714 0                            SLOPESW
  15093  REF   1               12,3443   25451 0                            GOITER
  15094                        12,3444   45345 1                   DLOAD    DSU
  15095  REF  14  LAST 1298    12,3445   00037 0                            T
  15096  REF   2  LAST 1298    12,3446   02764 0                            TPREV
  15097                        12,3447   77654 0                   BZE
  1510   REF   2  LAST 1298    12,3450   25511 0                            SUFFCHEK
  15105                        12,3451   77624 1   GOITER          CALL
  1511   REF   1               12,3452   24610 0                            ITERATOR
  1512                         12,3453   53145 1                   DLOAD    BZE
  1513   REF 646  LAST 1292    12,3454   00155 0                            MPAC
  1514   REF   3  LAST 1298    12,3455   25511 0                            SUFFCHEK
  1515                         12,3456   77615 0                   DAD
  1516   REF  10  LAST 1297    12,3457   03770 1                            COGA
  1517   REF  11  LAST 1298    12,3460   37770 0                   STCALL   COGA
  1519   REF   1               12,3461   25364 1                            LAMBLOOP


  1520                         12,3462   51145 0   NEGP            DLOAD    BPL                   IMPOSSIBLE TRAJECTORY DUE TO INACCURATE
  1521   REF   1               12,3463   00015 0                            DCOGA                 BOUND CALCULATION. TRY NEW COGA.
  1522   REF   1               12,3464   25504 1                            LOENERGY


  1523                         12,3465   71201 1   HIENERGY SETPD  DLOAD                          HIGH ENERGY TRAJECTORY RESULTED
  1524                         12,3466   00001 0                   0
  1525   REF  12  LAST 1298    12,3467   03770 1                            COGA                  IN OVFL OF P OR R1A, OR XI EXCEEDING 50.
  1526   REF   2  LAST 1297    12,3470   00011 1                   STORE    COGAMIN               THIS IS THE NEW BOUND.
  1527                         12,3471   70545 1   COMMONLM DLOAD  SR1
  1528   REF   2  LAST 1298    12,3472   00015 0                            DCOGA
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 1529   REF   3  LAST 1298   12,3473   00015 0                STORE  DCOGA        USE DCOGA/2 AS DECREMENT
 1530                        12,3474   44254 1                BZE    BDSU
 15301  REF   4  LAST 1298   12,3475   25511 0                       SUFFCHEK
 1531   REF  13  LAST 1298   12,3476   03770 1                       COGA
 1532   REF  14  LAST 1299   12,3477   37770 0                STCALL COGA
 1534   REF   2  LAST 1298   12,3500   25364 1                       LAMBLOOP

 1535                        12,3501   77745 1  BIGTIME  DLOAD
 1536   REF   3  LAST 1298   12,3502   02764 0                       TPREV
 1537   REF  15  LAST 1298   12,3503   00037 0                STORE  T

 1538                        12,3504   71201 1  LOENERGY SETPD  DLOAD        LOW ENERGY TRAJECTORY RESULTED
 1539                        12,3505   00001 0                       0
 1540   REF  15  LAST 1299   12,3506   03770 1                       COGA         IN OVERFLOW OF TIME.
 1541   REF   3  LAST 1297   12,3507   34017 0                STCALL COGAMAX      THIS IS THE NEW BOUND.
 1543   REF   1              12,3510   25471 1                       COMMONLM

 1544                        12,3511   51545 1  SUFFCHEK DLOAD  ABS
 1545   REF   2  LAST 1298   12,3512   02762 0                       TERRLAMB
 1546                        12,3513   41325 0                PDDL   DMP                                     PL AT 2D
 1547   REF   5  LAST 1298   12,3514   02673 1                       TDESIRED
 1548   REF   5  LAST 1296   12,3515   33412 0                       D1/4
 1549                        12,3516   45215 0                DAD    DSU                                     PL AT 0D
 1550   REF   3  LAST  671   12,3517   33432 1                       ONEBIT
 1551                        12,3520   43044 0                BPL    SETGO
 1552   REF   2  LAST 1298   12,3521   25546 1                       INITV
 1553   REF   1              12,3522   02434 0                       SOLNSW
 1554   REF   6  LAST 1296   12,3523   02712 1                       RTNLAMB

 1555                        12,3524   43001 1  360LAMB  SETPD  SETGO        LAMBERT CANNOT HANDLE CSTH=1
 1556                        12,3525   00001 0                       0
 1557   REF   2  LAST 1299   12,3526   02434 0                       SOLNSW
 1558   REF   7  LAST 1299   12,3527   02712 1                       RTNLAMB

 1559                        12,3530   71331 0  NOGUESS  SSP    DLOAD
 1560   REF   4  LAST 1297   12,3531   00051 0                       TWEEKIT
 1561                        12,3532   10000 0                       20000
 1562   REF   3  LAST 1298   12,3533   00011 1                       COGAMIN
 1563                        12,3534   65342 1                SR1    PDDL                                    PL AT 2
 1564   REF   4  LAST 1299   12,3535   00017 1                       COGAMAX
 1565                        12,3536   43342 0                SR1    DAD
 1566                        12,3537   77626 0                STADR                                          PL AT 0
 1567   REF  16  LAST 1299   12,3540   74007 0                STORE  COGA
 1568   REF   4  LAST 1299   12,3541   34015 1                STCALL DCOGA
 1570   REF   3  LAST 1299   12,3542   25364 1                       LAMBLOOP
 1574                           12,3543   52145 0  LOLIM    DLOAD  GOTO
 1575   REF   1                 12,3544   33436 0                  COGLOLIM         COGLOLIM=-.99951159 7
 1576   REF   1                 12,3545   25354 1                  MINCOGA


 1577                           12,3546   60345 0  INITV    DLOAD  NORM
 1578   REF  16  LAST 1296      12,3547   00041 1                  R1
 1579   REF  76  LAST 1297      12,3550   00047 1                  X1
 1580                           12,3551   70525 1           PDDL   SR1                                      PL AT 2
 1581   REF  11  LAST 1297      12,3552   02742 1                  P
 1582                           12,3553   77671 1           DDV                                             PL AT 0
 1583                           12,3554   75457 0           SL*    SQRT
 1584                           12,3555   20175 0                  0 -4,1
 1585                           12,3556   72405 0           DMP    SL1
 1586   REF   3  LAST 1287      12,3557   00021 1                  ROOTMU
 1587                           12,3560   41206 0           PUSH   DMP              00=VTAN (+7)            PL AT 2
 1588   REF  17  LAST 1299      12,3561   03770 1                  COGA
 1589                           12,3562   74261 1           SL     VXSC
 1590                           12,3563   20206 1                  5
 1591   REF   7  LAST 1291      12,3564   02724 1                  UR1
 1592                           12,3565   77725 1           PDDL                    XCH WITH 00             PL AT 0,6
 1593                           12,3566   76561 1           VXSC   VSL1
 1594   REF   5  LAST 1291      12,3567   02676 1                  UN
 1595                           12,3570   53235 0           VXV    VAD                                      PL AT 0
 1596   REF   8  LAST 1300      12,3571   02724 1                  UR1
 1597                           12,3572   43172 1           VSL1   CLEAR
 1598   REF   3  LAST 1299      12,3573   02674 0                  SOLNSW
 1599   REF  16  LAST 1287      12,3574   02746 0           STORE  VVEC
 1600                           12,3575   53135 0           SLOAD  BZE
 1601   REF   5  LAST  493      12,3576   02704 0                  VTARGTAG
 1602   REF   1                 12,3577   25602 1                  TARGETV
 1603                           12,3600   77650 1           GOTO
 1604   REF   8  LAST 1299      12,3601   02712 1                  RTNLAMB


 1605                           12,3602   45145 0  TARGETV  DLOAD  CALL
 1606   REF   6  LAST 1296      12,3603   02722 1                  MAGVEC2
 1607   REF   1                 12,3604   24751 1                  LAMENTER
 1608   REF   4  LAST  493      12,3605   36705 0           STCALL VTARGET
 1610   REF   9  LAST 1300      12,3606   02712 1                  RTNLAMB
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L         CONIC SUBROUTINES                                                                  USER'S PAGE NO.  40        E5 S3

  1611                               12,3607   45020 1  TIMERAD  STQ     CALL
  1612    REF   1                    12,3610   02712 1                   RTNTR
  1613    REF   2  LAST 1289         12,3611   25763 1                   PRAMSET
  1617                               12,3612   77624 1           CALL
  1618    REF   3  LAST 1289         12,3613   37727 1                   PARAM
  1619                               12,3614   71200 0           BOV     DLOAD                                         PL AT 0
  1620    REF   2  LAST 1289         12,3615   25027 0                   COGAOVFL
  1621    REF   6  LAST 1297         12,3616   33416 1                   D1/32
  1622                               12,3617   41225 1           DSU     DMP
  1623    REF  12  LAST 1297         12,3620   02744 1                   R1A
  1624    REF  12  LAST 1300         12,3621   02742 1                   P
  1625                               12,3622   41366 1           SQRT    DMP
  1626    REF  18  LAST 1300         12,3623   03770 1                   COGA
  1627                               12,3624   74212 0           SL4     VXSC
  1628    REF   5  LAST 1291         12,3625   02714 1                   U2
  1629                               12,3626   45325 1           PDDL    DSU                                           PL AT 6
  1630    REF   4  LAST 1293         12,3627   33410 1                   D1/64
  1631    REF  13  LAST 1301         12,3630   02744 1                   R1A
  1632                               12,3631   52361 1           VXSC    VSU                                           PL AT 0
  1633    REF   9  LAST 1300         12,3632   02724 1                   UR1
  1634                               12,3633   53512 1           VSL4    UNIT
  16345                              12,3634   77600 1           BOV
  16346   REF   1                    12,3635   25713 0                   CIRCULAR
  1635                               12,3636   60325 0           PDDL    NORM              0D=UNIT(ECC) (+3)           PL AT 6
  1636    REF   5  LAST  917         12,3637   02760 1                   RDESIRED          36D=ECC (+3)
  1637    REF  77  LAST 1300         12,3640   00047 1                   X1
  1638                               12,3641   41325 0           PDDL    DMP                                         PL AT 8
  1639    REF  17  LAST 1300         12,3642   00041 1                   R1
  1640    REF  13  LAST 1301         12,3643   02742 1                   P
  1641                               12,3644   56257 1           SL*     DDV                                         PL AT 6
  1642                               12,3645   20201 0                   0,1
  1643                               12,3646   56225 1           DSU     DDV
  1644    REF   2  LAST 1294         12,3647   33414 0                   D1/16
  1645                               12,3650   00045 0                   36D               36D=ECC (+3)
  1646    REF   1                    12,3651   00031 0           STORE   COSF
  1647                               12,3652   63400 0           BOV     DSQ
  1648    REF   1                    12,3653   20453 1                   BADR2
  1649                               12,3654   50021 1           BDSU    BMN
  1650    REF   6  LAST 1299         12,3655   33412 0                   D1/4
  16505   REF   2  LAST 1301         12,3656   20453 1                   BADR2
  1651                               12,3657   75366 0           SQRT    SIGN
  1652    REF   4  LAST  917         12,3660   02757 0                   SGNRDOT
  16525                              12,3661   77614 1           CLEAR
  1653    REF   1                    12,3662   04272 1                   APSESW

  1654                               12,3663   76561 1  TERMNVEC VXSC    VSL1
  1655    REF   6  LAST 1300         12,3664   02676 1                   UN
  1656                               12,3665   63235 0           VXV     PDVL              VXCH WITH 0D                PL AT 0,6
  1657                               12,3666   00001 0                   0D
  1658                               12,3667   53361 0           VXSC    VAD                                           PL AT 0
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 L        CONIC SUBROUTINES                                                                  USER'S PAGE NO.  41        E5 S3

  1659    REF   2  LAST 1301    12,3670   00031 0                       COSF
  1660                          12,3671   41572 1                VSL1   PUSH             0D=02                              PL AT 6

  1661                          12,3672   56241 0                DOT    DDV              LIMITS RESULT TO POSMAX OR NEGMAX
  1662    REF  10  LAST 1301    12,3673   02724 1                       UR1
  16622   REF   1               12,3674   33412 0                       DP1/4
  16624                         12,3675   40142 1                SR1    BOV              SCALE BACK DOWN TO NORMAL
  16625                         12,3676   25677 0                       +1               CLEAR OVFIND IF SET
  1663    REF  11  LAST 1297    12,3677   26734 0                STOVL  CSTH             CSTH (+1)
  1664    REF  11  LAST 1302    12,3700   02724 1                       UR1
  1665                          12,3701   76435 1                VXV    VSL1
  1666                          12,3702   72441 0                DOT    SL1
  1667    REF   7  LAST 1301    12,3703   02676 1                       UN
  1668    REF  16  LAST 1297    12,3704   16732 0                STODL  SNTH             SNTH (+1)
  1669    REF  14  LAST 1301    12,3705   02742 1                       P
  1670                          12,3706   77624 1                CALL
  1671    REF   3  LAST 1298    12,3707   25032 1                       GETX
  1672                          12,3710   77614 1                CLRGO
  16725   REF   4  LAST 1300    12,3711   02634 1                       SOLNSW
  1673    REF   1               12,3712   25012 0                       COMMNOUT

  16734                         12,3713   43001 1  CIRCULAR SETPD  SETGO
  16735                         12,3714   00001 0                       0
  16736   REF   5  LAST 1302    12,3715   02434 0                       SOLNSW
  16737   REF   3  LAST 1289    12,3716   25760 1                       ABTCONIC

  16738   REF   1               10,2000                          SETLOC CONICS5
  16739                         10,2453                          BANK

  167395  REF   1                                                COUNT* $$/CONIC
  1674                          10,2453   75345 1  BADR2         DLOAD  SIGN
  16741   REF   3  LAST  732    10,2454   11760 0                       LOOPHALF
  16742   REF   3  LAST 1302    10,2455   00031 0                       COSF
  16743   REF   4  LAST 1302    10,2456   14031 0                STODL  COSF
  1675    REF   3  LAST 1278    10,2457   11762 1                       KEPZERO
  16755                         10,2460   77614 1                SETGO
  1676    REF   2  LAST 1301    10,2461   04032 1                       APSESW
  1677    REF   1               10,2462   25663 0                       TERMNVEC
 16771  REF    4  LAST 1292   12,2000                         SETLOC CONICS
 16772                        12,3717                         BANK

 16773  REF    4 LAST 1292 TO 1302:    437    9124            COUNT* $$/CONIC
 1678                         12,3717   45020 1  APSIDES  STQ    CALL
 1679   REF    1              12,3720   02712 1                  RTNAPSE
 1680   REF    3  LAST 1301   12,3721   25763 1                  PRAMSET
 1684                         12,3722   77624 1           CALL
 1685   REF    4  LAST 1301   12,3723   37727 1                  PARAM
 1686                         12,3724   77600 1           BOV                                       PL AT 0
 1687   REF    1              12,3725   25726 0                  GETECC
 1688                         12,3726   42405 0  GETECC   DMP    SL4
 1689   REF   14  LAST 1301   12,3727   02744 1                  R1A
 1690                         12,3730   75421 1           BDSU   SQRT
 1691   REF    5  LAST 1301   12,3731   33410 1                  D1/64
 1692   REF    3  LAST  674   12,3732   02754 0           STORE  ECC
 1693                         12,3733   65215 1           DAD    PDDL                               PL AT  2
 1694   REF    1              12,3734   33404 1                  D1/8
 1695   REF   18  LAST 1301   12,3735   00041 1                  R1
 1696                         12,3736   72405 0           DMP    SL1
 1697   REF   15  LAST 1302   12,3737   02742 1                  P
 1698                         12,3740   77671 1           DDV                                       PL AT  0
 1699                         12,3741   60325 0           PDDL   NORM          0D=RP (+29 OR +27)   PL AT  2
 1700   REF   15  LAST 1303   12,3742   02744 1                  R1A
 1701   REF   78  LAST 1301   12,3743   00047 1                  X1
 1702                         12,3744   53725 1           PDDL   SL*                                PL AT  4
 1703   REF   19  LAST 1303   12,3745   00041 1                  R1
 1704                         12,3746   20174 1                  0 -5,1
 1705                         12,3747   45271 1           DDV    DSU                                PL AT 2,0
 1706                         12,3750   50000 1           BOV    BMN
 1707   REF    1              12,3751   25755 1                  INFINAPO
 1708   REF    2  LAST 1303   12,3752   25755 1                  INFINAPO
 1709                         12,3753   77650 1           GOTO
 1710   REF    2  LAST 1303   12,3754   02712 1                  RTNAPSE
 1711                         12,3755   52145 0  INFINAPO DLOAD  GOTO          RETURNS WITH APOAPSIS IN MPAC,PERIAPSIS
 1712   REF    1              12,3756   11773 1                  LDPOSMAX
 1713   REF    3  LAST 1303   12,3757   02712 1                  RTNAPSE       THAT PL IS AT 0.
 17136                            12,3760   77776 1  ABTCONIC EXIT
 17137  REF    7  LAST 1223       12,3761   0 5726 1           TC      P00000
 17138                            12,3762   20607 1           OCT     20607           NO SOLUTION FROM TIMETHET OR TIMERAD
 171385                        12,3763   40001 1  PRAMSET  SETPD  0DV
 171386                        12,3764   00001 0                  0D
 171387                        12,3765   25766 1                  +1
 171388                        12,3766   63375 0           VLOAD  PDVL
 171389 REF  12  LAST  917     12,3767   02657 1                  RVEC
 171390 REF  17  LAST 1300     12,3770   02746 0                  VVEC
 171391                        12,3771   77616 0           RVQ

 1714   REF   1                11,2000                     SETLOC CONICS3
 1715                          11,2300                     BANK

 1716   REF   1                                            COUNT* $$/CONIC
 1717                          11,2300   22437 1  MUTABLE  2DEC*  3.986032 E10 B-36*      MUE
 1717                          11,2301   16067 1
 1718                          11,2302   15625 1           2DEC*  .25087606 E-10 B+34*    1/MUE
 1718                          11,2303   21042 1
 1719                          11,2304   30276 1           2DEC*  1.99650495 E5 B-18*     SQRT(MUE)
 1719                          11,2305   04773 0
 1720                          11,2306   25004 1           2DEC*  .50087529 E-5 B+17*     1/SQRT(MUE)
 1720                          11,2307   06702 1

 1721                          11,2310   16471 1           2DEC   4.902778 E8 B-30        MUM
 1721                          11,2311   01352 1
 1722                          11,2312   21412 0           2DEC   .203966 E-8 B+28        1/MUM
 1722                          11,2313   20500 0
 1723                          11,2314   25477 1           2DEC*  2.21422176 E4 B-15*     SQRT(MUM)
 1723                          11,2315   03367 0
 1724                          11,2316   27533 1           2DEC*  .45162595 E-4 B+14*     1/SQRT(MUM)
 1724                          11,2317   07571 0


 1725   REF   1                04,3772            LDPOSMAX EQUALS LODPMAX       DPPOSMAX IN LOW MEMORY.

 R1727   ERASABLE ASSIGNMENTS


 R1728   KEPLER SUBROUTINE

 R1729      INPUT -
 R1730   RRECT      ERASE  +5
 R1731   VRECT      ERASE  +5
 R1732   TAU.       ERASE  +1
 R1733   XKEP       ERASE  +1
 R1734   TC         ERASE  +1
 R1735   XPREV      ERASE  +1
  1736                            0016            1/MU     EQUALS 14D
  1737                            0020            ROOTMU   EQUALS 16D
  1738                            0022            1/ROOTMU EQUALS 18D
 R1739      OUTPUT -
 R1740   RCV        ERASE  +5
```

```
R1741   VCV      ERASE  +5
R1742   RC       ERASE  +1
R1743   XPREV    ERASE  +1

R1744   DEBRIS -
 1745                              0010           ALPHA    EQUALS 8D
 1746                              0012           XMAX     EQUALS 10D
 1747                              0014           XMIN     EQUALS 12D
 1748                              0024           X        EQUALS 20D
 1749                              0030           XI       EQUALS 24D
 1750                              0032           S(XI)    EQUALS 26D
 1751                              0034           XSQC(XI) EQUALS 28D
 1752                              0036           T        EQUALS 30D
 1753                              0040           RI       EQUALS 32D
 1754                              0042           KEPC1    EQUALS 34D
 1755                              0044           KEPC2    EQUALS 36D
R1756   DELX     ERASE  +1
R1757   DELT     ERASE  +1
R1758   URRECT   ERASE  +5
R1759   RCNORM   ERASE  +1
R1760   XPREV    EQUALS XKEP


R1761   LAMBERT SUBROUTINE

R1762       INPUT-
R1763   R1VEC    ERASE  +5
R1764   R2VEC    ERASE  +5
R1765   TDESIRED ERASE  +1
R1766   GEOMSGN  ERASE  +0
R1767   GUESSW                          0 IF COGA GUESS AVAILABLE, 1 IF NOT
R1768   COGA     ERASE  +1              INPUT ONLY IF GUESSW IS ZERO.
R1769   NORMSW                          0 IF UN TO BE COMPUTED, 1 IF UN INPUT
R1770   UN       ERASE  +5              ONLY USED IF NORMSW IS 1
R1771   VTARGTAG ERASE  +0
R1772   TWEEKIT  EQUALS 40D             ONLY USED IF GUESSW IS 0

R1773       OUTPUT -
R1774   VTARGET  ERASE  +5              AVAILABLE ONLY IF VTARGTAG IS ZERO.
R1775   V1VEC    EQUALS MPAC

R1776       DEBRIS -
R1777   RTNLAMB  ERASE  +0
R1778   U2       ERASE  +5
R1779   MAGVEC2  ERASE  +1
R1780   UR1      ERASE  +5
R1781   R1       EQUALS 31D
R1782   UN       ERASE  +5
R1783   SNTH     ERASE  +1
R1784   CSTH     ERASE  +1
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R1785    1-CSTH   ERASE  +1
R1786    CSTH-RHO ERASE  +1
 1787                              0016            COGAMAX  EQUALS 14D            CLOBBERS 1/MU
 1788                              0010            COGAMIN  EQUALS 8D
 1789                              0014            DCOGA    EQUALS 12D
R1790    TWEEKIT  EQUALS 40D
R1791    P        ERASE  +1
R1792    COGA     ERASE  +1
R1793    R1A      ERASE  +1
R1794    X        EQUALS 20D
R1795    XSQ      EQUALS 22D
R1796    XI       EQUALS 24D
R1797    S(XI)    EQUALS 26D
R1798    XSQC(XI) EQUALS 28D
R1799    T        EQUALS 30D
R1800    KEPC1    EQUALS 34D
R1801    KEPC2    EQUALS 36D
R1802    SLOPESW
R1803    SOLNSW
R1804    OTHERS -

R1805    RVEC     EQUALS R1VEC
R1806    VVEC     ERASE  +5
R1807    COGAFLAG
R1808    RVSW
R1809    INFINFLG
R1810    APSESW
R1811    360SW
R1812    RTNTT    EQUALS RTNLAMB
R1813    ECC      ERASE  +1
R1814    RTNTR    EQUALS RTNLAMB
R1815    RTNAPSE  EQUALS RTNLAMB
R1816    R2       EQUALS MAGVEC2
 1817                              0030            COSF     EQUALS 24D
R1818    RTNPRM   ERASE  +0
R1819    SGNRDOT  ERASE  +0
R1820    RDESIRED ERASE  +1


R1821    ITERATOR SUBROUTINE

R1822    ORDERSW
 1823                              0016            MAX      EQUALS 14D            CLOBBERS 1/MU
 1824                              0010            MIN      EQUALS 8D
R1825    INDEP    ERASE  +1
 1826                              0014            DELINDEP EQUALS 12D
 1827                              0026            ITERCTR  EQUALS 22D
 1828                              0036            DEP      EQUALS 30D
R1829    DELDEP   ERASE  +1
R1830    DEPREV   ERASE  +1
```

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L      CONIC SUBROUTINES                                                USER'S PAGE NO.  47      E5 S3
 1831                            0050          TWEEKIT  EQUALS 40D

R1832   MORE KEPLER

R1833   EPSILONT ERASE  +1

R1834   MORE LAMBERT

R1835   TERRLAMB EQUALS DELDEP
R1836   TPREV    EQUALS DEPREV

R1837   EPSILONL EQUALS EPSILONT +2      DOUBLE PRECISION WORD
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L         INTEGRATION INITIALIZATION                                              USER'S PAGE NO.  1       E0 S3

R0006     1.0 INTRODUCTION
R0007     ----------------
R0008
R0009     FROM A USERS POINT OF VIEW, ORBITAL INTEGRATION IS ESSENTIALLY THE SAME AS THE 278 INTEGRATION
R0011     PROGRAM. THE SAME ENTRANCES TO THE PROGRAM WILL BE MAINTAINED, THE SAME STALLING ROUTINE WILL BE USED AND
R0013     OUTPUT WILL STILL BE VIA THE PUSHLIST. THE PRIMARY DIFFERENCES TO A USER INVOLVE THE ADDED CAPABILITY OF
R0015     TERMINATING INTEGRATION AT A SPECIFIC FINAL RADIUS AND THE DIFFERENCE IN STATE VECTOR SCALING INSIDE AND OUT-
R0017     SIDE THE LUNAR SPHERE OF INFLUENCE.
R0018
R0019     IN ORDER TO MAKE THE CSM(LEM)PREC AND CSM(LEM)CONIC ENTRANCES SIMILAR TO FLIGHT 278, THE INTEGRATION PROGRAM
R0021     WILL ITSELF SET THE FINAL RADIUS (RFINAL) TO 0 SO THAT REACHING THE DESIRED TIME ONLY WILL TERMINATE
R0023     INTEGRATION. THE DP REGISTER RFINAL MUST BE SET BY USERS OF INTEGRVS AND INTEGRV, AND MUST BE DONE AFTER THE
R0025     CALL TO INTSTALL.
R0026
R0027     WHEN THE LM IS ON THE LUNAR SURFACE (INDICATED BY LUNAR SURFACE FLAG SET) CALLS TO LEMCONIC, LEMPREC, AND
R0029     INTEGRV WITH VINFLAG = 0 WILL RESULT IN THE USE OF THE PLANETARY INERTIAL ORIENTATION SUBROUTINES TO PROVIDE
R0031     BOTH THE LMS POSITION AND VELOCITY IN THE REFERENCE COORDINATE  SYSTEM.
R0032     THE PROGRAM WILL PROVIDE OUTPUT AS IF INTEGRATION WAS USED. THAT IS, THE PUSHLIST WILL BE SET AS NOTED BELOW AND
R0034     THE PERMANENT STATE VECTOR UPDATED WHEN SPECIFIED BY AN INTEGRV CALL.
R0035
R0036     USERS OF INTEGRVS DESIRING INTEGRATION (INTYPFLG = 0) SHOULD NOTE THAT THE OBLATENESS PERTURBATION COMPUTATION
R0038     IN LUNAR ORBIT IS TIME DEPENDENT. THEREFORE, THE USER SHOULD SUPPLY AN INITIAL STATE VECTOR VALID AT SOME REAL
R0040     TIME AND THE DESIRED TIME (TDEC1) ALSO AT SOME REAL TIME. FOR CONIC ,,INTEGRATION,, THE USER MAY STILL USE ZERO
R0042     AS THE INITIAL TIME AND DELTA TIME AS THE DESIRED TIME.
R0043
R0044     2.0 GENERAL DESCRIPTION
R0045     -----------------------
R0046
R0047     THE INTEGRATION PROGRAM OPERATES AS A CLOSED INTERPRETIVE SUBROUTINE AND PERFORMS THESE FUNCTIONS---
R0049         1) INTEGRATES (PRECISION OR CONIC) EITHER CSM OR LM STATE VECTOR
R0050         2) INTEGRATES THE W-MATRIX
R0051         3) PERMANENT OR TEMPORARY UPDATE OF THE STATE VECTOR
R0052
R0053     THERE ARE SIX ENTRANCES TO THE INTEGRATION PROGRAM. FOUR OF THESE (CSMPREC, LEMPREC, CSMCONIC, LEMCONIC) SET
R0055     ALL THE FLAGS REQUIRED IN THE INTEGRATION PROGRAM ITSELF TO CAUSE THE PRECISION OR CONIC INTEGRATION (KEPLER) OF
R0057     THE LM OR CSM STATE VECTOR, AS THE NAMES SUGGEST. ONE ENTRANCE (INTEGRVS) PERMITS THE CALLING PROGRAM TO
R0059     PROVIDE A STATE VECTOR TO BE INTEGRATED. THE CALLING PROGRAM MUST SET THE FLAGS INDICATING (1) PRECISION OR
R0061     CONIC INTEGRATION, (2) IN OR OUT OF LUNAR SPHERE, (3) MIDCOURSE OR NOT, AND THE INTEGRATION PROGRAM COMPLETES
R0063     THE FLAG SETTING TO BYPASS W-MATRIX INTEGRATION. THE LAST ENTRANCE (INTEGRV, USED IN GENERAL BY THE
R0065     NAVIGATION PROGRAMS) PERMITS THE CALLER TO SET FIVE FLAGS (NOT MOONFLAG OR MIDFLAG) BUT NOT TO INPUT A STATE
R0067     VECTOR. ANY PROGRAM WHICH CALLS INTEGRVS OR INTEGRV MUST CALL INTSTALL BEFORE IT SETS THE INTEGRATION FLAGS
R0069     AND/OR STATE VECTOR.
R0070
R0071     THREE SETS OF 42 REGISTERS AND 2 FLAGS ARE USED FOR THE STATE VECTORS. TWO SETS, WHICH MAY NOT BE OVERLAYED, ARE
R0073     USED FOR THE PERMANENT STATE VECTORS FOR THE CSM AND LM. THE THIRD SET, WHICH MAY BE OVERLAYED WHEN INTEGRATION
R0075     IS NOT BEING DONE, IS USED IN THE COMPUTATIONS.
R0076
R0077     THE PERMANENT STATE VECTORS WILL BE PERIODICALLY UPDATED SO THAT THE VECTORS WILL NOT BE OLDER THAN 4 TIMESTEPS.
R0079     THE PERMANENT STATE VECTORS WILL ALSO BE UPDATED WHENEVER THE W-MATRIX IS INTEGRATED OR WHEN A CALLER OF INTEGRV
R0081     SETS STATEFLG (THE NAVIGATION PROGRAMS P20, P22.)
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R0082   APPENDIX B OF THE USERS GUIDE LISTS THE STATE VECTOR QUANTITIES.
R0083
R0084   2.1 RESTARTS
R0085
R0086   PHASE CHANGES WILL BE MADE IN THE INTEGRATION PROGRAM ONLY FOR THE INTEGRV ENTRANCE (I.E., WHEN THE W-MATRIX IS
R0088   INTEGRATED OR PERMANENT STATE VECTOR IS UPDATED.) THE GROUP NUMBER USED WILL BE THAT FOR THE P20-25 PROGRAMS
R0090   (I.E., GROUP2) SINCE THE INTEGRV ENTRANCE WILL ONLY BE USED BY THESE PROGRAMS. IF A RESTART OCCURS DURING AN
R0092   INTEGRATION OF THE STATE VECTOR ONLY, THE RECOVERY WILL BE TO THE LAST PHASE IN THE CALLING PROGRAM. CALLING
R0094   PROGRAMS WHICH USE THE INTEGRV OR INTEGRVS ENTRANCE OF INTEGRATION SHOULD ENSURE THAT IF PHASE CHANGING IS DONE
R0096   THAT IT IS PRIOR TO SETTING THE INTEGRATION INPUTS IN THE PUSHLIST.
R0097   THIS IS BECAUSE THE PUSHLIST IS LOST DURING A RESTART.
R0098
R0099   2.2 SCALING
R0100
R0101   THE INTEGRATION ROUTINE WILL MAINTAIN THE PERMANENT MEMORY STATE VECTORS IN THE SCALING AND UNITS DEFINED IN
R0103   APPENDIX B OF THE USERS GUIDE. THE SCALING OF THE OUTPUT POSITION VECTORDEPENDS ON THE ORIGIN OF THE COORDINATE
R0105    SYSTEM AT THE DESIRED INTEGRATION TIME. THE COORDINATE SYSTEM TRANSFORMATION WILL BE DONE AUTOMATICALLY ON
R0107   MULTIPLE TIMESTEP ENCKE INTEGRATION ONLY. THUS IT IS POSSIBLE TO HAVE OUTPUT FROM SUCCESSIVE INTEGRATIONS IN
R0109   DIFFERENT SCALING.
R0110   HOWEVER, RATT, VATT WILL ALWAYS BE SCALED THE SAME.
R0111
R0112   3.0 INPUT/OUTPUT
R0113   ----------------
R0114
R0115   PROGRAM INPUTS ARE THE FLAGS DESCRIBED IN APPENDIX A AND THE PERMANENT STATE VECTOR QUANTITIES DESCRIBED IN AP-
R0117   PENDIX B OF THE USERS GUIDE, PLUS THE DESIRED TIME TO INTEGRATE TO IN TDEC1 (A PUSH LIST LOCATION).
R0119   FOR INTEGRVS, THE RCV,VCV, TET OF THE TEMPORARY STATE VECTOR MUST BE SET, PLUS MOONFLAG AND MIDFLAG
R0121
R0122   FOR SIMULATION THE FOLLOWING QUANTITIES MUST BE PRESET ---
R0123
R0124                                                               EARTH  MOON
R0125                                                                29     27
R0126      RRECTCSM(LEM)  - RECTIFIED POSITION VECTOR       METERS  2      2
R0127
R0128                                                                7      5
R0129      VRECTCSM(LEM)  - RECTIFIED VELOCITY VECTOR       M/CSEC  2    2
R0130
R0131                                                                28     28
R0132      TETCSM(LEM)    - TIME STATE VECTOR IS VALID      CSEC    2      2
R0133                       CUSTOMARILY 0, BUT NOTE LUNAR
R0134                       ORBIT DEPENDENCE ON REAL TIME.
R0135
R0136                                                                22     18
R0137      DELTAVCSM(LEM) - POSITION DEVIATION              METERS  2      2
R0138                       0 IF TCCSM(LEM) = 0
R0139
R0140                                                                3     -1
R0141      NUVCSM(LEM)    - VELOCITY DEVIATION              M/CSEC  2      2
R0142                       0 IF TCCSM(LEM) = 0
R0143
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R0144                                                               29     27
R0145      RCVCSM(LEM)    - CONIC POSITION                 METERS  2      2
R0146                       EQUALS RRECTCSM(LEM) IF
R0147                       TCCSM(LEM) = 0
R0148
R0149                                                               7      5
R0150      VCVCSM(LEM)    - CONIC VELOCITY                 M/CSEC  2      2
R0151                       EQUALS VRECTCSM(LEM) IF
R0152                       TCCSM(LEM) = 0
R0153
R0154                                                               28     28
R0155      TCCSM(LEM)     - TIME SINCE RECTIFICATION       CSECS   2      2
R0156                       CUSTOMARILY 0
R0157
R0158                                                       1/2     17     16
R0159      XKEPCSM(LEM)   - ROOT OF KEPLERS EQUATION       M       2      2
R0160                       0 IF TCCSM(LEM) = 0
R0161
R0162      CMOONFLG       - PERMANENT FLAGS CORRESPONDING          0      0
R0163      CMIDFLAG         TO MOONFLAG AND MIDFLAG                0,1    0,1
R0164      LMOONFLG         C = CSM, L = LM                        0      0
R0165      LMIDFLG                                                 0,1    0,1
R0166
R0167      SURFFLAG       - LUNAR SURFACE FLAG                     0,1    0,1
R0168
R0169   IN ADDITION, IF (L)CMIDFLAG IS SET, THE INITIAL INPUT VALUES FOR LUNAR
R0170   SOLAR EPHEMERIDES SUBROUTINE AND PLANETARY INERTIAL ORIENTATION SUB-
R0171   ROUTINE MUST BE PRESET.
R0172
R0173   OUTPUT
R0174   AFTER EVERY CALL TO INTEGRATION
R0175                                                              EARTH  MOON
R0176                                                               29     29
R0177       0D   RATT   POSITION                           METERS  2      2
R0178                                                               7      7
R0179       6D   VATT   VELOCITY                           M/CSEC  2      2
R0180                                                               28     28
R0181      12D   TAT    TIME                                       2      2
R0182                                                               29     27
R0183      14D   RATTI  POSITION                           METERS  2      2
R0184                                                               7      5
R0185      20D   VATTI  VELOCITY                           M/CSEC  2      2
R0186                                                       3   2   36     30
R0187      26D   MU(P)  MU                                 M /CS   2      2
R0188
R0189       X1          MUTABLE ENTRY                              -2     -100
R0190
R0191       X2          COORDINT
R0192       X2          COORDINATE SYSTEM ORIGEN                   0      2
R0193                   (THIS, NOT MOONFLAG, SHOULD BE
R0194                     USED TO DETERMINE ORIGIN.)
R0195
R0196   IN ADDITION TO THE ABOVE, THE PERMANENT STATE VECTOR IS UPDATED WHENEVER
R0197   STATEFLG WAS SET AND WHENEVER A W-MATRIX IS TO BE INTEGRATED. THE PUSH
R0198   COUNTER IS SET TO 0 AND OVERFLOW IS CLEARED BEFORE RETURNING TO THE
R0199   CALLING PROGRAM.
R0200
R0201   4.0 CALLING SEQUENCES AND SAMPLE CODE
R0202   ----------------------------------
R0203
R0204       A) PRECISION ORBITAL INTEGRATION. CSMPREC,LEMPREC ENTRANCES
R0205              L-X     STORE TIME TO 95T5791T5 T  95 PUS  L9ST (T4531)
R0206              L       CALL
R0207              L+1               CSMPREC (OR LEMPREC)
R0208              L+2     RETURN
R0209          INPUT                                                              28
R0210              TDEC1 (PD 32D) TIME TO INTEGRATE TO...CENTISECONDS SCALED 2
R0211          OUTPUT
R0212              THE DATA LISTED IN SECTION 3.0 PLUS
R0213              RQVV   POSITION VECTOR OF VEHICLE WITH RESPECT TO SECONDARY
R0214              BODY... METERS B-29 ONLY IF MIDFLAG = DIMOFLAG = 1
R0215       B) CONIC INTEGRATION. CSMCONIC, LEMCONIC ENTRANCES
R0216              L-X     STORE TIME IN PUSH LIST (TDEC1)
R0217              L       CALL
R0218              L+1               CSMCONIC (OR LEMCONIC)
R0219          INPUT/OUTPUT
R0220              SAME AS PRECISION INTEGRATION, EXCEPT RQVV NOT SET
R0221       C) INTEGRATE GIVEN STATE VECTOR. INTEGRVS ENTRANCE
R0222                      CALL
R0223                                INTSTALL
R0224                      VLOAD
R0225                                POSITION VECTOR
R0226                      STOVL   RCV
R0227                                VELOCITY VECTOR
R0228                      STODL   VCV
R0229                                TIME STATE VECTOR VALID
R0230                      STODL   TET
R0231                                FINAL RADIUS
R0232                      STORE   RFINAL
R0233                      SET(CLEAR)   SET(CLEAR)
R0234                                   INTYPFLAG
R0235                                   MOONFLAG
R0236                      SET(CLEAR)   DLOAD
R0237                                   DESIRED TIME
R0238                      STCALL       TDEC1
R0239                                   INTEGRVS
R0240          INPUT
R0241              RCV     POSITION VECTOR                   METERS
R0242              VCV     VELOCITY VECTOR                   M/CSEC
R0243              TET     TIME OF STATE VECTOR(MAY = 0)     CSEC B-28
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L         INTEGRATION INITIALIZATION                                                     USER'S PAGE NO.   5       E0 S3

R0244               TDEC1  TIME TO INTEGRATE TO                  CSEC B-28 (PD 320)
R0245                      (MAY BE INCREMENT IF TET=0)
R0246           OUTPUT
R0247               SAME AS FOR PRECISION OR CONIC INTEGRATION,
R0248               DEPENDING ON INTYPFLG.
R0249        C) INTEGRATE STATE VECTOR.INTGRV ENTRANCE
R0250               L-X    STORE TIME IN PUSH LIST (TDEC1)(MAY BE DONE AFTER CALL TO INTSTALL)
R0252               L-8    CALL
R0253               L-7
R0254               L-6    SET(CLEAR) SET(CLEAR)
R0255               L-5               VINTFLAG   1=CSM, 0=LM
R0256               L-4               INTYPFLAG  1=CONIC, 0=PRECISION
R0257               L-3    SET(CLEAR) SET(CLEAR)
R0258               L-2               DIMOFLAG   1=W-MATRIX, 0=NO W-MATRIX
R0259               L-1               D6OR9FLG   1=9X9, 0=6X6
R0260               L      SET        DLOAD
R0261               L+1               STATEFLG   DESIRE PERMANENT UPDATE
R0262               L+2               FINAL RAD. OF STATE VECTOR
R0263               L+3    STCALL     RFINAL
R0264               L+4               INTEGRV
R0265               L      CALL                  NORMAL USE-- WILL UPDATE STATE
R0266               L+1               INTEGRV    VECTOR IF DIMOFLAG=1.(STATEFLG IS
R0267               L+2    RETURN                ALWAYS RESET IN INTEGRATION AFTER
R0268                                            IT IS USED.)
R0269           INPUT
R0270               TDEC1 (PD 320) TIME TO INTEGRATE TO    CSEC B-28
R0271           OUTPUT
R0272               SAME AS FOR PRECISION OR CONIC INTEGRATION
R0273           THE PROGRAM WILL SET MOONFLAG, MIDFLAG DEPENDING ON
R0274           THE PERMANENT STATE VECTOR REPRESENTATION.

 02742  REF   2  LAST  227   13,2000                         SETLOC INTINIT
 02743                       13,2702                         BANK
 02744  REF   7  LAST  653   E3,1554                         EBANK= RRECTCSM
 02745  REF   2 LAST  227 TO  230:     30     30*             COUNT* $$/INTIN
 0275   REF  96  LAST 1256   13,2702  0 5402 1  STATEINT TC      PHASCHNG
 0276                        13,2703   00052 0           OCT     00052
 02765  REF   4  LAST  555   01,2036            2P5SPT4  =       2.5SPOT
 0277   REF   8  LAST  941   13,2704  3 5047 1           CAF     PRIO5
 0278   REF  36  LAST  829   13,2705  0 5135 0           TC      FINDVAC
 0279   REF   8  LAST 1313   E3,1554                     EBANK=  RRECTCSM
 0280   REF   3  LAST  555   13,2706   02711 1           2CADR   STATINT1
 0280                        13,2707   26063 0
 0281   REF  57  LAST 1225   13,2710  0 5314 1           TC      TASKOVER
 0282   REF 233  LAST 1293   13,2711  0 6006 1  STATINT1 TC      INTPRET
 0283                        13,2712   47014 1           BON     RTB
 02831  REF   2  LAST  276   13,2713   04712 1                   QUITFLAG
 02832  REF   1              13,2714   26753 1                   NOINT           NO STATEINT IF V96
 0284   REF  26  LAST  940   13,2715   51751 0                   LOADTIME
 0286   REF  41  LAST  940   13,2716   00041 1           STORE   TDEC1
```

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L        INTEGRATION INITIALIZATION                                                              USER'S PAGE NO.   6       E3 S3

 0323                        13,2717   45014 0              CLEAR   CALL
 03235  REF   2  LAST  276   13,2720   04274 1                      V96ONFLG
 0324   REF  21  LAST 1256   13,2721   27516 0                      INTSTALL
 0325                        13,2722   45014 0              SET     CALL
 03251  REF   4  LAST  515   13,2723   01076 1                      NODOFLAG
 0326   REF   2  LAST  228   13,2724   26744 1                      SETIFLGS
 0327                        13,2725   52014 0              SET     GOTO              INHIBIT BACKWARDS INTEGRATION
 03275  REF   1              13,2726   01466 1                      POOFLAG
 0328   REF   1              13,2727   26000 0                      STATEUP
 0356                        13,2730   00003 1   600SECS    2DEC    60000
 0356                        13,2731   25140 0
 0404                        13,2732   77414 0   ENDINT     CLEAR   EXIT
 0405   REF   2  LAST  588   13,2733   01672 0                      STATEFLG
 0408   REF  97  LAST 1313   13,2734  0 5402 1              TC      PHASCHNG
 0409                        13,2735   20032 1              OCT     20032
 0410   REF   2  LAST  230   01,2033             2P3SPT1    =       2.3SPOT
 0411                        13,2736  0 0006 1              EXTEND
 0412   REF   3  LAST  662   13,2737  3 2731 0              DCA     600SECS
 0413   REF   5  LAST 1218   13,2740  0 5332 0              TC      LONGCALL
 0414   REF   6  LAST  275   E3,1554                        EBANK=  RRECTHIS
 0415   REF   3  LAST  231   13,2741   02702 0              2CADR   STATEINT
 0415                        13,2742   26063 0
 0416   REF  89  LAST 1037   13,2743  0 5205 0              TC      ENDOFJOB
 0426                        13,2744   43014 0   SETIFLGS   SET     CLEAR
 0427   REF   3  LAST 1314   13,2745   01472 1                      STATEFLG
 0428   REF  14  LAST  922   13,2746   01673 1                      INTYPFLG
 0429                        13,2747   43014 0              CLEAR   CLEAR
 0430   REF  11  LAST  633   13,2750   01676 1                      DIM0FLAG
 04301  REF   3  LAST  614   13,2751   01675 1                      D6OR9FLG
 04302                       13,2752   77616 0              RVQ
 04303                       13,2753   77776 1   NOINT      EXIT
 04304  REF  98  LAST 1314   13,2754  0 5402 1              TC      PHASCHNG
 04305                       13,2755   00002 0              OCT     2

 04306  REF  63  LAST 1066   13,2756  0 5561 0              TC      DOWNFLAG
 04307  REF   3  LAST 1313   13,2757   00221 0              ADRES   QUITFLAG

 04308  REF  90  LAST 1314   13,2760  0 5205 0              TC      ENDOFJOB

R0431    ATOPCSM TRANSFERS RRECT TO RRECT +41 TO RRECTCSM TO RRECTCSM +41

R0432    CALLING SEQUENCE
R0433       L   CALL
R0434       L+1         ATOPCSM

R0435    NORMAL EXIT AT L+2

 0436                        13,2761   47020 0   ATOPCSM    STQ     RTB
 0437   REF  23  LAST 1292   13,2762   00051 0                      S2
 0438   REF   3  LAST 1260   13,2763   26774 1                      MOVEACSM
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0439                         13,2764   45014 0              SET    CALL
0440   REF  27  LAST  762    13,2765   04063 0                     CMOONFLG
0441   REF   3  LAST 1260    13,2766   20240 0                     SVDWN1
0442                         13,2767   43014 0              BON    CLRGO
0443   REF  14  LAST  923    13,2770   00303 1                     MOONFLAG
0444   REF  24  LAST 1314    13,2771   00051 0                     S2
0445   REF  28  LAST 1315    13,2772   04223 0                     CMOONFLG
0446   REF  25  LAST 1315    13,2773   00051 0                     S2
0447   REF   1               13,2774  0 3140 1  MOVEACSM TC     SETBANK
0448   REF   2  LAST   89    13,2775  55'500 1     +1    TS     DIFEQCNT          INITIALIZE INDEX
0449   REF   3  LAST 1315    13,2776  51'500 0           INDEX  DIFEQCNT
0450   REF   5  LAST 1277    13,2777  3 1502 1           CA     RRECT
0451   REF   4  LAST 1315    13,3000  51'500 0           INDEX  DIFEQCNT
0452   REF   9  LAST 1313    13,3001  55'554 0           TS     RRECTCSM
0453   REF   5  LAST 1315    13,3002  11'500 1           CCS    DIFEQCNT          IS TRANSFER COMPLETE
0454   REF   4  LAST 1314    13,3003  1 2775 1           TCF    MOVEACSM +1       NO-LOOP
0455   REF  64  LAST 1266    13,3004  0 6030 1           TC     DANZIG            COMPLETE- RETURN


R0456  PTOACSM TRANSFERS RRECTCSM TO RRECTCSM +41 TO RRECT TO RRECT +41

R0457  CALLING SEQUENCE
R0458      L   CALL
R0459               PTOACSM

R0460  NORMAL EXIT AT L+2
0461                         13,3005   43034 1  PTOACSM  RTB    BON
0462   REF   2  LAST 1259    13,3006   27023 0                  MOVEPCSM
0463   REF  29  LAST 1315    13,3007   04303 0                  CMOONFLG
0464   REF   1               13,3010   27016 0                  SETMOON
0465                         13,3011   66214 0  CLRMOON  CLEAR  SSP
0466   REF  15  LAST 1315    13,3012   00263 0                  MOONFLAG
0467   REF   4  LAST 1259    13,3013   02151 0                  PBODY
0468                         13,3014   00000 1
0469                         13,3015   77616 0           RVQ
0470                         13,3016   66214 0  SETMOON  SET    SSP
0471   REF  16  LAST 1315    13,3017   00063 1                  MOONFLAG
0472   REF   5  LAST 1315    13,3020   02151 0                  PBODY
0473                         13,3021   00002 0                  2
0474                         13,3022   77616 0           RVQ
0475   REF   2  LAST 1315    13,3023  0 3140 1  MOVEPCSM TC     SETBANK
0476   REF   6  LAST 1315    13,3024  55'500 1     +1    TS     DIFEQCNT
0477   REF   7  LAST 1315    13,3025  51'500 0           INDEX  DIFEQCNT
0478   REF  10  LAST 1315    13,3026  3 1554 1           CA     RRECTCSM
0479   REF   8  LAST 1315    13,3027  51'500 0           INDEX  DIFEQCNT
0480   REF   6  LAST 1315    13,3030  55'502 0           TS     RRECT
0481   REF   9  LAST 1315    13,3031  11'500 1           CCS    DIFEQCNT
0482   REF   3  LAST 1315    13,3032  1 3024 0           TCF    MOVEPCSM +1
0483   REF  65  LAST 1315    13,3033  0 6030 1           TC     DANZIG
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L         INTEGRATION INITIALIZATION                                                  USER'S PAGE NO.  8      E3 S3

R0484     ATOPLEM  TRANSFERS RRECT TO RRECT +41 TO RRECTLEM TO RRECTLEM +41

 0485                           13,3034   47020 0  ATOPLEM  STQ     RTB
 0486     REF  26  LAST 1315    13,3035   00051 0                   S2
 0487     REF   2  LAST 1259    13,3036   27047 1                   MOVEALEM
 0488                           13,3037   45014 0           SET     CALL
 0489     REF   2  LAST   35    13,3040   04064 1                   LMOONFLG
 0490     REF   3  LAST 1259    13,3041   20264 0                   SVDWN2
 0491                           13,3042   43014 0           BON     CLRGO
 0492     REF  17  LAST 1315    13,3043   00303 1                   MOONFLAG
 0493     REF  27  LAST 1316    13,3044   00051 0                   S2
 0494     REF   3  LAST 1316    13,3045   04224 1                   LMOONFLG
 0495     REF  28  LAST 1316    13,3046   00051 0                   S2
 0496     REF   3  LAST 1315    13,3047  0 3140 1  MOVEALEM TC      SETBANK
 0497     REF  10  LAST 1315    13,3050  55'500 1     +1    TS      DIFEQCNT
 0498     REF  11  LAST 1316    13,3051  51'500 0           INDEX   DIFEQCNT
 0499     REF   7  LAST 1315    13,3052  3 1502 1           CA      RRECT
 0500     REF  12  LAST 1316    13,3053  51'500 0           INDEX   DIFEQCNT
 0501     REF   2  LAST   90    13,3054  55'626 0           TS      RRECTLEM
 0502     REF  13  LAST 1316    13,3055  11'500 1           CCS     DIFEQCNT
 0503     REF   3  LAST 1316    13,3056  1 3050 0           TCF     MOVEALEM +1
 0504     REF  66  LAST 1315    13,3057  0 6030 1           TC      DANZIG


R0505     PTOALEM  TRANSFERS RRECTLEM TO RRECTLEM +41 TO RRECT TO RRECT +41

 0506                           13,3060   47014 1  PTOALEM  BON     RTB
 0507     REF   6  LAST  511    13,3061   04307 1                   SURFFLAG
 0508     REF   1               13,3062   27101 1                   USEPIOS
 0509     REF   2  LAST 1258    13,3063   27070 0                   MOVEPLEM
 0510                           13,3064   52014 0           BON     GOTO
 0511     REF   4  LAST 1316    13,3065   04304 1                   LMOONFLG
 0512     REF   2  LAST 1315    13,3066   27016 0                   SETMOON
 0513     REF   1               13,3067   27011 1                   CLRMOON
 0514     REF   4  LAST 1316    13,3070  0 3140 1  MOVEPLEM TC      SETBANK
 0515     REF  14  LAST 1316    13,3071  55'500 1     +1    TS      DIFEQCNT
 0516     REF  15  LAST 1316    13,3072  51'500 0           INDEX   DIFEQCNT
 0517     REF   3  LAST 1316    13,3073  3 1626 1           CA      RRECTLEM
 0518     REF  16  LAST 1316    13,3074  51'500 0           INDEX   DIFEQCNT
 0519     REF   8  LAST 1316    13,3075  55'502 0           TS      RRECT
 0520     REF  17  LAST 1316    13,3076  11'500 1           CCS     DIFEQCNT
 0521     REF   3  LAST 1316    13,3077  1 3071 0           TCF     MOVEPLEM +1
 0522     REF  67  LAST 1316    13,3100  0 6030 1           TC      DANZIG


 0523                           13,3101   77201 1  USEPIOS  SETPD   VLOAD
 0524                           13,3102   00001 0                   0
 0525     REF  10  LAST 1242    13,3103   02026 1                   RLS
 0526                           13,3104   41525 0           PDDL    PUSH
 0527     REF  42  LAST 1313    13,3105   00041 1                   TDEC1
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L          INTEGRATION INITIALIZATION                                                              USER'S PAGE NO.   9       E3 53

 0528    REF  15  LAST  922   13,3106   15517 0             STODL   TET
 0529    REF   1              13,3107   27756 0                     5/8
 0530                         13,3110   77624 1             CALL
 0531    REF   7  LAST 1238   13,3111   55345 0                     RP-TO-R
 0532    REF  16  LAST 1281   13,3112   25535 0             STOVL   RCV
 0533    REF   2  LAST   34   13,3113   11754 1                     ZUNIT
 0534                         13,3114   14001 0             STODL   0D
 0535    REF  16  LAST 1317   13,3115   01517 0                     TET
 0536                         13,3116   14007 0             STODL   6D
 0537    REF   2  LAST 1317   13,3117   27756 0                     5/8
 0538                         13,3120   45014 0             SET     CALL             NEEDED FOR SETTING X1 ON EXIT
 05381   REF  18  LAST 1316   13,3121   00063 1                     MOONFLAG
 0539    REF   8  LAST 1317   13,3122   55345 0                     RP-TO-R
 0540                         13,3123   74235 0             VXV     VXSC
 0541    REF  17  LAST 1317   13,3124   01535 0                     RCV
 0542    REF   1              13,3125   27137 1                     OMEGMOON
 0543    REF  15  LAST 1282   13,3126   25543 1             STOVL   VCV
 0544    REF  18  LAST 1238   13,3127   11762 1                     ZEROVEC
 0545    REF   6  LAST 1259   13,3130   01521 0             STORE   TDELTAV
 0546                         13,3131   67174 1             AXT,2   SXA,2
 0547                         13,3132   00002 0                     2
 0548    REF   6  LAST 1315   13,3133   02150 1                     PBODY
 0549    REF   6  LAST 1259   13,3134   35527 1             STCALL  TNJV
 0550    REF   1              13,3135   27252 1                     A-PCHK
 0551                         13,3136   07112 1  OMEGMOON  2DEC*    2.66169947 E-8 B+23*
 0551                         13,3137   06620 0
 0552    REF   1              13,3140  3 3144 0  SETBANK   CAF      INTBANK
 0553    REF  28  LAST 1232   13,3141  54 006 0            TS       BBANK
 0554    REF   1              13,3142  3 3553 1            CAF      FORTYONE
 0555    REF 275  LAST 1234   13,3143  0 0002 0            TC       Q
 0556    REF  11  LAST 1315   E3,1554                      EBANK=   RRECTCSM
 0557    REF   9  LAST  633   13,3144   26063 0  INTBANK   BBCON    INTEGRV

R0558    SPECIAL PURPOSE ENTRIES TO ORBITAL INTEGRATION. THESE ROUTINES PROVIDE ENTRANCES TO INTEGRATION WITH
R0560    APPROPRIATE SWITCHES SET OR CLEARED FOR THE DESIRED INTEGRATION.

R0561    CSMPREC AND LEMPREC PERFORM ORBIT INTEGRATION BY THE ENCKE METHOD TO THE TIME INDICATED IN TDEC1
R0563    ACCELERATIONS DUE TO OBLATENESS ARE INCLUDED. NO W-MATRIX INT. IS DONE.
R0564    THE PERMANENT STATE VECTOR IS NOT UPDATED.
R0565    CSMCONIC AND LEMCONIC PERFORM ORBIT INTEG. BY KEPLERS METHOD TO THE TIME INDICATED IN TDEC1
R0567    NO DISTURBING ACCELERATIONS ARE INCLUDED. IN THE PROGRAM FLOW THE GIVEN
R0568    STATE VECTOR IS RECTIFIED BEFORE SOLUTION OF KEPLERS EQUATION

R0569    THE ROUTINES ASSUME THAT THE CSM (LEM) STATE VECTOR IN P-MEM IS VALID.
R0570    SWITCHES SET PRIOR TO ENTRY TO THE MAIN INTEG. PROG ARE AS FOLLOWS
R0571                   CSMPREC  CSMCONIC   LEMPREC  LEMCONIC
R0572    VINTFLAG         SET       SET       CLEAR    CLEAR
R0573    INTYPFLG         CLEAR     SET       CLEAR    SET
R0574    DIMOFLAG         CLEAR     CLEAR     CLEAR    CLEAR
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R0575    CALLING SEQUENCE
R0576       L-X   STORE TDEC1
R0577       L     CALL         (STCALL TDEC1)
R0578       L+1            CSMPREC (CSMCONIC, LEMPREC, LEMCONIC)

R0579     NORMAL EXIT TO L+2


R0580    SUBROUTINES CALLED
R0581      INTEGRV1
R0582      PRECOUT FOR CSMPREC AND LEMPREC
R0583      CONICOUT  FOR CSMCONIC AND LEMCONIC


R0584    OUTPUT - SEE PAGE 2 OF THIS LOG SECTION
R0585    INPUT
R0586     TDEC1    TIME TO INTEGRATE TO . CSECS B-28
 0587                          13,3145   45020 1  CSMPREC   STQ      CALL
 0588    REF  79  LAST 1303    13,3146   00046 0                     X1
 0589    REF  22  LAST 1314    13,3147   27516 0                     INTSTALL
 0590                          13,3150   43130 1            SXA,1    SET
 0591    REF   2  LAST   93    13,3151   02213 0                     IRETURN
 0592    REF   9  LAST  588    13,3152   01474 1                     VINTFLAG

 0593                          13,3153   43014 0  IFLAGP    SET      CLEAR
 0594    REF   3  LAST  228    13,3154   01467 0                     PRECIFLG
 0595    REF  12  LAST 1314    13,3155   01676 1                     DIM0FLAG
 0596                          13,3156   77614 1            CLRGO
 05961   REF  15  LAST 1314    13,3157   01633 0                     INTYPFLG
 05962   REF   1               13,3160   27240 1                     INTEGRV1
 0597                          13,3161   45020 1  LEMPREC   STQ      CALL
 0598    REF  80  LAST 1318    13,3162   00046 0                     X1
 0599    REF  23  LAST 1318    13,3163   27516 0                     INTSTALL
 0600                          13,3164   43130 1            SXA,1    CLRGO
 0601    REF   3  LAST 1318    13,3165   02213 0                     IRETURN
 0602    REF  10  LAST 1318    13,3166   01634 1                     VINTFLAG
 0603    REF   1               13,3167   27153 0                     IFLAGP

 0604                          13,3170   45020 1  CSMCONIC STQ       CALL
 0605    REF  81  LAST 1318    13,3171   00046 0                     X1
 0606    REF  24  LAST 1318    13,3172   27516 0                     INTSTALL
 0607                          13,3173   43130 1            SXA,1    SET
 0608    REF   4  LAST 1318    13,3174   02213 0                     IRETURN
 0609    REF  11  LAST 1318    13,3175   01474 1                     VINTFLAG
 0610                          13,3176   43014 0  IFLAGC    CLEAR    SETGO
 0611    REF  13  LAST 1318    13,3177   01676 1                     DIM0FLAG
 0612    REF  16  LAST 1318    13,3200   01433 1                     INTYPFLG
 0613    REF   2  LAST 1318    13,3201   27240 1                     INTEGRV1
 0614                          13,3202   45020 1  LEMCONIC STQ       CALL
 0615    REF  82  LAST 1318    13,3203   00046 0                     X1
 0616   REF  25  LAST 1318   13,3204   27516 0                      INTSTALL
 0617                        13,3205   43130 1             SXA,1    CLRGO
 0618   REF   5  LAST 1318   13,3206   02213 0                      IRETURN
 0619   REF  12  LAST 1318   13,3207   01634 1                      VINTFLAG
 0620   REF   1              13,3210   27176 1                      IFLAGC

 0621                        13,3211   66214 0  INTEGRVS SET        SSP
 0622   REF   4  LAST 1318   13,3212   01467 0                      PRECIFLG
 0623   REF   7  LAST 1317   13,3213   02151 0                      PBODY
 0624                        13,3214   00000 1                      0
 0625                        13,3215   66214 0             BOF      SSP
 0626   REF  19  LAST 1317   13,3216   00343 0                      MOONFLAG
 0627                        13,3217   27222 0                      +3
 0628   REF   8  LAST 1319   13,3220   02151 0                      PBODY
 06281                       13,3221   00002 0                      2
 0629                        13,3222   77220 1             STQ      VLOAD
 0630   REF   6  LAST 1319   13,3223   02213 0                      IRETURN
 0631   REF  19  LAST 1317   13,3224   11762 1                      ZEROVEC
 0632   REF   7  LAST 1317   13,3225   01521 0             STORE    TDELTAV
 0633   REF   7  LAST 1317   13,3226   35527 1             STCALL   TNUV
 0634   REF   2  LAST 1259   13,3227   23420 0                      RECTIFY
 0635                        13,3230   43014 0             CLEAR    SET
 0636   REF  14  LAST 1318   13,3231   01676 1                      DIM0FLAG
 0637   REF   1              13,3232   04062 1                      NEWIFLG
 06371                       13,3233   77614 1             SETGO
 06372  REF   1              13,3234   04020 1                      RPQFLAG
 0638   REF   1              13,3235   22320 0                      ALOADED
R0639   INTEGRV IS AN ENTRY TO ORBIT INTEGRATION WHICH PERMITS THE CALLER ,
R0640   NORMALLY THE NAVIGATION PROGRAM ,TO SET THE INTEG. FLAGS. THE ROUTINE
R0641   IS ENTERED AT INTEGRV1 BY CSMPREC ET.AL. AND AT ALOADED BY INTEGRVS.
R0642   THE ROUTINE SETS UP A-MEMORY IF ENTERED AT INTEGRV,1 AND SETS THE INTEG.
R0643   PROGRAM FOR PRECISION OR CONIC

R0644   THE CALLER MUST FIRST CALL INTSTALL TO CHECK IF INTEG. IS IN USE BEFORE
R0645   SETTING ANY FLAGS.
R0646   THE FLAGS WHICH SHOULD BE SET OR CLEARED ARE
R0647     VINTFLAG    (IGNORED WHEN ENTERED FROM INTEGRVS)
R0648     INTYPFLG
R0649     DIM0FLAG
R0650     D6OR9FLG
R0651   CALLING SEQUENCE
R0652     L-K     CALL
R0653     L-Y             INTSTALL
R0654     L-1     SET OR CLEAR ALL FOUR FLAGS. ALSO CAN SET STATEFLG IF DESIRED
R0655             AND DIM0FLAG IS CLEAR.
R0656     L       CALL
R0657     L+1             INTEGRV
R0658   INITIALIZATION
R0659     FLAGS AS ABOVE
R0660     STORE TIME TO INTEGRATE TO IN TDEC1
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L         INTEGRATION INITIALIZATION                                                                USER'S PAGE NO.  12       E3 S3

R0661    OUTPUT
R0662      RATT    AS
R0663      VATT       DEFINED
R0664      TAT                   BEFORE


 0665                            13,3236    77620 0   INTEGRV  STQ
 0666    REF   7  LAST 1319      13,3237    02213 0                     IRETURN
 0667                            13,3240    43014 0   INTEGRV1 SET      SET
 0668    REF   2  LAST 1319      13,3241    04060 0                     RPQFLAG
 0669    REF   2  LAST 1319      13,3242    04062 1                     NEWIFLG
 0670                            13,3243    77731 1   INTEGRV2 SSP
 0671    REF   9  LAST 1259      13,3244    00053 1                     QPRET
 0672    REF   2  LAST 1319      13,3245    22320 0                     ALOADED
 0673                            13,3246    52014 0            BON      GOTO
 0674    REF  13  LAST 1319      13,3247    01714 1                     VINTFLAG
 0675    REF   2  LAST  274      13,3250    27005 1                     PTOACSM
 0676    REF   1                 13,3251    27060 1                     PTOALEM
 06765   REF   1                 11,2000                       SETLOC   INTINIT1
 06766                           11,2320                       BANK
 06767   REF   1                                               COUNT*   $$/INTIN
 0677                            11,2320    77745 1   ALOADED  DLOAD
 0678    REF  43  LAST 1316      11,2321    00041 1                     TDEC1
 0679    REF   2  LAST   77      11,2322    00745 1            STORE    TDEC
 0680                            11,2323    52014 0            BOFF     GOTO
 0681    REF  17  LAST 1318      11,2324    01753 1                     INTYPFLG
 0682    REF   1                 11,2325    27364 0                     TESTLOOP
 0683    REF   1                 11,2326    27350 1                     RVCON
 06835   REF   3  LAST 1313      13,2000                       SETLOC   INTINIT
 06836                           13,3252                       BANK
 06837   REF   3 LAST 1313 TO 1320:   232   262*               COUNT*   $$/INTIN
 0684                            13,3252    45014 0   A-PCHK   BOF      CALL
 0685    REF   1                 13,3253    00342 1                     MIDFLAG
 0686    REF   1                 13,3254    27263 0                     ANDOUT           DONT MAKE ORIGIN CHANGE CHECK
 0687    REF   1                 13,3255    23317 0                     CHKSWTCH
 0688                            13,3256    45044 0            BPL      CALL
 0689    REF   2  LAST 1320      13,3257    27263 0                     ANDOUT           NO ORIGIN CHANGE
 0690    REF   1                 13,3260    23360 0                     ORIGCHNG         MAKE THE SWITCH
 06905                           13,3261    77754 1            LXA,2                     SET X2 FOR MOON OR EARTH SCALING
 06906   REF   9  LAST 1319      13,3262    02150 1                     PBODY
 0691                            13,3263    77414 0   ANDOUT   BOFCLR   EXIT
 0692    REF   4  LAST 1314      13,3264    01652 1                     STATEFLG
 0693    REF   1                 13,3265    27304 0                     RECTOUT
 0694    REF  99  LAST 1314      13,3266   0 5402 1            TC       PHASCHNG
 0695                            13,3267    04022 0            OCT      04022
 0696    REF  68  LAST 1257      13,3270   0 5547 1            TC       UPFLAG           PHASE CHANGE HAS OCCURRED BETWEEN
 0697    REF   3  LAST 1257      13,3271    00230 0            ADRES    REINTFLG         INTSTALL AND INTWAKE
 0698    REF 234  LAST 1313      13,3272   0 6006 1            TC       INTPRET
 0699                            13,3273    77731 1            SSP
 0700    REF  10 -LAST 1320      13,3274    00053 1                     QPRET
 0701   REF   1                 13,3275   27302 0                      PHEXIT
 0702                           13,3276   52014 0             BON      GOTO
 0703   REF  14  LAST 1320      13,3277   01714 1                      VINTFLAG
 0704   REF   2  LAST   34      13,3300   26761 0                      ATOPCSM
 0705   REF   2  LAST   34      13,3301   27034 0                      ATOPLEM
 0706                           13,3302   77624 1  PHEXIT     CALL
 0707   REF  26  LAST 1259      13,3303   22327 1                      GRP2PC
 0708                           13,3304   45001 1  RECTOUT    SETPD    CALL
 0709                           13,3305   00001 0                      0
 0710   REF   3  LAST 1319      13,3306   23420 0                      RECTIFY
 0711                           13,3307   53775 1             VLOAD    VSL*
 0712   REF   9  LAST 1316      13,3310   01503 0                      RRECT
 0713                           13,3311   57576 1                      0,2
 0714                           13,3312   53715 1             PDVL     VSL*                RATT TO PD0
 0715   REF   6  LAST 1282      13,3313   01511 0                      VRECT
 0716                           13,3314   57576 1                      0,2
 0717                           13,3315   63325 0             PDDL     PDVL                VATT TO PD6     TAT TO PD12
 0718   REF  17  LAST 1317      13,3316   01517 0                      TET
 0719   REF  10  LAST 1321      13,3317   01503 0                      RRECT
 0720                           13,3320   64715 0             PDVL     PDDL*
 0721   REF   7  LAST 1321      13,3321   01511 0                      VRECT
 0722   REF   2  LAST  491      13,3322   50037 0                      MUEARTH,2
 0723                           13,3323   76006 0             PUSH     AXT,1
 0724                           13,3324   77765 0             DEC      -10
 0725                           13,3325   76014 0             BON      AXT,1
 0726   REF  20  LAST 1319      13,3326   00303 1                      MOONFLAG
 0727                           13,3327   27331 0                      +2
 0728                           13,3330   77775 1             DEC      -2
 0729                           13,3331   40001 1  INTEXIT    SETPD    BOV
 0730                           13,3332   00001 0                      0
 0731                           13,3333   27334 0                      +1
 07311                          13,3334   43014 0             CLEAR    CLEAR
 07312  REF   1                 13,3335   04675 1                      MIDAVFLG
 07313  REF   5  LAST 1320      13,3336   01672 0                      STATEFLG
 0732                           13,3337   43014 0             CLEAR    CLEAR
 0733   REF   2  LAST  301      13,3340   04676 1                      AVEMIDSW            ALLOW UPDATE OF DOWNLINK STATE VECTOR
 0734   REF   5  LAST 1319      13,3341   01667 1                      PRECIFLG
 0735                           13,3342   77535 1             SLOAD    EXIT
 0736   REF   8  LAST 1320      13,3343   02214 1                      IRETURN
 0737   REF 647  LAST 1298      13,3344  3 0154 1             CA       MPAC
 0738   REF  35  LAST 1286      13,3345  50 120 1             INDEX    FIXLOC
 0739   REF  11  LAST 1320      13,3346  54 052 1             TS       QPRET
 0740   REF   3  LAST 1259      13,3347  0 3527 1             TC       INTWAKE
R0741   RVCON SETS UP ORBIT INTEGRATION TO DO A CONIC SOLUTION FOR POSITION AND
R0742   VELOCITY FOR THE INTERVAL (TET-TDEC)

 0743                           13,3350   45345 1  RVCON      DLOAD    DSU
 0744   REF   3  LAST 1320      13,3351   00745 1                      TDEC
 0745   REF  18  LAST 1321      13,3352   01517 0                      TET
 0746   REF  10  LAST 1280      13,3353   36303 1             STCALL   TAU.
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L       INTEGRATION INITIALIZATION                                                      USER'S PAGE NO.  14      E3 53

 0747   REF   4  LAST 1321   13,3354   23420 0                 RECTIFY
 0748                        13,3355   77624 1          CALL
 0749   REF   1              13,3356   22336 1                 KEPPREP
 0750                        13,3357   43345 1          DLOAD  DAD
 0751   REF   6  LAST 1262   13,3360   01551 1                 TC
 0752   REF  19  LAST 1321   13,3361   01517 0                 TET
 0753   REF  20  LAST 1322   13,3362   35517 1          STCALL TET
 0754   REF   2  LAST 1320   13,3363   27304 0                 RECTOUT
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L        INTEGRATION INITIALIZATION                                                          USER'S PAGE NO.  15       E3 S3

P0755             TESTLOOP

 0756                            13,3364   43014 0  TESTLOOP BOF    CLRGO
 0757    REF    4  LAST 1314     13,3365   04752 0                  QUITFLAG
 0758                            13,3366   27371 1                  +3
 0759    REF    6  LAST 1321     13,3367   01632 1                  STATEFLG
 0760    REF    1                13,3370   27331 0                  INTEXIT              STOP INTEGRATION
 0761                            13,3371   73001 1   +3       SETPD LXA,2
 0762                            13,3372   00013 0                  10D
 0763    REF   10  LAST 1320     13,3373   02150 1                  PBODY
 0764                            13,3374   51575 1            VLOAD ABVAL
 0765    REF   18  LAST 1317     13,3375   01535 0                  RCV
 0766                            13,3376   43006 0            PUSH  CLEAR                RC TO 10D
 0767    REF    2  LAST 1320     13,3377   00262 1                  MIDFLAG
 0768                            13,3400   50023 0            DSU*  BMN                  MIDFLAG=0 IF R G.T. RMP
 0769    REF    1                13,3401   66600 1                  RME,2
 0770                            13,3402   27405 0                  +3
 0771                            13,3403   77614 1            SET
 0772    REF    3  LAST 1323     13,3404   00062 0                  MIDFLAG
 0773                            13,3405   41345 0  NORFINAL DLOAD  DMP
 0774                            13,3406   00013 0                  10D
 0775                            13,3407   00043 0                  34D
 0776                            13,3410   55762 1            SR1R  DDV*
 0777    REF    3  LAST 1321     13,3411   50037 0                  MUEARTH,2
 0778                            13,3412   41366 1            SQRT  DMP
 0779    REF    1                13,3413   23751 0                  .3D
 0780                            13,3414   40442 1            SR3   SR4                  DT    IS TRUNCATED TO A MULTIPLE
 0781                            13,3415   54345 1            DLOAD SL
 0782    REF  648  LAST 1321     13,3416   00155 0                  MPAC
 0783                            13,3417   20220 0                  15D                      OF 128 CSECS.
 0784                            13,3420   40006 0            PUSH  BOV
 0785    REF    1                13,3421   27446 1                  MAXDT
 0786                            13,3422   50021 1            BDSU  BMN
 0787    REF    1                13,3423   27515 0                  DT/2MAX
 0788    REF    2  LAST 1323     13,3424   27446 1                  MAXDT
 0789                            13,3425   45345 1  DT/2COMP DLOAD  DSU
 0790    REF    4  LAST 1321     13,3426   00745 1                  TDEC
 0791    REF   21  LAST 1322     13,3427   01517 0                  TET
 0792                            13,3430   54234 0            RTB   SL
 0793    REF    3  LAST  769     13,3431   45636 0                  SGNAGREE
 0794                            13,3432   20211 1                  8D
 0795    REF    2  LAST   94     13,3433   02305 0            STORE DT/2                 B-19
 0796                            13,3434   51400 1            BOV   ABS
 0797    REF    1                13,3435   27452 1                  GETMAXDT
 0798                            13,3436   50025 0            DSU   BMN                  IS TIME TO INTEG. TO GR THAN MAXTIME
 0799                            13,3437   00015 0                  12D
 0800    REF    1                13,3440   27456 0                  POUHCHK
 0801                            13,3441   75345 1  USEMAXDT DLOAD  SIGN
 0802                            13,3442   00015 0                  12D
 0803    REF    3  LAST 1323     13,3443   02305 0                  DT/2
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L        INTEGRATION INITIALIZATION                                                          USER'S PAGE NO.  16      E3 S3

 0804    REF   4  LAST 1323   13,3444    36305 1                STCALL  DT/2
 0805    REF   2  LAST 1323   13,3445    27456 0                        POOHCHK
 0806                         13,3446    65345 0  MAXDT         DLOAD   PDDL              EXCHANGE DT/2MAX WITH COMPUTED MAX.
 0807    REF   2  LAST 1323   13,3447    27515 0                        DT/2MAX
 0808                         13,3450    77650 1                GOTO
 0809    REF   1              13,3451    27425 1                        DT/2COMP
 0810                         13,3452    77634 0  GETMAXDT      RTB
 0811    REF  15  LAST  880   13,3453    45761 0                        SIGNMPAC
 0812    REF   5  LAST 1324   13,3454    36305 1                STCALL  DT/2
 0813    REF   1              13,3455    27441 0                        USEMAXDT
 0814                         13,3456    51545 1  POOHCHK       DLOAD   ABS
 0815    REF   6  LAST 1324   13,3457    02305 0                        DT/2
 0816                         13,3460    50025 0                DSU     BMN
 0817    REF   1              13,3461    27513 0                        DT/2MIN
 0818    REF   2  LAST 1317   13,3462    27252 1                        A-PCHK
 0819                         13,3463    43014 0                BOFF    BON
 0820    REF   2  LAST 1314   13,3464    01746 0                        PCOFLAG           IS BACKWARDS INTEGRATION INHIBITED
 0821    REF   1              13,3465    23237 0                        TIMESTEP          NO
 0822    REF   6  LAST 1321   13,3466    01707 0                        PRECIFLG          WAS THIS CALL VIA CSM(LEM)PREC
 0823    REF   2  LAST 1324   13,3467    23237 0                        TIMESTEP          YES
 0827                         13,3470    45345 1                DLOAD   DSU
 0828    REF   7  LAST 1324   13,3471    02305 0                        DT/2
 0829                         13,3472    00015 0                        12D
 0830                         13,3473    43040 1                BMN     BOFCLR
 0831    REF   3  LAST 1324   13,3474    27252 1                        A-PCHK
 0832    REF   3  LAST 1320   13,3475    04242 1                        NEWIFLG
 0833    REF   3  LAST 1324   13,3476    23237 0                        TIMESTEP
 0834                         13,3477    45345 1                DLOAD   DSU
 0835    REF   5  LAST 1323   13,3500    00745 1                        TDEC
 0836    REF  22  LAST 1323   13,3501    01517 0                        TET
 0837                         13,3502    77640 0                BMN                       NO BACKWARD INTEGRATION
 0838    REF   2  LAST 1323   13,3503    27331 0                        INTEXIT
 0839                         13,3504    40525 1                PDDL    SR4
 0840    REF   8  LAST 1324   13,3505    02305 0                        DT/2              IS 4(DT) LS(TDEC - TET)
 0841                         13,3506    44322 1                SR2R    BDSU              NO
 0842                         13,3507    52040 1                BMN     GOTO
 0843    REF   3  LAST 1324   13,3510    27331 0                        INTEXIT
 0844    REF   4  LAST 1324   13,3511    23237 0                        TIMESTEP
 0845                         13,3512    00000 1  DT/2MIN       2DEC    3 B-20
 0845                         13,3513    01400 1
 0846                         13,3514    14152 1  DT/2MAX       2DEC    4000 E2 B-20
 0846                         13,3515    00000 1
 0849                         13,3516    77776 1  INTSTALL      EXIT
 0850    REF  17  LAST  747   13,3517  3 0106 0    +1          CA      FLGWRD10
 0851    REF  12  LAST 1208   13,3520  7 4346 0                MASK    PRIO30
 0853                         13,3521  0 0006 1                EXTEND
 0854    REF   1              13,3522  1 3561 1                BZF     OKTOGRAB          YES
 0856    REF   1              13,3523  3 3565 1                CAF     WAKESTAL
 0857    REF   2  LAST  428   13,3524  0 5163 0                TC      JOBSLEEP
 0858                         13,3525    77776 1  INTWAKED      EXIT
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L        INTEGRATION INITIALIZATION                                                          USER'S PAGE NO. 17      E3 S3

 0859   REF   1                  13,3526  1 3547 0              TCF     INTWAKE1

 0860   REF  18  LAST 1324       13,3527  4 0106 1  INTWAKE    CS      FLGWRD10          IS THIS INTSTALLED ROUTINE TO BE
 0861   REF   1                  13,3530  7 4754 1              MASK    REINTBIT              RESTARTED
 0862   REF 334  LAST 1229       13,3531  10 000 0              CCS     A
 0863   REF   2  LAST 1325       13,3532  0 3547 1              TC      INTWAKE1          NO

 0864   REF  36  LAST 1321       13,3533  50 120 1              INDEX   FIXLOC
 0865   REF  12  LAST 1321       13,3534  3 0052 0              CA      QPRET
 0866   REF   1                  13,3535  55 1261 1             TS      TBASE2            YES, DONT RESTART WITH SOMEONE ELSES Q

 0867   REF 100  LAST 1320       13,3536  0 5402 1              TC      PHASCHNG
 0868                            13,3537   04022 0              OCT     04022

 0869   REF   2  LAST 1325       13,3540  3 1261 0              CA      TBASE2
 0870   REF  37  LAST 1325       13,3541  50 120 1              INDEX   FIXLOC
 0871   REF  13  LAST 1325       13,3542  54 052 1              TS      QPRET

 0872   REF   2  LAST 1325       13,3543  3 4754 0              CAF     REINTBIT
 0873   REF  19  LAST 1325       13,3544  7 0106 1              MASK    FLGWRD10
 0874                            13,3545  0 0006 1              EXTEND
 0875   REF   1                  13,3546  1 3563 0              BZF     GOBAC             DONT INTWAKE IF WE CAME HERE VIA RESTART

 0880   REF   2  LAST 1324       13,3547  3 3565 1  INTWAKE1 CAF     WAKESTAL
 0881   REF   5  LAST  428       13,3550  0 5167 1              TC      JOBWAKE
 0882   REF  20  LAST 1216       13,3551  10 064 1              CCS     LOCCTR
 0883   REF   3  LAST 1325       13,3552  1 3547 0              TCF     INTWAKE1
 0884                            13,3553   00051 0  FORTYONE DEC     41
 0885   REF  13  LAST 1324       13,3554  4 4346 0              CS      PRIO30
 0886   REF  20  LAST 1325       13,3555  7 0106 1              MASK    FLGWRD10
 0887   REF  21  LAST 1325       13,3556  54 106 1              TS      FLGWRD10          RELEASE STALL AREA
 0889                            13,3557  0 0003 1              RELINT
 0890   REF   2  LAST 1325       13,3560  1 3563 0              TCF     GOBAC
 0892   REF   4  LAST  201       13,3561  3 4753 1  CKTOGRAB CAF     INTFLBIT
 0893   REF  22  LAST 1325       13,3562  26 106 1              ADS     FLGWRD10
 0894   REF 235  LAST 1320       13,3563  0 6006 1  GOBAC      TC      INTPRET
 0895                            13,3564   77616 0              RVQ
 0900   REF  26  LAST 1319       13,3565   27517 1  WAKESTAL CADR    INTSTALL +1
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L         INTEGRATION INITIALIZATION                                                   USER'S PAGE NO.  18      E3 53

P0913     AVETOMID

R0914     THIS ROUTINE PERFORMS THE TRANSITION FROM A THRUSTING PHASE TO THE COAST
R0915     PHASE BY INITIALIZING THIS VEHICLES PERMANENT STATE VECTOR WITH THE
R0916     VALUES LEFT BY THE AVERAGEG ROUTINE IN RN,VN,PIPTIME.

R0917     BEFORE THIS IS DONE THE W-MATRIX, IF ITS  VALID (ORWFLAG OR RENDWFLG IS
R0918     SET) IS INTEGRATED FORWARD TO PIPTIME WITH THE PRE-THRUST STATE VECTOR.

R0919     IN ADDITION, THE OTHER VEHICLE IS INTEGRATED (PERMANENT) TO PIPTIME.

R0920     FINALLY TRKMKCNT IS ZEROED

 0921     REF   1                 35,2000                        SETLOC INTINIT2
 0922                             35,3677                        BANK

 0923     REF   1                                                COUNT* $$/INTIN
 0924                             35,3677   43020 1  AVETOMID STQ    BON
 0925     REF  14  LAST 1259      35,3700   02310 1                  EGRESS
 0926     REF   9  LAST  628      35,3701   02716 0                  RENDWFLG
 0927     REF   1                 35,3702   73753 1                  INT/W              W-MATRIX VALID ,GO INTEGRATE IT
 0928                             35,3703   77614 1           BON
 0929     REF  13  LAST  641      35,3704   01711 1                  ORBWFLAG
 0930     REF   2  LAST 1326      35,3705   73753 1                  INT/W              W-MATRIX VALID ,GO INTEGRATE IT

 0946                             35,3706   45174 1  SETCOAST AXT,2  CALL               NOW MOVE PROPERLY SCALED RN,VN AND
 0947                             35,3707   00002 0                  2                  PIPTIME TO INTEGRATION ERASABLES.
 0948     REF  27  LAST 1325      35,3710   27516 0                  INTSTALL
 0949                             35,3711   77014 1           BON    AXT,2
 0950     REF   3  LAST  547      35,3712   00315 0                  AMOONFLG
 0951                             35,3713   73715 0                  +2
 0952                             35,3714   00000 1                  0
 0953                             35,3715   53775 1           VLOAD  VSR*
 0954     REF  17  LAST  841      35,3716   01030 0                  RN
 0955                             35,3717   57176 0                  0,2
 0956     REF  11  LAST 1321      35,3720   01503 0           STORE  RRECT
 0957     REF  19  LAST 1323      35,3721   15535 0           STODL  RCV
 0958     REF  18  LAST 1068      35,3722   01044 0                  PIPTIME
 0959     REF  23  LAST 1324      35,3723   25517 0           STOVL  TET
 0960     REF  18  LAST  895      35,3724   01036 0                  VN
 0961                             35,3725   45057 1           VSR*   CALL
 0962                             35,3726   57176 0                  0,2
 0963     REF   2  LAST  515      35,3727   23434 0                  MINIRECT           FINISH SETTING UP STATE VECTOR
 0964                             35,3730   77634 0           RTB
 0965     REF   1                 35,3731   26774 1                  MOVATHIS           PUT TEMP STATE VECTOR INTO PERMANENT
 0968                             35,3732   43014 0           SET    BON
 0969     REF  30  LAST 1315      35,3733   04063 0                  CMOONFLG
 0970     REF   4  LAST 1326      35,3734   00315 0                  AMOONFLG
 0971                             35,3735   73740 0                  +3
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0972                           35,3736   77614 1                CLEAR
0973     REF  31  LAST 1326    35,3737   04263 1                         CMOONFLG

0974                           35,3740   71214 0                BON      DLOAD              NOW DO LM
0975     REF   7  LAST 1316    35,3741   04307 1                         SURFFLAG
0976     REF   2  LAST 1259    35,3742   75735 1                         FAZAB5             NO COASTING LM
0977     REF  19  LAST 1326    35,3743   01044 0                         PIPTIME
0978     REF  44  LAST 1320    35,3744   34041 0                STCALL   TDEC1
0979     REF   3  LAST 1314    35,3745   26744 1                         SETIFLGS
0980                           35,3746   45014 0                CLEAR    CALL
0981     REF  15  LAST 1321    35,3747   01674 0                         VINTFLAG
0982     REF  10  LAST 1317    35,3750   27236 0                         INTEGRV
0985                           35,3751   77650 1                GOTO
0986     REF  15  LAST 1326    35,3752   02310 1                         EGRESS
0987                           35,3753   45145 0     INT/W      DLOAD    CALL
0988     REF  20  LAST 1327    35,3754   01044 0                         PIPTIME            INTEGRATE W THRU BURN
0989     REF  28  LAST 1326    35,3755   27516 0                         INTSTALL
0990                           35,3756   43014 0                SET      SET
0991     REF  15  LAST 1319    35,3757   01476 0                         DIM0FLAG           DO W-MATRIX
0992     REF   3  LAST 1321    35,3760   04476 0                         AVEMIDSW           SO WONT CLOBBER RN,VN,PIPTIME
0993                           35,3761   43014 0                CLEAR    SET
0994     REF   4  LAST 1314    35,3762   01675 1                         D6OR9FLG
0995     REF  16  LAST 1327    35,3763   01474 1                         VINTFLAG
0996     REF  45  LAST 1327    35,3764   34041 0                STCALL   TDEC1
0997     REF  11  LAST 1327    35,3765   27236 0                         INTEGRV
0998                           35,3766   77650 1                GOTO
0999     REF   1               35,3767   73706 1                         SETCOAST
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P1000    MIDTOAV1

R1001    THIS ROUTINE INTEGRATES (PRECISION) TO THE TIME SPECIFIED IN TDEC1.
R1002    IF, AT THE END OF AN INTEGRATION TIME STEP, CURRENT TIME PLUS A DELTA
R1003    TIME (SEE TIMEDELT.....BASED ON THE COMPUTATUON TIME FOR ONE TIME STEP)
R1004    IS GREATER THAN THE DESIRED TIME, ALARM 1703 IS SET AND THE INTEGRATION
R1005    IS DONE AS IT IS FOR MIDTOAV2.
R1006    RETURN IS IN BASIC TO THE RETURN ADDRESS PLUS ONE.

R1007    IF THE INTEGRATION IS FINISHED TO THE DESIRED TIME, RETURN IS IN BASIC
R1008    TC THE RETURN ADDRESS

R1009    IN EITHER CASE , BEFCRE RETURNING, THE EXTRAPOLATED STATE VECTOR IS TRAN
R1010    FERRED FROM R,VATT TC R,VN1-PIPTIME1 IS SET TO THE FINISHING INTEGRA-
R1011    TION TIME AND MPAC IS SET TC THE DELTA TIME---
R1012                                  TAT MINUS CURRENT TIME.


R1013    MIDTOAV2

R1014    THIS ROUTINE INTEGRATES THE CSM STATE VECTOR TO CURRENT TIME PLUS
R1015    INCREMENTS OF TIMEDELT SUCH THAT THE DIFFERENCE BETWEEN CURRENT TIME
R1016    AND THE STATE VECTOR TIME AT THE END OF THE LAST STEP IS AT LEAST 5.6
R1017    SECS.
R1018    NC INPUTS ARE REQUIRED OF THE CALLER. RETURN IS IN BASIC TO THE RETURN
R1019    ADDRESS WITH THE ABCVE TRANSFERS TO R,VN1-PIPTIME1-AND MPAC DONE

  1020   REF   4  LAST 1320   13,2000                      SETLOC INTINIT
  1021                        13,3566                      BANK
  10215  REF   1                                           COUNT* $$/R41
  1022   REF   1                 0773                      EBANK= IRETURN1
  1023                        13,3566   45020 1  MIDTOAV2  STQ    CALL
  1024   REF   2  LAST 1328   13,3567   00773 1                   IRETURN1
  1025   REF  29  LAST 1327   13,3570   27516 0                   INTSTALL
  1026                        13,3571   43145 0            DLOAD  CLEAR
  1027   REF   1              13,3572   13771 1                   TIMEDELT
  1028   REF   1              13,3573   04674 0                   MID1FLAG
  1029   REF   1              13,3574   37466 1            STCALL T-TO-ADD
  1030   REF   1              13,3575   27612 1                   ENTMID2

  1031                        13,3576   45020 1  MIDTOAV1  STQ    CALL
  1032   REF   3  LAST 1328   13,3577   00773 1                   IRETURN1
  1033   REF  30  LAST 1328   13,3600   27516 0                   INTSTALL
  1034                        13,3601   47014 1            SET    RTB
  1035   REF   2  LAST 1328   13,3602   04474 1                   MID1FLAG
  1036   REF  27  LAST 1313   13,3603   51751 0                   LOADTIME
  1037                        13,3604   44215 1            DAD    BDSU         INITIAL CHECK.IS TDEC1 IN THE FUTURE.
  1038   REF   2  LAST 1328   13,3605   13771 1                   TIMEDELT
  1039   REF  46  LAST 1327   13,3606   00041 1                   TDEC1
  1040                        13,3607   45044 0            BPL    CALL
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 L        INTEGRATION INITIALIZATION                                                              USER'S PAGE NO.  21      E1 S3

  1041    REF   1                 13,3610   27616 0                       ENTMID1
  1042    REF   1                 13,3611   13756 1                       NOTIME             NO SET ALARM.SWITCH TO MIDTOAV2

  1043                            13,3612   43234 0  ENTMID2   RTB        CAD
  1044    REF  28  LAST 1328      13,3613   51751 0                       LOADTIME
  1045    REF   2  LAST 1328      13,3614   03466 0                       T-TO-ADD
  1046    REF  47  LAST 1328      13,3615   00041 1            STORE      TDEC1

  1047                            13,3616   45014 0  ENTMID1   CLEAR      CALL
  1048    REF  16  LAST 1327      13,3617   01676 1                       DIM0FLAG           NO W-MATRIX
  1049    REF   1                 13,3620   26034 1                       THISVINT
  1050                            13,3621   43014 0            CLEAR      SET
  1051    REF  18  LAST 1320      13,3622   01673 1                       INTYPFLG
  1052    REF   2  LAST 1321      13,3623   04475 0                       MIDAVFLG           LET INTEG. KNOW THE CALL IS FOR MIDTOAV.
  1053                            13,3624   77624 1            CALL
  1054    REF  12  LAST 1327      13,3625   27236 0                       INTEGRV             GO INTEGRATE
  10541                           13,3626   66134 1            SXA,2      SXA,1
  105415 REF   16  LAST  840      13,3627   03746 1                       RTX2
  10542   REF  14  LAST  716      13,3630   03745 1                       RTX1
  105425                          13,3631   67214 1            CLEAR      SLOAD
  10543   REF   5  LAST 1326      13,3632   00275 1                       AMOONFLG
  105435 REF   17  LAST 1329      13,3633   03747 0                       RTX2
  10544                           13,3634   43054 1            BZE        SET
  105445                          13,3635   27637 0                       +2
  10545   REF   6  LAST 1329      13,3636   00075 0                       AMOONFLG
  1055                            13,3637   77775 1            VLOAD
  1056    REF  35  LAST  940      13,3640   00001 0                       RATT
  1057    REF   7  LAST  841      13,3641   25071 0            STOVL      RN1
  1058    REF  26  LAST  923      13,3642   00007 0                       VATT
  1059    REF   4  LAST  841      13,3643   15077 0            STODL      VN1
  1060    REF  10  LAST  940      13,3644   00015 0                       TAT
  1061    REF   9  LAST  837      13,3645   01105 1            STORE      PIPTIME1
  1071                            13,3646   77776 1            EXIT

  1072                            13,3647  0 0004 0            INHINT
  1073                            13,3650  0 0006 1            EXTEND
  1074    REF  34  LAST 1097      13,3651  4 0025 1            DCS        TIME2
  1075    REF 649  LAST 1323      13,3652  20 155 1            DAS        MPAC
  1076    REF   5  LAST 1157      13,3653  0 7226 0            TC         TPAGREE

  1077    REF   4  LAST 1328      13,3654  3 0773 1            CA         IRETURN1
  1078    REF   7  LAST  572      13,3655  0 4660 0            TC         BANKJUMP
  1079                            13,3656   47014 1  CKMID2    BOF        RTB
  1080    REF   3  LAST 1328      13,3657   04754 0                       MID1FLAG
  1081    REF   1                 13,3660   27675 0                       MID2
  1082    REF  29  LAST 1329      13,3661   51751 0                       LOADTIME
  1083                            13,3662   44215 1            DAD        BDSU
  1084    REF   3  LAST 1328      13,3663   13771 1                       TIMEDELT
  1085    REF   6  LAST 1324      13,3664   00745 1                       TDEC
  1086                            13,3665   45044 0            BPL        CALL
 1087   REF   2  LAST 1320   13,3666   27364 0                    TESTLOOP         YES
 1088   REF   2  LAST 1329   13,3667   13756 1                    NOTIME

 1089                        13,3670   43234 0  TIMEINC  RTB      CAD
 1090   REF  30  LAST 1329   13,3671   51751 0                    LOADTIME
 1091   REF   3  LAST 1329   13,3672   03466 0                    T-TO-ADD
 1092   REF   7  LAST 1329   13,3673   34745 0           STCALL   TDEC
 1093   REF   3  LAST 1330   13,3674   27364 0                    TESTLOOP

 1094                        13,3675   45345 1  MID2     DLOAD    DSU
 1095   REF   8  LAST 1330   13,3676   00745 1                    TDEC
 1096   REF  24  LAST 1326   13,3677   01517 0                    TET
 1097                        13,3700   45246 0           ABS      DSU
 1098   REF   1              13,3701   13755 1                    3CSECS
 1099                        13,3702   77644 1           BPL
 1100   REF   1              13,3703   27670 0                    TIMEINC

 1101                        13,3704   44234 1           RTB      BDSU             SEE IF 5.6 SECS. AVAILABLE TO CALLER.
 1102   REF  31  LAST 1330   13,3705   51751 0                    LOADTIME
 1103   REF  25  LAST 1330   13,3706   01517 0                    TET
 1104                        13,3707   51025 1           DSU      BPL
 1105   REF   1              13,3710   13773 0                    5.6SECS
 1106   REF   4  LAST 1324   13,3711   27252 1                    A-PCHK           YES,GET OUT.

 1107                        13,3712   43345 1           DLOAD    DAD              NO,ADD TIMEDELT TO T-TO-ADD AND TRY
 1108   REF   4  LAST 1330   13,3713   03466 0                    T-TO-ADD         AGAIN.
 1109   REF   4  LAST 1329   13,3714   13771 1                    TIMEDELT
 1110   REF   5  LAST 1330   13,3715   37466 1           STCALL   T-TO-ADD
 1111   REF   2  LAST 1330   13,3716   27670 0                    TIMEINC
A11114

 111141 REF   1              05,2000                     SETLOC   INTINIT3
 111142                      05,3754                     BANK

 111143 REF   1                                          COUNT*   $$/R41
 11115                       05,3754   00000 1  3CSECS   2DEC     3
 11115                       05,3755   00003 1

 1112                        05,3756   77414 0  NOTIME   CLEAR    EXIT             TOO LATE
 1113   REF   4  LAST 1329   05,3757   04674 0                    MID1FLAG
 1114   REF   5  LAST 1329   05,3760   24 773 1          INCR     IRETURN1         SET ERROR EXIT  (CALLOC +2)
 1115   REF  32  LAST 1191   05,3761   0 5671 1          TC       ALARM            INSUFFICIENT TIME FOR INTEGRATION --
 1116                        05,3762   01703 1           OCT      1703                TIG WILL BE SLIPPED...
 1117   REF 236  LAST 1325   05,3763   0 6006 1          TC       INTPRET
 1118                        05,3764   77745 1           DLOAD
 1119   REF   5  LAST 1330   05,3765   13771 1                    TIMEDELT
 1120   REF   6  LAST 1330   05,3766   03466 0           STORE    T-TO-ADD
 1121                        05,3767   77616 0           RVQ

 1123                        05,3770   00000 1  TIMEDELT 2DEC     1250
 1123                        05,3771   02342 0
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L        INTEGRATION INITIALIZATION                                                      USER'S PAGE NO.  23      E1 53

 1124                           05,3772  00000 1  5.6SECS  2DEC    560
 1124                           05,3773  01060 0
 1126   REF   1                 27,2000                    SETLOC  UPDATE2
 1127                           27,3072                    BANK
 1129   REF   1                                            COUNT*  $$/INTIN

 1131   REF  12  LAST  790      E3,1706                    EBANK=  TEPHEM
 1134   REF 237  LAST 1330      27,3072  0 6006 1 INTWAKEU TC      INTPRET

 1135                           27,3073  53135 0           SLOAD   BZE               IS THIS A CSM/LEM STATE VECTOR UPDATE
 1136   REF   4  LAST  194      27,3074  01502 1                   UPSVFLAG          REQUEST. IF NOT GO TO INTWAKUP.
 1137   REF   1                 27,3075  57141 1                   INTWAKUP

 1138                           27,3076  77775 1           VLOAD                     MOVE RRECT(6) AND VRECT(6) INTO
 1139   REF  12  LAST 1326      27,3077  01503 0                   RRECT                  RCV(6)   AND VCV(6)   RESPECTIVELY.
 1140   REF  20  LAST 1326      27,3100  25535 0           STOVL   RCV
 1141   REF   8  LAST 1321      27,3101  01511 0                   VRECT             NOW GO TO 'RECTIFY +13D' TO
 1142                           27,3102  77624 1           CALL                      STORE VRECT INTO VCV  AND ZERO OUT
 1143   REF   1                 27,3103  23435 1                   TINIRECT          TDELTAV(6),TNUV(6),TC(2) AND XKEP(2)
 1144                           27,3104  51535 0           SLOAD   ABS               COMPARE ABSOLUTE VALUE OF 'UPSVFLAG'
 1145   REF   5  LAST 1331      27,3105  01502 1                   UPSVFLAG          TO 'UPDATE MOON STATE VECTOR CODE'
 1146                           27,3106  53025 0           DSU     BZE               TO DETERMINE WHETHER THE STATE VECTOR TO
 1147   REF   1                 27,3107  17150 0                   UPMNSVCD          BE UPDATED IS IN THE EARTH OR LUNAR
 1148   REF   1                 27,3110  57115 0                   INTWAKEM          SPHERE OF INFLUENCE.........
 1149                           27,3111  43174 1           AXT,2   CLRGO             EARTH SPHERE OF INFLUENCE.
 1150                           27,3112  00000 1           DEC     0
 1151   REF  21  LAST 1321      27,3113  00223 1                   MOONFLAG
 1152   REF   1                 27,3114  57120 0                   INTWAKEC
 1153                           27,3115  43174 1  INTWAKEM AXT,2   SET               LUNAR SPHERE OF INFLUENCE.
 1154                           27,3116  00002 0           DEC     2
 1155   REF  22  LAST 1331      27,3117  00063 1                   MOONFLAG
 1156                           27,3120  50135 0  INTWAKEC SLOAD   BMN               COMMON CODING AFTER X2 INITIALIZED AND
A1157                                                                                MOONFLAG SET(OR CLEARED).
 1158   REF   6  LAST 1331      27,3121  01502 1                   UPSVFLAG          IS THIS A REQUEST FOR A LEM OR CSM
 1159   REF   1                 27,3122  57130 1                   INTWAKLM           STATE VECTOR UPDATE......
 1160                           27,3123  77624 1           CALL                      UPDATE CSM STATE VECTOR
 1161   REF   3  LAST 1321      27,3124  26761 0                   ATOPCSM

 1162                           27,3125  52014 0           CLEAR   GOTO
 1163   REF  14  LAST 1326      27,3126  01671 0                   CRBWFLAG
 1164   REF   1                 27,3127  57132 0                   INTWAKEX

 1165                           27,3130  77624 1  INTWAKLM CALL                      UPDATE  LM STATE VECTOR
 1166   REF   3  LAST 1321      27,3131  27034 0                   ATOPLEM

 1167                           27,3132  77414 0  INTWAKEX CLEAR   EXIT
 1168   REF  10  LAST 1326      27,3133  02676 1                   RENDWFLG

 11681  REF 247  LAST 1256      27,3134  3 4772 1          CAF     ZERO
 11682                          27,3135  0 0006 1          EXTEND
 11683  REF   2  LAST  194   27,3136  01 077 0               WRITE   CHAN77             ZERO CHANNEL 77
 1169   REF   7  LAST 1331   27,3137  55'501 0               TS      UPSVFLAG

 1170   REF 238  LAST 1331   27,3140  0 6006 1               TC      INTPRET
 1171                        27,3141   77624 1  INTWAKUP CALL
 1172   REF   4  LAST  648   27,3142   27525 0                       INTWAKE0           RELEASE :GRAB: OF ORBIT INTEG
 1173                        27,3143   77776 1               EXIT

 1174   REF 101  LAST 1325   27,3144  0 5402 1               TC      PHASCHNG
 1175                        27,3145   04026 1               OCT     04026
 1176   REF   1              27,3146  0 3706 0               TC      UPOUT +1

 1177                        27,3147   00002 0  UPMNSVCD OCT     2
 1178                        27,3150   00000 1               OCT     0


 11785  REF   1              11,2000                         SETLOC  ORBITAL
 11786                       11,2327                         BANK

 11787  REF   1                                              COUNT*  $$/ORBIT
 1179                        11,2327   77420 1  GRP2PC       STQ     EXIT
 1180   REF   3  LAST  126   11,2330   03536 1                       GRP2SVQ
 1181   REF 102  LAST 1332   11,2331  0 5402 1               TC      PHASCHNG
 1182                        11,2332   04022 0               OCT     04022
 1183   REF 239  LAST 1332   11,2333  0 6006 1               TC      INTPRET
 1184                        11,2334   77650 1               GOTO
 1185   REF   4  LAST 1332   11,2335   03536 1                       GRP2SVQ
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R0001           DELETE
 0003   REF   2 LAST 1332   11,2000                     SETLOC ORBITAL
 0004                       11,2336                     BANK
 0005   REF   2 LAST 1332 TO 1333:     7     7*         COUNT* $$/ORBIT
R0006           DELETE
 0007                       11,2336   40354 1  KEPPREP  LXA,2  SETPD
 0008   REF  11 LAST 1323   11,2337   02150 1                  PBODY
 0009                       11,2340   00001 0                  0
 0010                       11,2341   75543 1           DLOAD* SQRT           SQRT(MU) (+18 OR +15)  0D          PL  2D
 0011   REF   4 LAST 1323   11,2342   50037 0                  MUEARTH,2
 0012                       11,2343   53515 0           PDVL   UNIT                                              PL  8D
 0013   REF  21 LAST 1331   11,2344   01535 0                  RCV
 0014                       11,2345   60325 0           PDDL   NORM           NORM R (+29 OR +27 - N1) 2D        PL  4D
 0015                       11,2346   00045 0                  36D
 0016   REF  83 LAST 1318   11,2347   00047 1                  X1
 0017                       11,2350   77715 1           PDVL
 0018                       11,2351   65241 0           DOT    PDDL           F*SQRT(MU)(+7 OR+5) 4D           PL  6D
 0019   REF  16 LAST 1317   11,2352   01543 1                  VCV
 0020   REF  11 LAST 1321   11,2353   02303 0                  TAU.           (+28)
 0021                       11,2354   60225 1           DSU    NORM
 0022   REF   7 LAST 1322   11,2355   01551 1                  TC
 0023   REF  41 LAST 1258   11,2356   00051 0                  S1
 0024                       11,2357   77742 0           SR1
 0025                       11,2360   65271 0           DDV    PDDL
 0026                       11,2361   00003 1                  2D
 0027                       11,2362   41405 0           DMP    PUSH           FS(+6 +N1-N2) 6D                 PL  8D
 0028                       11,2363   00005 1                  4D
 0029                       11,2364   65316 0           DSQ    PDDL           (FS)SQ(+12 +2(N1-N2)) 8D         PL 10D
 0030                       11,2365   00005 1                  4D
 0031                       11,2366   64716 0           DSQ    PDDL*          SSQ/MU(-2OR +2(N1-N2)) 10D         PL 12D
 0032   REF   5 LAST 1333   11,2367   50037 0                  MUEARTH,2
 0033                       11,2370   40442 1           SR3    SR4
 0034                       11,2371   47515 0           PDVL   VSQ            PREALIGN MU (+43 OR +37) 12D     PL 14D
 0035   REF  17 LAST 1333   11,2372   01543 1                  VCV
 0036                       11,2373   44205 0           DMP    BDSU                                            PL 12D
 0037                       11,2374   00045 0                  36D
 0038                       11,2375   41271 0           DDV    DMP                                             PL 10D
 0039                       11,2376   00003 1                  2D             -(1/R-ALPHA)(+12 +3N1-2N2)
 0040                       11,2377   53605 1           DMP    SL*
 0041   REF   1             11,2400   23771 1                  DP2/3
 0042                       11,2401   20176 0                  0 -3,1         10L(1/R-ALPHA)(+13 +2(N1-N2))
 0043                       11,2402   43260 1           XSU,1  DAD            2(FS)SQ - ETCETRA           PL 8D
 0044   REF  42 LAST 1333   11,2403   00050 1                  S1             X1 = N2-N1
 0045                       11,2404   45257 0           SL*    DSU            -FS+2(FS)SQ ETC (+6 +N1-N2)      PL  6D
 0046                       11,2405   20211 1                  8D,1
 0047                       11,2406   41205 0           DMP    DMP
 0048                       11,2407   00001 0                  0
 0049                       11,2410   00005 1                  4D
 0050                       11,2411   53657 0           SL*    SL*
 0051                       11,2412   20211 1                  8D,1
 0052                          11,2413   20201 0                0,1         S(-FS(1-2FS)-1/6...)(+17 OR +16)
 0053                          11,2414   65215 1      DAD      PDDL                                        PL  0D
 0054   REF   2  LAST   89     11,2415   01553 0               XKEP
 0055                          11,2416   53605 1      DMP      SL*          S(+17 OR +16)
 0056                          11,2417   00001 0               0D
 0057                          11,2420   20202 0               1,1
 0058                          11,2421   43204 0      BOVB     DAD
 0059   REF  10  LAST 1258     11,2422   57544 0               TCDANZIG
 0060                          11,2423   77626 0      STADR
 0061   REF   3  LAST 1278     11,2424   75500 0      STORE    XKEPNEW
 0062                          11,2425   74020 0      STQ      AXC,1
 0063   REF   3  LAST 1282     11,2426   02267 0               KEPRTN
 0064                          11,2427   00012 1      DEC      10
 0065                          11,2430   74014 1      BON      AXC,1
 0066   REF  23  LAST 1331     11,2431   00303 1               MOONFLAG
 0067   REF   1                11,2432   24077 1               KEPLERN
 0068                          11,2433   00002 0      DEC      2
 0069                          11,2434   77650 1      GOTO
 0070   REF   2  LAST 1334     11,2435   24077 1               KEPLERN
 0071                           11,2436   66350 1  FBR3     LXA,1  SSP
 0072   REF  18  LAST 1316      11,2437   01500 0                  DIFEQCNT
 0073   REF  43  LAST 1333      11,2440   00051 0                  S1
 0074                           11,2441   77762 1           DEC    -13
 0075                           11,2442   54345 1           DLOAD  SR
 0076   REF   9  LAST 1324      11,2443   02305 0                  DT/2
 0077                           11,2444   20612 0                  9D
 0078                           11,2445   61500 0           TIX,1  ROUND
 0079                           11,2446   22447 0                  +1
 0080                           11,2447   43206 1           PUSH   DAD
 0081   REF   8  LAST 1333      11,2450   01551 1                  TC
 0082   REF  12  LAST 1333      11,2451   16303 0           STODL  TAU.
 0083                           11,2452   77615 0           DAD
 0084   REF  26  LAST 1330      11,2453   01517 0                  TET
 0085   REF  27  LAST 1335      11,2454   35517 1           STCALL TET
 0086   REF   2  LAST 1322      11,2455   22336 1                  KEPPREP
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P0087   AGC ROUTINE TO COMPUTE ACCELERATION COMPONENTS.

0088                          11,2456   73150 1   ACCOMP    LXA,1   LXA,2
0089    REF  12  LAST 1333    11,2457   02150 1                     PBODY
0090    REF  13  LAST 1336    11,2460   02150 1                     PBODY
0091                          11,2461   77775 1             VLOAD
0092    REF  20  LAST 1319    11,2462   11762 1                     ZEROVEC
0093    REF   2  LAST   93    11,2463   26202 0             STOVL   FV
0094    REF  31  LAST 1239    11,2464   02152 0                     ALPHAV
0095                          11,2465   53257 1             VSL*    VAD
0096                          11,2466   57605 0                     0 -7,2
0097    REF  22  LAST 1333    11,2467   01535 0                     RCV
0098    REF   2  LAST   93    11,2470   02160 1             STORE   BETAV
0099                          11,2471   65014 1             BOF     XCHX,2
0100    REF  17  LAST 1329    11,2472   01756 1                     DIM0FLAG
0101                          11,2473   22500 1                     +5
0102    REF  19  LAST 1335    11,2474   01500 0                     DIFEQCNT
0103    REF   6  LAST   93    11,2475   12216 1             STORE   VECTAB,2
0104                          11,2476   77724 0             XCHX,2
0105    REF  20  LAST 1336    11,2477   01500 0                     DIFEQCNT
0106                          11,2500   53575 0             VLOAD   UNIT
0107    REF  32  LAST 1336    11,2501   02152 0                     ALPHAV
0108    REF  33  LAST 1336    11,2502   16152 0             STODL   ALPHAV
0109                          11,2503   00045 0                     36D
0110    REF   4  LAST 1237    11,2504   02301 1             STORE   ALPHAM
0111                          11,2505   77624 1             CALL
0112    REF   1               11,2506   22602 0                     GAMCOMP
0113                          11,2507   66175 1             VLOAD   SXA,1
0114    REF   3  LAST 1336    11,2510   02160 1                     BETAV
0115    REF  29  LAST 1316    11,2511   00051 0                     S2
0116    REF  34  LAST 1336    11,2512   16152 0             STODL   ALPHAV
0117    REF   2  LAST   93    11,2513   02210 0                     BETAM
0118    REF   5  LAST 1336    11,2514   02301 1             STORE   ALPHAM
0119                          11,2515   71214 0             BOF     DLOAD
0120    REF   4  LAST 1323    11,2516   00342 1                     MIDFLAG
0121    REF   1               11,2517   22754 1                     OBLATE
0122    REF  28  LAST 1335    11,2520   01517 0                     TET
0123                          11,2521   77624 1             CALL
0124    REF   3  LAST  766    11,2522   54136 1                     LSPOS
0125                          11,2523   72174 0             AXT,2   LXA,1
0126                          11,2524   00002 0                     2
0127    REF  30  LAST 1336    11,2525   00051 0                     S2
0128                          11,2526   77614 1             BOF
0129    REF  24  LAST 1334    11,2527   00343 0                     MOONFLAG
0130                          11,2530   22533 1                     +3
0131                          11,2531   77076 0             VCOMP   AXT,2
0132                          11,2532   00000 1                     0
0133    REF   4  LAST 1336    11,2533   02160 1             STORE   BETAV
0134    REF   3  LAST   93    11,2534   26262 0             STOVL   RPQV
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L         ORBITAL INTEGRATION                                                               USER'S PAGE NO.   5      E0 S3

 0135                              11,2535   00003 1                         20
 0136    REF    2  LAST    93      11,2536   02271 1              STORE    RPSV
 0140                              11,2537   77214 0              BUF      VLOAD
 0141    REF   18  LAST  1336      11,2540   01756 1                       DIM0FLAG
 0142    REF    1                  11,2541   22554 0                       GETRPSV
 0143    REF   35  LAST  1336      11,2542   02152 0                       ALPHAV
 0144                              11,2543   53761 1              VXSC     VSR*
 0145    REF    6  LAST  1336      11,2544   02301 1                       ALPHAM
 0146                              11,2545   57175 0                       1,2
 0147                              11,2546   65051 0              VSU      XCHX,2
 0148    REF    5  LAST  1336      11,2547   02160 1                       BETAV
 0149    REF   21  LAST  1336      11,2550   01500 0                       DIFEQCNT
 0150    REF    7  LAST  1336      11,2551   12224 0              STORE    VECTAB +6,2
 0155                              11,2552   77724 0              XCHX,2
 0156    REF   22  LAST  1337      11,2553   01500 0                       DIFEQCNT
 0157                              11,2554   62175 0   GETRPSV    VLOAD    INCR,1
 0158    REF    4  LAST  1336      11,2555   02262 0                       RPQV
 0159                              11,2556   00004 0                       4
 0160                              11,2557   43014 0              CLEAR    BOF
 0161    REF    3  LAST  1320      11,2560   04260 1                       RPQFLAG
 0162    REF   25  LAST  1336      11,2561   00343 0                       MOONFLAG
 0163                              11,2562   22567 0                       +5
 0164                              11,2563   53261 1              VSR      VAD
 0165                              11,2564   20612 0                       9D
 0166    REF    3  LAST  1337      11,2565   02271 1                       RPSV
 0167    REF    4  LAST  1337      11,2566   02271 1              STORE    RPSV
 0168                              11,2567   77624 1              CALL
 0169    REF    2  LAST  1336      11,2570   22602 0                       GAMCOMP
 0170                              11,2571   62174 1              AXT,2    INCR,1
 0171                              11,2572   00004 0                       4
 0172                              11,2573   00004 0                       4
 0173                              11,2574   77775 1              VLOAD
 0174    REF    5  LAST  1337      11,2575   02271 1                       RPSV
 0175    REF    6  LAST  1337      11,2576   36160 0              STCALL   BETAV
 0176    REF    3  LAST  1337      11,2577   22602 0                       GAMCOMP
 0177                              11,2600   77650 1              GOTO
 0178    REF    2  LAST  1336      11,2601   22754 1                       OBLATE
 0179                              11,2602   74575 0   GAMCOMP    VLOAD    VSR1
 0180    REF    7  LAST  1337      11,2603   02160 1                       BETAV
 0181                              11,2604   40236 1              VSQ      SETPD
 0182                              11,2605   00001 0                       0
 0183                              11,2606   61501 1              NORM     ROUND
 0184                              11,2607   00040 0                       31D
 0185                              11,2610   60325 0              PDDL     NORM            NORMED B SQUARED TO PD LIST
 0186    REF    7  LAST  1337      11,2611   02301 1                       ALPHAM          NORMALIZE (LESS ONE) LENGTH OF ALPHA
 0187                              11,2612   00041 1                       32D             SAVING NORM SCALE FACTOR IN X1
 0188                              11,2613   63342 1              SR1      PDVL
 0189    REF    8  LAST  1337      11,2614   02160 1                       BETAV           C(PDL+2) = ALMOST NORMED ALPHA
 0190                              11,2615   77656 1              UNIT
 0191    REF    9  LAST  1337      11,2616   16160 1              STODL    BETAV
 0192                       11,2617   00045 0                    36D
 0193   REF   3  LAST 1336  11,2620   02210 0           STORE    BETAM
 0194                       11,2621   55301 0           NORM     BDDV            FORM NORMALIZED QUOTIENT ALPHAM/BETAM
 0195                       11,2622   00042 1                    33D
 0196                       11,2623   41562 0           SR1R     PUSH            C(PDL+2) = ALMOST NORMALIZED RHO.
 0197                       11,2624   77743 1           DLOAD*
 0198   REF   1             11,2625   27732 1                    ASCALE,1
 0199   REF  44  LAST 1335  11,2626   00051 0           STORE    S1
 0200                       11,2627   57124 1           XCHX,2   XAD,2
 0201   REF  45  LAST 1338  11,2630   00050 1                    S1
 0202                       11,2631   00040 0                    32D
 0203                       11,2632   71264 1           XSU,2    DLOAD
 0204                       11,2633   00041 1                    33D
 0205                       11,2634   00003 1                    2D
 0206                       11,2635   65057 0           SR*      XCHX,2
 0207                       11,2636   57177 1                    0 -1,2
 0208   REF  46  LAST 1338  11,2637   00050 1                    S1
 0209                       11,2640   74406 0           PUSH     SR1R            RHO/4 TO 4D
 0210                       11,2641   50315 0           PDVL     DOT
 0211   REF  36  LAST 1337  11,2642   02152 0                    ALPHAV
 0212   REF  10  LAST 1337  11,2643   02160 1                    BETAV
 0213                       11,2644   44372 1           SL1R     BDSU            (RHO/4) - 2(ALPHAV/2.BETAV/2)
 0214                       11,2645   57206 1           PUSH     DMPR            TO PDL+6
 0215                       11,2646   00005 1                    4
 02155                      11,2647   77752 1           SL1
 0216                       11,2650   43206 1           PUSH     DAD
 0217   REF   1             11,2651   33412 0                    DQUARTER
 0218                       11,2652   75406 1           PUSH     SQRT
 0219                       11,2653   41475 1           DMPR     PUSH
 0220                       11,2654   00013 0                    10D
 0221                       11,2655   43352 1           SL1      DAD
 0222   REF   2  LAST 1338  11,2656   33412 0                    DQUARTER
 0223                       11,2657   43325 1           PDDL     DAD             (1/4)+2((Q+1)/4)    TO PD+14D
 0224                       11,2660   00013 0                    10D
 0225   REF   1             11,2661   11760 0                    HALFDP
 0226                       11,2662   72475 1           DMPR     SL1
 0227                       11,2663   00011 1                    8D
 0228                       11,2664   56215 1           DAD      DDV
 0229   REF   1             11,2665   23747 1                    THREE/8
 0230                       11,2666   00017 1                    14D
 0231                       11,2667   74275 1           DMPR     VXSC
 0232                       11,2670   00007 0                    6
 0233   REF  11  LAST 1338  11,2671   02160 1                    BETAV                       -
 0234                       11,2672   64515 1           PDVL     VSR3            (G/2)(C(PD+4))G/2 TO PD+16D
 0235   REF  37  LAST 1338  11,2673   02152 0                    ALPHAV
 0236                       11,2674   41455 0           VAD      PUSH            A12 + C(PD+16D) TO PD+16D
 0237                       11,2675   41345 0           DLOAD    DMP
 0238                       11,2676   00001 0                    0
 0239                       11,2677   00015 0                    12D             -
 0240                       11,2700   61501 1           NORM     ROUND
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L         ORBITAL  INTEGRATION                                                              USER'S PAGE NO.   7       E0 S3

0241                        11,2701  00037 0                   30D
0242                        11,2702  40665 0            BDDV   DMP*
0243                        11,2703  00003 1                   2
0244    REF   6  LAST 1333  11,2704  50037 0                   MUEARTH,2
0245                        11,2705  74276 1            DCOMP  VXSC
0246                        11,2706  57124 1            XCHX,2 XAD,2
0247    REF  47  LAST 1338  11,2707  00050 1                   S1
0248    REF  31  LAST 1336  11,2710  00051 0                   S2
0249                        11,2711  55064 0            XSU,2  XSU,2
0250                        11,2712  00036 1                   30D
0251                        11,2713  00037 0                   31D
02513                       11,2714  77600 1            BOV                         CLEAR OVIND
02516                       11,2715  22716 1                   +1
0252                        11,2716  65057 0            VSR*   XCHX,2
0253                        11,2717  57177 1                   0 -1,2
0254    REF  48  LAST 1339  11,2720  00050 1                   S1
0255                        11,2721  77655 1            VAD
0256    REF   3  LAST 1336  11,2722  02202 0                   FV
0257    REF   4  LAST 1339  11,2723  02202 0            STORE  FV
025805                      11,2724  43400 1            BOV    RVQ                  RETURN IF NO OVERFLOW
02581                       11,2725  22726 1                   +1
025815                      11,2726  51575 1  GOBAQUE   VLOAD  ABVAL
025816 REF   8  LAST 1319   11,2727  01521 0                   TDELTAV
025817                      11,2730  77654 0            BZE
025818 REF   1              11,2731  22751 1                   INT-ABRT
025819                      11,2732  54345 1            DLOAD  SR
02582  REF   2  LAST   93   11,2733  02212 1                   H
025825                      11,2734  20612 0                   9D
02583                       11,2735  44206 0            PUSH   BDSU
025835 REF   9  LAST 1335   11,2736  01551 1                   TC
02584  REF  13  LAST 1335   11,2737  16303 0            STODL  TAU.
025845 REF  29  LAST 1336   11,2740  01517 0                   TET
02585                       11,2741  45425 0            DSU    STADR
025855 REF  30  LAST 1339   11,2742  42260 0            STCALL TET
02586  REF   3  LAST 1335   11,2743  22336 1                   KEPPREP
025865                      11,2744  77624 1            CALL
02587  REF   5  LAST 1322   11,2745  23420 0                   RECTIFY
025875                      11,2746  77614 1            SETGO
02588  REF   4  LAST 1337   11,2747  04020 1                   RPQFLAG
025885 REF   4  LAST 1330   11,2750  27364 0                   TESTLOOP

025886                      11,2751  77776 1  INT-ABRT  EXIT
025887 REF   8  LAST 1304   11,2752 0 5726 1            TC     POODOO
025888                      11,2753  20430 1            OCT    20430                SUB-SURFACE STATE VECTOR
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L         ORBITAL  INTEGRATION                                                                USER'S PAGE NO.   8        E0 53

P0259     THE OBLATE ROUTINE COMPUTES THE ACCELERATION DUE TO OBLATENESS. IT USES THE UNIT OF THE VEHICLE
R0261     POSITION VECTOR FOUND IN ALPHAV AND THE DISTANCE TO THE CENTER IN ALPHAM. THIS IS ADDED TO THE SUM OF THE
R0263     DISTURBING ACCELERATIONS IN FV AND THE PROPER DIFEQ STAGE IS CALLED VIA X1.
 0265                          11,2754   71354 0  OBLATE   LXA,2  DLOAD
 0266     REF  14  LAST 1336   11,2755   02150 1                  PBODY
 0267     REF   8  LAST 1337   11,2756   02301 1                  ALPHAM
 0268                          11,2757   44601 0           SETPD  DSU*
 0269                          11,2760   00001 0                  0
 0270     REF   1              11,2761   50007 0                  RDE,2
 0271                          11,2762   43044 0           BPL    BUF                 GET URPV
 0272     REF   1              11,2763   23212 1                  NBRANCH
 0273     REF  26  LAST 1337   11,2764   00343 0                  MOONFLAG
 0274     REF   1              11,2765   23221 1                  COSPHIE
 0275                          11,2766   65375 0           VLOAD  PDDL
 0276     REF  38  LAST 1338   11,2767   02152 0                  ALPHAV
 0277     REF  31  LAST 1339   11,2770   01517 0                  TET
 0278                          11,2771   45125 0           PDDL   CALL
 0279     REF   1              11,2772   23745 0                  3/5
 0280     REF   4  LAST 1236   11,2773   55370 0                  R-TO-RP
 0284     REF   1              11,2774   24017 1           STOVL  URPV                  RP/R  B-1 IN PLANETARY COORDINATES
 0285     REF   3  LAST 1317   11,2775   11754 1                  ZUNIT
 0286                          11,2776   45006 0           PUSH   CALL                  ZUNIT B-1 IN PLANETARY COORDL AT 00D
 0287     REF   1              11,2777   23227 1                  MATRIX
 0288                          11,3000   77715 1           PDVL                         UZ    B-2 IN INERT COORD       AT 00D
 0289     REF   7  LAST 1239   11,3001   11760 0                  XUNIT
 0290                          11,3002   45006 0           PUSH   CALL                  XUNIT B-1 IN PLANETARY COORD. AT 06D
 0291     REF   2  LAST 1340   11,3003   23227 1                  MATRIX
 0292                          11,3004   77772 0           VSL1
 0293                          11,3005   24041 1           STOVL  32D                   UX    B-1 IN INERT. COORD      AT 32D
 0294                          11,3006   77772 0           VSL1,
 0295     REF   1              11,3007   14025 0  COMTERM  STODL  UZ                    UZ  B-1 IN INERTIAL COORD          AT 20D
 0296     REF   1              11,3010   00023 0                  COSPHI/2               '       Z-COMPONENT OF URPV
 0297                          11,3011   65275 1           DMPR   PDDL                  P   B-6    ,  3COSPHI/64           AT 00D
 0298     REF   1              11,3012   23755 1                  3/32                   2
 0299     REF   2  LAST 1340   11,3013   00023 0                  COSPHI/2
 0300                          11,3014   57316 1           DSQ    DMPR
 0301     REF   1              11,3015   23757 0                  15/16                  '                        2
 0302                          11,3016   41425 1           DSU    PUSH                  P   B-5    ,(1/2)(15COSPHI -3)     AT 02D
 0303     REF   1              11,3017   23753 1                  3/64                   3
 0304                          11,3020   41275 1           DMPR   DMP
 0305     REF   3  LAST 1340   11,3021   00023 0                  COSPHI/2
 0306     REF   1              11,3022   23763 1                  7/12
 0307                          11,3023   65372 1           SL1R   PDDL
 0308                          11,3024   00001 0                  0D
 0309                          11,3025   44275 1           DMPR   BDSU
 0310     REF   1              11,3026   23771 1                  2/3                    '                        '    '
 0311                          11,3027   57206 1           PUSH   DMPR                  P   B-7,(1/3)(7COSPHI P   -4P )   AT 04D
 0312     REF   4  LAST 1340   11,3030   00023 0                  COSPHI/2               4                        3    2
 0313                          11,3031   65275 1           DMPR   PDDL
 0314     REF   1              11,3032   23765 1                  9/16
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0315                        11,3033   00003 1                  2D                '                      '    '
0316                        11,3034   44275 1           DMPR   BDSU             P   B-10,(1/4)(9COSPHI P  -5P )
0317   REF   1              11,3035   23767 0                  5/128             5                      4    3
0318                        11,3036   56203 0           DMP*   DDV                                  '
0319   REF   1              11,3037   50033 1                  J4REQ/J3,2           B- , (J RP/J R)P
0320   REF   9  LAST 1340   11,3040   02301 1                  ALPHAM                      4    3   5
0321                        11,3041   56615 0           DAD    DMPR*
0322                        11,3042   00005 1                  4D                             2     2  '              '
0323   REF   1              11,3043   50027 1                  2J3RE/J2,2           B  ,(2J RP /J2 R )P  +(2J RP/J2R)P
0324                        11,3044   43271 1           DDV    DAD                         4           5     3        4
0325   REF  10  LAST 1341   11,3045   02301 1                  ALPHAM              -        2 '  2         '        '
0326                        11,3046   00003 1                  2D                 (R/R)(J RP P /R + 2J RP P /  + J P )
0327                        11,3047   77761 1           VXSC                             4    5       3    4  2   2 3
0328   REF  39  LAST 1340   11,3050   02152 0                  ALPHAV                     4       2  '           -
0329   REF   1              11,3051   14033 1           STODL  TVEC                 B-6,(SUM((J /R )P   (COSPHI))UR)
0330                        11,3052   70403 1           DMP*   SR1                       I=2   I     I+1
0331   REF   2  LAST 1341   11,3053   50033 1                  J4REQ/J3,2                         '
0332                        11,3054   43271 1           DDV    DAD                     (J RP/J R)P
0333   REF  11  LAST 1341   11,3055   02301 1                  ALPHAM                    4    3   4
0334                        11,3056   50473 1           DMPR*  SR3                          2    2  '              '
0335   REF   2  LAST 1341   11,3057   50027 1                  2J3RE/J2,2             (2J RP /J R )P  +(2J RP/J R)P
0336                        11,3060   43271 1           DDV    DAD                       4     2    4     3    2   3
0337   REF  12  LAST 1341   11,3061   02301 1                  ALPHAM
0338                        11,3062   76561 1           VXSC   VSL1                       4   '        -
0339   REF   2  LAST 1340   11,3063   00025 0                  UZ                   B-6  SUM(P(COSPHI))UZ
0340                        11,3064   77645 0           BVSU                             I=2  I
0341   REF   2  LAST 1341   11,3065   00033 1                  TVEC               4              I-2 '            -
0342   REF   3  LAST 1341   11,3066   14033 1           STODL  TVEC              SUM((MU J (RP/R)    )(P   (COSPHI)UR -
0343   REF  13  LAST 1341   11,3067   02301 1                  ALPHAM            I=2      I            I+2
0344                        11,3070   63501 0           NORM   DSQ                            P (COSPHI)UZ))  B-6 AT 20D
0345   REF  84  LAST 1333   11,3071   00047 1                  X1                             I
0346                        11,3072   60316 0           DSQ    NORM
0347   REF  49  LAST 1339   11,3073   00051 0                  S1                            4
0348                        11,3074   54606 0           PUSH   BDDV*            NORMALIZED  R                    AT 0D
0349   REF   1              11,3075   50023 0                  J2REQSQ,2
0350                        11,3076   40161 0           VXSC   BOV
0351   REF   4  LAST 1341   11,3077   00033 1                  TVEC
0352                        11,3100   23101 0                  +1                B+38 FOR EARTH , B+42 FOR MOON
0353                        11,3101   56070 0           XAD,1  XAD,1
0354   REF  85  LAST 1341   11,3102   00046 0                  X1
0355   REF  86  LAST 1341   11,3103   00046 0                  X1
0356                        11,3104   53670 0           XAD,1  VSL*
0357   REF  50  LAST 1341   11,3105   00050 1                  S1
0358                        11,3106   20153 1                  0 -22D,1
0359                        11,3107   40055 0           VAD    BOV
0360   REF   5  LAST 1339   11,3110   02202 0                  FV
0361   REF   1              11,3111   22726 1                  GOBAQUE
0362   REF   6  LAST 1341   11,3112   16202 0           STODL  FV                B+16 FOR EARTH , B+20 FOR MOON
0363   REF   2  LAST 1340   11,3113   00017 1                  URPV              B-1  X-COMPONENT OF POSITION  IN
0364                        11,3114   41414 0           BOF    PUSH                        PLANETORY COORD.      AT 02D
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L      ORBITAL INTEGRATION                                                           USER'S PAGE NO.  10          E0 53

    0365   REF  27  LAST 1340   11,3115   00343 0                   MOONFLAG
    0366   REF   2  LAST 1340   11,3116   23212 1                   NBRANCH                    2
    0367                        11,3117   65316 0           DSQ     PODL              B-2   X                         AT 040
    0368   REF   3  LAST 1341   11,3120   00021 1                   URPV +2           B-1  Y-COMPONENT
    0369                        11,3121   45316 1           DSQ     CSU
    0370                        11,3122   74205 0           DMP     VXSC
    0371   REF   3  LAST 1317   11,3123   27756 0                   5/8                       2  2 -
    0372   REF  40  LAST 1341   11,3124   02152 0                   ALPHAV            B-6  5(Y -X )UR   2  2 -
    0373                        11,3125   65332 0           VSL3    PODL              B-3             5(Y -X )UR      AT 020
    0374                        11,3126   53361 0           VXSC    VAD
    0375                        11,3127   00041 1                   32D                      2  2 -   2         -
    0376                        11,3130   47315 0           PDVL    VXV                 (5(Y -X )UR/R ) +(2X/R)UX     AT 020
    0377                        11,3131   00041 1                   32D                  B-1    UX
    0378   REF   3  LAST 1341   11,3132   00025 0                   UZ                   B-2  -UY =(UX * UZ)
    0379                        11,3133   74372 1           VSL1    VXSC                 B-3   -(2Y/R)UY
    0380   REF   4  LAST 1342   11,3134   00021 1                   URPV +2                       2  2 -   2        -
    0381                        11,3135   41455 0           VAD     PUSH                 B-3 (5(X -Y )UR/R )+(2X/R)UX -(
    0382                        11,3136   77745 1           DLOAD                                     -
    0383   REF   5  LAST 1340   11,3137   00023 0                   COSPHI/2                    2Y/R)UY                   AT 020
    0384                        11,3140   41516 0           DSQ     PUSH                 B-2 (Z.COMPONENT)            AT 080
    0385                        11,3141   65205 0           DMP     PODL                                 2
    0386   REF   4  LAST 1342   11,3142   27756 0                   5/8                  B-5  5COSPHI/2               AT 080
    0387                        11,3143   43302 1           SR2     DAD
    0388                        11,3144   00011 1                   08D
    0389                        11,3145   41221 0           BDSU    DMP                                      2
    0390   REF   7  LAST 1301   11,3146   33416 1                   D1/32                B-5  (1 - 7COSPHI )
    0391   REF   5  LAST 1342   11,3147   00017 1                   URPV
    0392                        11,3150   74205 0           DMP     VXSC
    0393   REF   5  LAST 1342   11,3151   27756 0                   5/8
    0394   REF  41  LAST 1342   11,3152   02152 0                   ALPHAV                                  2 -
    0395                        11,3153   65272 0           VSL5    PODL                 B-5 (5X/R)(1-7COSPHI )UR     AT 080
    0396                        11,3154   74225 1           DSU     VXSC
    0397   REF   8  LAST 1342   11,3155   33416 1                   D1/32
    0398                        11,3156   00041 1                   32D
    0399                        11,3157   53372 1           VSL1    VAD                                     2 -           -
    0400                        11,3160   41325 0           PDDL    DMP                  B-5 (5X/R)(1-7COSPHI )UR +(5COSPHI
    0401   REF   6  LAST 1342   11,3161   00017 1                   URPV                        -
    0402   REF   7  LAST 1342   11,3162   00023 0                   URPV +4              -1)UX                        AT 080
    0403                        11,3163   74205 0           DMP     VXSC
    0404   REF   6  LAST 1342   11,3164   27756 0                   5/8                  B-5   5X Y
    0405   REF   4  LAST 1342   11,3165   00025 0                   UZ                              M M
    0406                        11,3166   53352 0           VSL2    VAD                                     2 -           2
    0407                        11,3167   60325 0           PDDL    NORM                 B-5 (5X/R)(1-7COSPHI )UR +(5COSPHI
    0408   REF  14  LAST 1341   11,3170   02301 1                   ALPHAM                      -         2 -
    0409   REF  37  LAST 1285   11,3171   00050 1                   X2                   -1)UX +(10XZ/R )UZ           AT 080
    0410                        11,3172   67206 1           PUSH    SLOAD
    0411   REF   2  LAST   91   11,3173   01770 0                   E32C31RM
    0412                        11,3174   74271 0           DDV     VXSC
    0413                        11,3175   63257 1           VSL*    PDVL
    0414                        11,3176   57601 1                   0 -3,2
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 0415                          11,3177   67206 1             PUSH    SLOAD
 0416  REF   2  LAST   91      11,3200   01767 0                     E3J22R2M
 0417                          11,3201   53361 0             VXSC    VAD
 0418                          11,3202   70257 0             VSL*    V/SC
 0419                          11,3203   20146 0                     0 -270,1         B+16 OR B+20 (J   + C  )
 0420                          11,3204   40055 0             VAD     BOV                             22    31
 0421  REF   7  LAST 1341      11,3205   02202 0                     FV
 0422  REF   2  LAST 1341      11,3206   22726 1                     GOBAQUE
 0423  REF   6  LAST 1343      11,3207   02202 0             STORE   FV
 0424                          11,3210   77754 1             LXA,2
 0425  REF  15  LAST 1340      11,3211   02150 1                     PBODY
 0426                          11,3212   72135 0  NBRANCH    SLOAD   LXA,1
 0427  REF  23  LAST 1337      11,3213   01501 1                     DIFEQCNT
 0428  REF 650  LAST 1329      11,3214   00154 1                     MPAC
 0429                          11,3215   73205 1             DMP     CGOTO
 0430  REF   1                 11,3216   27760 0                     -1/12
 0431  REF 651  LAST 1343      11,3217   00155 0                     MPAC
 0432  REF   1                 11,3220   23234 0                     DIFEQTAB
 0433                          11,3221   77745 1  COSPHIE    DLOAD
 0434  REF  42  LAST 1342      11,3222   02156 1                     ALPHAV +4
 0435  REF   6  LAST 1342      11,3223   24023 0             STOVL   COSPHI/2
 0436  REF   4  LAST 1340      11,3224   11754 1                     ZUNIT
 0437                          11,3225   77650 1             GOTO
 0438  REF   1                 11,3226   23007 1                     COMTERM

 0439                          11,3227   57435 1  MATRIX     VXV     VCOMP
 0440  REF   3  LAST 1245      11,3230   02012 0                     504LM          ROUTINE TRANSLATES FROM PLANETARY
 0441                          11,3231   77655 1             VAD                    TO INERTIAL COORDINATES
 0442                          11,3232   43505 0             VXM     RVQ
 0443  REF   8  LAST 1248      11,3233   00025 0                     MMATRIX

 0444  REF   1                 11,3234   23445 0  DIFEQTAB   CADR    DIFEQ+0
 0445  REF   1                 11,3235   23451 0             CADR    DIFEQ+1
 0446  REF   1                 11,3236   23452 0             CADR    DIFEQ+2

 0447                          11,3237   45014 0  TIMESTEP   BOF     CALL
 0448  REF   5  LAST 1336      11,3240   00342 1                     MIDFLAG
 0449  REF   1                 11,3241   23245 0                     RECTEST        SKIP ORIGIN CHANGE LOGIC
 0450  REF   2  LAST 1320      11,3242   23317 0                     CHKSWTCH
 0451                          11,3243   77640 0             BMN
 0452  REF   1                 11,3244   23354 1                     DOSWITCH

 0453                          11,3245   51575 1  RECTEST    VLOAD   ABVAL          RECTIFY IF
 0454  REF   9  LAST 1339      11,3246   01521 0                     TDELTAV
 0455                          11,3247   77600 1             BOV
 0456  REF   1                 11,3250   23273 0                     CALLRECT
 0457                          11,3251   51025 1             DSU     BPL              1) EITHER TDELTAV OR TNUV EQUALS OR
 0458  REF   2  LAST   34      11,3252   23761 0                     3/4                 EXCEEDS 3/4 IN MAGNITUDE
 0459  REF   2  LAST 1343      11,3253   23273 0                     CALLRECT
 0460                          11,3254   53615 0             DAD     SL*                          OR
 0461   REF   3  LAST 1343   11,3255   23761 0                     3/4
 0462                        11,3256   57605 0                     0 -7,2        2) ABVAL(TDELTAV) EQUALS OR EXCEEDS
 0463                        11,3257   45271 1            DDV      DSU              .01(ABVAL(RCV))
 0464                        11,3260   00013 0                     100
 0465   REF   1              11,3261   27762 1                     RECRATIO
 0466                        11,3262   77244 0            BPL      VLOAD
 0467   REF   3  LAST 1343   11,3263   23273 0                     CALLRECT
 0468   REF   8  LAST 1319   11,3264   01527 0                     TNUV
 0469                        11,3265   45246 0            ABVAL    DSU
 0470   REF   4  LAST 1344   11,3266   23761 0                     3/4
 0471                        11,3267   77600 1            BDV
 0472   REF   4  LAST 1344   11,3270   23273 0                     CALLRECT
 0473                        11,3271   77640 0            BMN
 0474   REF   1              11,3272   23275 0                     INTGRATE
 0475                        11,3273   77624 1  CALLRECT  CALL
 0476   REF   6  LAST 1339   11,3274   23420 0                     RECTIFY
 0477                        11,3275   77775 1  INTGRATE  VLOAD
 0478   REF   9  LAST 1344   11,3276   01527 0                     TNUV
 0479   REF   2  LAST   77   11,3277   24763 0            STOVL    ZV
 0480   REF  10  LAST 1343   11,3300   01521 0                     TDELTAV
 0481   REF   2  LAST   77   11,3301   00755 0            STORE    YV
 0482                        11,3302   77614 1            CLEAR
 0483   REF   1              11,3303   00261 1                     JSWITCH
 0484                        11,3304   66375 0  DIFEQ0    VLOAD    SSP
 0485   REF   3  LAST 1344   11,3305   00755 0                     YV
 0486   REF  24  LAST 1343   11,3306   01501 1                     DIFEQCNT
 0487                        11,3307   00000 1                     0
 0488   REF  43  LAST 1343   11,3310   16152 0            STODL    ALPHAV
 0489   REF   3  LAST 1240   11,3311   11762 1                     DPZERO
 0490   REF   3  LAST 1339   11,3312   02212 1            STORE    H             START H AT ZERO. GOES 0(DELT/2)DELT.
 0491                        11,3313   52014 0            BON      GOTO
 0492   REF   2  LAST 1344   11,3314   00301 0                     JSWITCH
 0493   REF   1              11,3315   23664 1                     DOW..
 0494   REF   1              11,3316   22456 0                     ACCOMP

 0495                        11,3317   43020 1  CHKSWTCH  STQ      BOF
 0496   REF   3  LAST   93   11,3320   02267 0                     QRIGEX
 0497   REF   5  LAST 1339   11,3321   04340 1                     RPQFLAG
 0498   REF   1              11,3322   23332 1                     RPQOK         MOON POSITION IS AVAILABLE
 0499                        11,3323   45145 0            DLOAD    CALL
 0500   REF  32  LAST 1340   11,3324   01517 0                     TET
 0501   REF   3  LAST  940   11,3325   54141 1                     LUNPOS        GET MOON POSITION
 0502                        11,3326   57414 1            BOF      VCOMP
 0503   REF  28  LAST 1342   11,3327   00343 0                     MOONFLAG
 0504                        11,3330   23331 1                     +1
 0505   REF   5  LAST 1337   11,3331   02262 0            STORE    RPQV
 0506                        11,3332   77354 0  RPQOK     LXA,2    VLOAD         RESTORE X2 AFTER USING LUNPOS
 0507   REF  16  LAST 1343   11,3333   02150 1                     PBODY
 0508   REF  11  LAST 1344   11,3334   01521 0                     TDELTAV       -
 0509                        11,3335   53257 1            VSL*     VAD           |RQC|-RSPHERE WHEN OUTSIDE THE SPHERE.
 0510                          11,3336   57605 0                      0 -7,2           -  -          -
 0511   REF  23  LAST 1336     11,3337   01535 0                      RCV              R = RDEVIATION + RCONIC
 0512                          11,3340   51414 1               BOF    ABVAL
 0513   REF  29  LAST 1344     11,3341   00343 0                      MOONFLAG
 0514   REF   1                11,3342   23347 0                      EARSPH
 0515                          11,3343   44302 0               SR2    BDSU             INSIDE
 0516   REF   1                11,3344   27764 1                      RSPHERE
 0517                          11,3345   77650 1               GOTO
 0518   REF   4  LAST 1344     11,3346   02267 0                      ORIGEX
 0519                          11,3347   51451 0   EARSPH      VSU    ABVAL            OUTSIDE
 0520   REF   6  LAST 1344     11,3350   02262 0                      RPQV
 0521                          11,3351   52025 1               DSU    GOTO
 0522   REF   2  LAST 1345     11,3352   27764 1                      RSPHERE
 0523   REF   5  LAST 1345     11,3353   02267 0                      ORIGEX
 0524                          11,3354   77624 1   DOSWITCH    CALL
 0525   REF   2  LAST 1320     11,3355   23360 0                      ORIGCHNG
 0526                          11,3356   77650 1               GOTO
 0527   REF   2  LAST 1344     11,3357   23275 0                      INTGRATE
 0528                          11,3360   45020 1   ORIGCHNG    STQ    CALL
 0529   REF   6  LAST 1345     11,3361   02267 0                      ORIGEX
 0530   REF   7  LAST 1344     11,3362   23420 0                      RECTIFY
 0531                          11,3363   53775 1               VLOAD  VSL*
 0532   REF  24  LAST 1345     11,3364   01535 0                      RCV
 0533                          11,3365   57576 1                      0,2
 0534                          11,3366   53651 0               VSU    VSL*
 0535   REF   7  LAST 1345     11,3367   02262 0                      RPQV
 0536                          11,3370   57574 0                      2,2
 0537   REF  13  LAST 1331     11,3371   01503 0               STORE  RRECT
 0538   REF  25  LAST 1345     11,3372   15535 0               STODL  RCV
 0539   REF  33  LAST 1344     11,3373   01517 0                      TET
 0540                          11,3374   77624 1               CALL
 0541   REF   1                11,3375   54144 1                      LUNVEL
 0542                          11,3376   57414 1               BOF    VCOMP
 0543   REF  30  LAST 1345     11,3377   00343 0                      MOONFLAG
 0544                          11,3400   23401 0                      +1
 0545                          11,3401   53715 1               PDVL   VSL*
 0546   REF  18  LAST 1333     11,3402   01543 1                      VCV
 0547                          11,3403   57576 1                      0,2
 0548                          11,3404   77651 0               VSU
 0549                          11,3405   77657 0               VSL*
 0550                          11,3406   57574 0                      0 +2,2
 0551   REF   9  LAST 1331     11,3407   01511 0               STORE  VRECT
 0552   REF  19  LAST 1345     11,3410   01543 1               STORE  VCV
 0553                          11,3411   67154 0               LXA,2  SXA,2
 0554   REF   7  LAST 1345     11,3412   02267 0                      ORIGEX
 0555   REF  14  LAST 1325     11,3413   00052 0                      QPRET
 0556                          11,3414   52014 0               BON    GOTO
 0557   REF  31  LAST 1345     11,3415   00303 1                      MOONFLAG
 0558   REF   2  LAST 1316     11,3416   27011 1                      CLRMOON
 0559   REF   3  LAST 1316     11,3417   27016 0                      SETMOON
```

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P0560   THE RECTIFY SUBROUTINE IS CALLED BY THE INTEGRATION PROGRAM AND OCCASIONALLY BY THE MEASUREMENT INCORPORATION
R0562   ROUTINES TO ESTABLISH A NEW CONIC.

 0563                        11,3420   77354 0   RECTIFY   LXA,2   VLOAD
 0564   REF  17  LAST 1344   11,3421   02150 1                     PBODY
 0565   REF  12  LAST 1344   11,3422   01521 0                     TDELTAV
 0566                        11,3423   53257 1             VSL*    VAD
 0567                        11,3424   57605 0                     0 -7,2
 0568   REF  26  LAST 1345   11,3425   01535 0                     RCV
 0569   REF  14  LAST 1345   11,3426   01503 0             STORE   RRECT
 0570   REF  27  LAST 1346   11,3427   25535 0             STOVL   RCV
 0571   REF  10  LAST 1344   11,3430   01527 0                     TNUV
 0572                        11,3431   53257 1             VSL*    VAD
 0573                        11,3432   57602 1                     0 -4,2
 0574   REF  20  LAST 1345   11,3433   01543 1                     VCV
 0575   REF  10  LAST 1345   11,3434   01511 0   MINIRECT  STORE   VRECT
 0576   REF  21  LAST 1346   11,3435   25543 1   TINIRECT  STOVL   VCV
 0577   REF  21  LAST 1336   11,3436   11762 1                     ZEROVEC
 0578   REF  13  LAST 1346   11,3437   01521 0             STORE   TDELTAV
 0579   REF  11  LAST 1346   11,3440   15527 0             STODL   TNUV
 0580   REF  22  LAST 1346   11,3441   11762 1                     ZEROVEC
 0581   REF  10  LAST 1339   11,3442   01551 1             STORE   TC
 0582   REF   3  LAST 1334   11,3443   01553 0             STORE   XKEP
 0583                        11,3444   77616 0             RVQ
```

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R0584   THE THREE DIFEQ ROUTINES - DIFEQ+0, DIFEQ+12, AND DIFEQ+24 - ARE ENTEREDTO PROCESS THE CONTRIBUTIONS AT THE
R0586   BEGINNING, MIDDLE, AND END OF THE TIMESTEP, RESPECTIVELY. THE UPDATING IS DONE BY THE NYSTROM METHOD.
 0588                         11,3445   64575 1  DIFEQ+0   VLOAD   VSR3
 0589   REF   9  LAST 1343    11,3446   02202 0                    FV
 0590   REF   2  LAST   93    11,3447   36166 0            STCALL  PHIV
 0591   REF   1               11,3450   23625 1                    DIFEQCOM
 0592                         11,3451   74575 0  DIFEQ+1   VLOAD   VSR1
 0593   REF  10  LAST 1347    11,3452   02202 0                    FV
 0594                         11,3453   53206 0            PUSH    VAD
 0595   REF   3  LAST 1347    11,3454   02166 1                    PHIV
 0596   REF   2  LAST   93    11,3455   26174 1            STOVL   PSIV
 0597                         11,3456   53362 0            VSR1    VAD
 0598   REF   4  LAST 1347    11,3457   02166 1                    PHIV
 0599   REF   5  LAST 1347    11,3460   36166 0            STCALL  PHIV
 0600   REF   2  LAST 1347    11,3461   23625 1                    DIFEQCOM
 0601                         11,3462   57345 1  DIFEQ+2   DLOAD   DMPR
 0602   REF   4  LAST 1344    11,3463   02212 1                    H
 0603   REF   2  LAST 1333    11,3464   23771 1                    DP2/3
 0604                         11,3465   74206 0            PUSH    VXSC
 0605   REF   6  LAST 1347    11,3466   02166 1                    PHIV
 0606                         11,3467   53372 1            VSL1    VAD
 0607   REF   3  LAST 1344    11,3470   00763 0                    ZV
 0608                         11,3471   53361 0            VXSC    VAD
 0609   REF   5  LAST 1347    11,3472   02212 1                    H
 0610   REF   4  LAST 1344    11,3473   00755 0                    YV
 0611   REF   5  LAST 1347    11,3474   24755 0            STOVL   YV
 0612   REF  11  LAST 1347    11,3475   02202 0                    FV
 0613                         11,3476   53322 1            VSR3    VAD
 0614   REF   3  LAST 1347    11,3477   02174 1                    PSIV
 0615                         11,3500   76561 1            VXSC    VSL1
 0616                         11,3501   77655 1            VAD
 0617   REF   4  LAST 1347    11,3502   00763 0                    ZV
 0618   REF   5  LAST 1347    11,3503   00763 0            STORE   ZV
 0619                         11,3504   45014 0            BOFF    CALL
 0620   REF   3  LAST 1344    11,3505   00341 1                    JSWITCH
 0621   REF   1               11,3506   23556 0                    ENDSTATE
 0622   REF  27  LAST 1321    11,3507   22327 1                    GRP2PC
 0623                         11,3510   77354 0            LXA,2   VLOAD
 0624   REF   1               11,3511   00770 1                    COLREG
 0625   REF   6  LAST 1347    11,3512   00763 0                    ZV
 0626                         11,3513   77732 1            VSL3                            ADJUST W-POSITION FOR STORAGE
 0627   REF  59  LAST 1258    11,3514   12467 1            STORE   W +54D,2
 0628                         11,3515   77775 1            VLOAD
 0629   REF   6  LAST 1347    11,3516   00755 0                    YV
 0630                         11,3517   40132 0            VSL3    BOV
 0631   REF   1               11,3520   23650 0                    WMATEND
 0632   REF  60  LAST 1347    11,3521   12401 1            STORE   W,2

 0633                         11,3522   77624 1            CALL
 0634   REF  28  LAST 1347    11,3523   22327 1                    GRP2PC
```

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L          ORBITAL  INTEGRATION                                                                          USER'S PAGE NO.  16      EQ S3

 0635                             11,3524   66354 0             LXA,2   SSP
 0636    REF    2  LAST 1347      11,3525   00770 1                     COLREG
 0637    REF   32  LAST 1339      11,3526   00052 0                     S2
 0638                             11,3527   00000 1                     0
 0639                             11,3530   67114 1             INCR,2  SXA,2
 0640                             11,3531   00006 1                     6
 0641    REF    7  LAST 1347      11,3532   00754 1                     YV
 0642                             11,3533   45104 0             TIX,2   CALL
 0643    REF    1                 11,3534   23621 0                     RELOADSV
 0644    REF   29  LAST 1347      11,3535   22327 1                     GRP2PC
 0645                             11,3536   67154 0             LXA,2   SXA,2
 0646    REF    8  LAST 1348      11,3537   00754 1                     YV
 0647    REF    3  LAST 1348      11,3540   00770 1                     COLREG

 0648                             11,3541   77624 1  NEXTCOL    CALL
 0649    REF   30  LAST 1348      11,3542   22327 1                     GRP2PC
 0650                             11,3543   76754 0             LXA,2   VLOAD*
 0651    REF    4  LAST 1348      11,3544   00770 1                     COLREG
 0652    REF   61  LAST 1347      11,3545   75376 1                     W,2
 0653                             11,3546   77722 0             VSR3                     ADJUST W-POSITION FOR INTEGRATION
 0654    REF    9  LAST 1348      11,3547   00755 0             STORE   YV
 0655                             11,3550   76173 0             VLOAD*  AXT,1
 0656    REF   62  LAST 1348      11,3551   75310 1                     W +54D,2
 0657                             11,3552   00000 1                     0
 0658                             11,3553   77722 0             VSR3                     ADJUST W-VELOCITY FOR INTEGRATION
 0659    REF    7  LAST 1347      11,3554   34763 1             STCALL  ZV
 0660    REF    1                 11,3555   23304 1                     DIFEQ0

 0661                             11,3556   77200 0  ENDSTATE   BOV     VLOAD
 0662    REF    3  LAST 1343      11,3557   22726 1                     GOBAQUE
 0663    REF    8  LAST 1348      11,3560   00763 0                     ZV
 0664    REF   12  LAST 1346      11,3561   25527 0             STOVL   TNUV
 0665    REF   10  LAST 1348      11,3562   00755 0                     YV
 0666    REF   14  LAST 1346      11,3563   01521 0             STORE   TDELTAV
 0667                             11,3564   43014 0             BON     BOFF
 0668    REF    3  LAST 1329      11,3565   04715 0                     MIDAVFLG
 0669    REF    1                 11,3566   27656 1                     CKMID2                   CHECK FOR MID2 BEFORE GOING TO TIMEINC
 0670    REF   19  LAST 1337      11,3567   01756 1                     DIMOFLAG
 0671    REF    5  LAST 1339      11,3570   27364 0                     TESTLOOP
 0672                             11,3571   77776 1             EXIT
 0673    REF  103  LAST 1332      11,3572  0 5402 1             TC      PHASCHNG
 0674                             11,3573   04022 0             OCT     04022                    PHASE 1
 0675    REF   69  LAST 1320      11,3574  0 5547 1             TC      UPFLAG                   PHASE CHANGE HAS OCCURRED BETWEEN
 0676    REF    4  LAST 1320      11,3575   00230 0             ADRES   REINTFLG                 INTSTALL AND INTWAKE
 0677    REF  240  LAST 1332      11,3576  0 6006 1             TC      INTPRET
 0678                             11,3577   77731 1             SSP
 0679    REF   15  LAST 1345      11,3600   00053 1                     QPRET
 0680    REF    1                 11,3601   23606 0                     AMOVED
 0681                             11,3602   52014 0             BON     GOTO
 0682    REF   17  LAST 1327      11,3603   01714 1                     VINTFLAG
 0683   REF   4  LAST 1331   11,3604   28761 0                      ATOPCSM
 0684   REF   4  LAST 1331   11,3605   27034 0                      ATOPLEM
 0685                        11,3606   66214 0  AMOVED    SET       SSP
 0686   REF   4  LAST 1347   11,3607   00061 0                      JSWITCH
 0687   REF   5  LAST 1348   11,3610   00771 0                      COLREG
 0688                        11,3611   77741 0            DEC       -30
 0689                        11,3612   66214 0            BOFF      SSP
 0690   REF   5  LAST 1327   11,3613   01755 1                      D6OR9FLG
 0691   REF   1              11,3614   23541 0                      NEXTCOL
 0692   REF   6  LAST 1349   11,3615   00771 0                      COLREG
 0693                        11,3616   77717 0            DEC       -48
 0694                        11,3617   77650 1            GOTO
 0695   REF   2  LAST 1349   11,3620   23541 0                      NEXTCOL


 0696                        11,3621   77745 1  RELOADSV  DLOAD                        RELOAD TEMPORARY STATE VECTOR
 0697   REF   9  LAST 1330   11,3622   00745 1                      TDEC               FROM PERMANENT IN CASE OF
 0698   REF  48  LAST 1329   11,3623   34041 0            STCALL    TDEC1
 0699   REF   1              11,3624   27243 1                      INTEGRV2           BY STARTING AT INTEGRV2.
 0700                        11,3625   43345 1  DIFEQCOM  DLOAD     DAD                INCREMENT H AND DIFEQCNT.
 0701   REF  10  LAST 1335   11,3626   02305 0                      DT/2
 0702   REF   6  LAST 1347   11,3627   02212 1                      H
 0703                        11,3630   66110 1            INCR,1    SXA,1
 0704                        11,3631   77763 0            DEC       -12
 0705   REF  25  LAST 1344   11,3632   01500 0                      DIFEQCNT           DIFEQCNT SET FOR NEXT ENTRY.
 0706   REF   7  LAST 1349   11,3633   02212 1            STORE     H
 0707                        11,3634   74561 0            VXSC      VSR1
 0708   REF  12  LAST 1347   11,3635   02202 0                      FV
 0709                        11,3636   74255 0            VAD       VXSC
 0710   REF   9  LAST 1348   11,3637   00763 0                      ZV
 0711   REF   8  LAST 1349   11,3640   02212 1                      H
 0712                        11,3641   77655 1            VAD
 0713   REF  11  LAST 1348   11,3642   00755 0                      YV
 0714   REF  44  LAST 1344   11,3643   02152 0            STORE     ALPHAV
 0715                        11,3644   52014 0            BON       GOTO
 0716   REF   5  LAST 1349   11,3645   00301 0                      JSWITCH
 0717   REF   2  LAST 1344   11,3646   23664 1                      DOW..
 0718   REF   1              11,3647   22436 0                      FBR3


 0719                        11,3650   43014 0  WMATEND   CLEAR     CLEAR
 0720   REF  20  LAST 1348   11,3651   01676 1                      DIM0FLAG           DONT INTEGRATE W THIS TIME
 0721   REF  15  LAST 1331   11,3652   01671 0                      ORBWFLAG           INVALIDATE W
 0722                        11,3653   77614 1            CLEAR
 0723   REF  11  LAST 1331   11,3654   02676 1                      RENDWFLG
 0724                        11,3655   77414 0            SET       EXIT
 0725   REF   7  LAST 1323   11,3656   01472 1                      STATEFLG           PICK UP STATE VECTOR UPDATE
 0726   REF  33  LAST 1330   11,3657 0 5671 1             TC        ALARM
 0727                        11,3660   00421 0            OCT       421
 0728   REF 241  LAST 1348   11,3661 0 6006 1             TC        INTPRET
 0729                         11,3662   77650 1           GOTO
 0730   REF   6  LAST 1348    11,3663   27364 0                       TESTLOOP        FINISH INTEGRATING STATE VECTOR
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P0731    ORBITAL ROUTINE FOR EXTRAPOLATION OF THE W MATRIX. IT COMPUTES THE SECOND DERIVATIVE OF EACH COLUMN POSITION
R0733    VECTOR OF THE MATRIX AND CALLS THE NYSTROM INTEGRATION ROUTINES TO SOLVETHE DIFFERENTIAL EQUATIONS. THE PROGRAM
R0735    USES A TABLE OF VEHICLE POSITION VECTORS COMPUTED DURING THE INTEGRATION OF THE VEHICLES POSITION AND VELOCITY.
 0737                          11,3664   70754 0  DOW..      LXA,2  DLOAD*
 0738    REF  18  LAST 1346    11,3665   02150 1                    PBODY
 0739    REF   7  LAST 1339    11,3666   50037 0                    MUEARTH,2
 0740    REF   4  LAST 1338    11,3667   36210 1             STCALL BETAM
 0741    REF   1               11,3670   23712 1                    DOW..1
 0742    REF  13  LAST 1349    11,3671   02202 0             STORE  FV
 0743                          11,3672   62014 0             BOF    INCR,1
 0744    REF   6  LAST 1343    11,3673   00342 1                    MIDFLAG
 0745    REF   3  LAST 1342    11,3674   23212 1                    NBRANCH
 0746                          11,3675   77771 0             DEC    -6
 0747                          11,3676   70744 1             LXC,2  DLOAD*
 0748    REF  19  LAST 1351    11,3677   02150 1                    PBODY
 0749    REF   8  LAST 1351    11,3700   50041 1                    MUEARTH -2,2
 0750    REF   5  LAST 1351    11,3701   36210 1             STCALL BETAM
 0751    REF   2  LAST 1351    11,3702   23712 1                    DOW..1
 0752                          11,3703   50414 0             BON    VSR6
 0753    REF  32  LAST 1345    11,3704   00303 1                    MOONFLAG
 0754                          11,3705   23706 1                    +1
 0755                          11,3706   77655 1             VAD
 0756    REF  14  LAST 1351    11,3707   02202 0                    FV
 0757    REF  15  LAST 1351    11,3710   36202 1             STCALL FV
 0758    REF   4  LAST 1351    11,3711   23212 1                    NBRANCH
 0759                          11,3712   60575 0  DOW..1     VLOAD  VSR4
 0760    REF  45  LAST 1349    11,3713   02152 0                    ALPHAV
 0761                          11,3714   53513 0             PDVL*  UNIT
 0762    REF   8  LAST 1337    11,3715   02216 0                    VECTAB,1
 0763                          11,3716   46315 1             PDVL   VPROJ
 0764    REF  46  LAST 1351    11,3717   02152 0                    ALPHAV
 0765                          11,3720   52361 1             VXSC   VSU
 0766    REF   5  LAST 1344    11,3721   23761 0                    3/4
 0767                          11,3722   60325 0             PDDL   NORM
 0768                          11,3723   00045 0                    36D
 0769    REF  33  LAST 1348    11,3724   00052 0                    S2
 0770                          11,3725   63406 0             PUSH   DSQ
 0771                          11,3726   77605 1             DMP
 0772                          11,3727   65301 0             NORM   PDDL
 0773                          11,3730   00043 0                    34D
 0774    REF   6  LAST 1351    11,3731   02210 0                    BETAM
 0775                          11,3732   56342 1             SR1    DDV
 0776                          11,3733   77761 1             VXSC
 0777                          11,3734   57154 0             LXA,2  XAD,2
 0778    REF  34  LAST 1351    11,3735   00051 0                    S2
 0779    REF  35  LAST 1351    11,3736   00051 0                    S2
 0780                          11,3737   57074 0             XAD,2  XAD,2
 0781    REF  36  LAST 1351    11,3740   00051 0                    S2
 0782                          11,3741   00042 1                    34D
 0783                          11,3742   43457 0             VSL*   RVQ
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L       ORBITAL INTEGRATION                                                  USER'S PAGE NO.  20       E0 S3

 0784                     11,3743  57606 0                 0 -8D,2
 0785  REF   1            11,2000                  SETLOC ORBITAL1
 0786                     11,3744                  BANK

 07865 REF   3 LAST 1333 TO 1352:   774   781*     COUNT* $$/ORBIT
 0787                     11,3744  04631 1  3/5     2DEC   .6 B-2
 0787                     11,3745  23146 0
 0788                     11,3746  14000 1  THREE/8 2DEC   .375
 0788                     11,3747  00000 1
 0789                     11,3750  02314 0   .3D     2DEC   .3 B-2
 0789                     11,3751  31463 1
 0790                     11,3752  01400 1  3/64    2DEC   3 B-6
 0790                     11,3753  00000 1
 0791  REF   7  LAST 1301 15,3411           DP1/4   =      D1/4            1 B-2
 0792  REF   2  LAST 1302 15,3411           DQUARTER EQUALS DP1/4
 0794                     11,3754  03000 1  3/32    2DEC   3 B-5
 0794                     11,3755  00000 1
 0795                     11,3756  36000 1  15/16   2DEC   15. B -4
 0795                     11,3757  00000 1
 0796                     11,3760  30000 1  3/4     2DEC   3.0 B -2
 0796                     11,3761  00000 1
 0797                     11,3762  22525 0  7/12    2DEC   .5833333333
 0797                     11,3763  12525 0
 0798                     11,3764  22000 1  9/16    2DEC   9 B -4
 0798                     11,3765  00000 1
 0799                     11,3766  01200 1  5/128   2DEC   5 B-7
 0799                     11,3767  00000 1
 0800  REF  23  LAST 1346 04,3761           DPZERO  EQUALS ZEROVEC
 0801                     11,3770  25252 0  DP2/3   2DEC   .6666666667
 0801                     11,3771  25253 1
 0802  REF   3  LAST 1347 11,3770           2/3     EQUALS DP2/3
R0804  LM504 IS TEMPORARY
 0806  REF   1            13,2000                  SETLOC ORBITAL2
 0807                     13,3717                  BANK
 08075 REF   1                                     COUNT* $$/ORBIT
R0808  IT IS VITAL THAT THE FOLLOWING CONSTANTS NOT BE SHUFFLED
 0809                     13,3717  77764 1         DEC    -11
 0810                     13,3720  77775 1         DEC    -2
 0811                     13,3721  77766 0         DEC    -9
 0812                     13,3722  77771 0         DEC    -6
 0813                     13,3723  77775 1         DEC    -2
 0814                     13,3724  77775 1         DEC    -2
 0815                     13,3725  00000 1         DEC    0
 0816                     13,3726  77763 0         DEC    -12
 0817                     13,3727  77766 0         DEC    -9
 0818                     13,3730  77773 1         DEC    -4
 0819                     13,3731  77770 1  ASCALE  DEC    -7
 0820                     13,3732  77771 0         DEC    -6
 0821                     13,3733  27446 1         2DEC*  1.32715445 E16 B-54*      5
 0821                     13,3734  14620 0
 0822                            13,3735   16471 1           2DEC*  4.9027780 E8 B-30*        M
 0822                            13,3736   01352 1
 0823                            13,3737   22437 1  MUEARTH  2DEC*  3.986032 E10 B-36*
 0823                            13,3740   16067 1
 0824                            13,3741   00000 1           2DEC   0
 0824                            13,3742   00000 1
 0825                            13,3743   02302 1  J4REQ/J3 2DEC*  .4991607391 E7 B-26*
 0825                            13,3744   24736 0
 0826                            13,3745   77651 0           2DEC   -176236.02 B-25
 0826                            13,3746   76237 0
 0827                            13,3747   77776 1  2J3RE/J2 2DEC*  -.1355426363 E5 B-27*
 0827                            13,3750   53032 0
 0828                            13,3751   10407 0           2DEC*  .3067493316 E18 B-60*
 0828                            13,3752   05344 1
 0829                            13,3753   13710 0  J2REQSQ  2DEC*  1.75501139 E21 B-72*
 0829                            13,3754   35320 0
 0830                            13,3755   24000 1  5/8      2DEC   5 B-3
 0830                            13,3756   00000 1
 0831                            13,3757   74631 0  -1/12    2DEC   -.1
 0831                            13,3760   63145 1
 0832   REF    9  LAST 1351      13,3735            MUM      =      MUEARTH -2
 0833                            13,3761   00243 1  RECRATIO 2DEC   .01
 0833                            13,3762   32703 1
 0834                            13,3763   03654 0  RSPHERE  2DEC   64373.76 E3 B-29
 0834                            13,3764   21000 1
 0835                            13,3765   03654 0  RDM      2DEC   16093.44 E3 B-27
 0835                            13,3766   21000 1
 0836                            13,3767   04627 0  RDE      2DEC   80467.20 E3 B-29
 0836                            13,3770   25200 1
 0837                               0000            RATT     EQUALS 0D
 0838                               0006            VATT     EQUALS 6D
 0839                               0014            TAT      EQUALS 12D
 0840                               0016            RATT1    EQUALS 14D
 0841                               0024            VATT1    EQUALS 20D
 0842                               0032            MU(P)    EQUALS 26D
 0843                               0040            TDEC1    EQUALS 32D
 0844                               0016            URPV     EQUALS 14D
 0845   REF    8  LAST 1342         0022            COSPHI/2 EQUALS URPV +4
 0846                               0024            UZ       EQUALS 20D
 0847                               0032            TVEC     EQUALS 26D
 0002   REF   1                  23,2000                                 SETLOC INFLIGHT
 0003                            23,3240                                 BANK

 0004   REF  31  LAST  822       E5,1671                                 EBANK= XSM

R0005   CALCGTA COMPUTES THE GYRO TORQUE ANGLES REQUIRED TO BRING THE STABLE MEMBER INTO THE DESIRED ORIENTATION.

R0007   THE INPUT IS THE DESIRED STABLE MEMBER COORDINATES REFERRED TO PRESENT STABLE MEMBER COORDINATES. THE THREE
R0009   HALF-UNIT VECTORS ARE STORED AT XDC, YDC, AND ZDC.

R0010   THE OUTPUTS ARE THE THREE GYRO TORQUING ANGLES TO BE APPLIED TO THE Y, Z, AND X GYROS AND ARE STORED DP AT IGC,
R0012   MGC, AND OGC RESPECTIVELY.

 0013   REF   1                                                          COUNT* $$/INFLT
 0014                            23,3240    71220 1   CALCGTA   ITA      DLOAD                 PUSHDOWN  00-03,16D-27D,34D-37D
 0015   REF  37  LAST 1351       23,3241    00051 0                      S2                    XDC = (XD1 XD2 XD3)
 0016   REF   6  LAST  776       23,3242    02714 1                      XDC                   YDC = (YD1 YD2 YD3)
 0017                            23,3243    65325 0             PDDL     PDDL                  ZDC = (ZD1 ZD2 ZD3)
 0018   REF  30  LAST 1250       23,3244    15336 0                      HI6ZEROS
 0019   REF   7  LAST 1354       23,3245    02720 0                      XDC +4
 0020                            23,3246    55476 1             DCOMP    VDEF
 0021                            23,3247    77656 1             UNIT
 0022   REF   1                  23,3250    14027 1             STODL    ZPRIME                ZP = UNIT(-XD3 0 XD1) = (ZP1 ZP2 ZP3)
 0023   REF   2  LAST 1354       23,3251    00027 1                      ZPRIME

 0024                            23,3252    77742 0             SR1
 0025   REF  12  LAST 1240       23,3253    14023 0             STODL    SINTH                 SIN(IGC) = ZP1
 0026   REF   3  LAST 1354       23,3254    00033 1                      ZPRIME +4
 0027                            23,3255    77742 0             SR1
 0028   REF  11  LAST 1240       23,3256    34021 0             STCALL   COSTH                 COS(IGC) = ZP3
 0029   REF   7  LAST  892       23,3257    47311 1                      ARCTRIG

 0030   REF   5  LAST  538       23,3260    16762 0             STODL    IGC                   Y GYRO TORQUING ANGLE   FRACTION OF REV.
 0031   REF   8  LAST 1354       23,3261    02716 0                      XDC +2
 0032                            23,3262    77742 0             SR1
 0033   REF  13  LAST 1354       23,3263    14023 0             STODL    SINTH                 SIN(MGC) = XD2
 0034   REF   4  LAST 1354       23,3264    00027 1                      ZPRIME

 0035                            23,3265    65205 0             DMP      PDDL
 0036   REF   9  LAST 1354       23,3266    02720 0                      XDC +4                PD00 = (ZP1)(XD3)
 0037   REF   5  LAST 1354       23,3267    00033 1                      ZPRIME +4

 0038                            23,3270    45205 1             DMP      DSU
 0039   REF  10  LAST 1354       23,3271    02714 1                      XDC                   MPAC = (ZP3)(XD1)
 0040                            23,3272    77626 0             STADR
 0041   REF  12  LAST 1354       23,3273    43756 1             STCALL   COSTH                 COS(MGC) = MPAC - PD00
 0042   REF   8  LAST 1354       23,3274    47311 1                      ARCTRIG

 0043   REF   4  LAST  538       23,3275    26764 0             STOVL    MGC                   Z GYRO TORQUING ANGLE   FRACTION OF REV.
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  0044   REF   6  LAST 1354    23,3276   00027 1                     ZPRIME
  0045                         23,3277   77641 1              DOT
  0046   REF   5  LAST  747    23,3300   02730 1                     ZDC
  0047   REF  13  LAST 1354    23,3301   24021 1              STOVL  COSTH          COS(OGC) = ZP . ZDC
  0048   REF   7  LAST 1355    23,3302   00027 1                     ZPRIME
  0049                         23,3303   77641 1              DOT
  0050   REF   5  LAST  747    23,3304   02722 1                     YDC
  0051   REF  14  LAST 1354    23,3305   34023 1              STCALL SINTH          SIN(OGC) = ZP . YDC
  0052   REF   9  LAST 1354    23,3306   47311 1                     ARCTRIG

  0053   REF  19  LAST  756    23,3307   36760 0              STCALL OGC            X GYRO TORQUING ANGLE   FRACTION OF REV.
  0054   REF  38  LAST 1354    23,3310   00051 0                     S2
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L        INFLIGHT ALIGNMENT ROUTINES                                                     USER'S PAGE NO.   3      E5 S3

R0055    ARCTRIG COMPUTES AN ANGLE GIVEN THE SINE AND COSINE OF THIS ANGLE.

R0056    THE INPUTS ARE SIN/4 AND COS/4 STORED DP AT SINTH AND COSTH.

R0057    THE OUTPUT IS THE CALCULATED ANGLE BETWEEN +.5 AND -.5 REVOLUTIONS AND STORED AT THETA. THE OUTPUT IS ALSO
R0059    AVAILABLE AT MPAC.


 0060                        23,3311   51545 1   ARCTRIG   DLOAD   ABS                  PUSHDOWN  16D-21D
 0061    REF  15  LAST 1355  23,3312   00023 0                     SINTH
 0062                        23,3313   50025 0             DSU     BMN
 0063    REF   1             23,3314   07525 1                     QTSN45               ABS(SIN/4) - SIN(45)/4
 0064    REF   1             23,3315   47324 1                     TRIG1                IF (-45,45) OR (135,-135)


 0065                        23,3316   72545 0             DLOAD   SL1                  (45,135) OR (-135,-45)
 0066    REF  14  LAST 1355  23,3317   00021 1                     COSTH
 0067                        23,3320   75326 1             ACOS    SIGN
 0068    REF  16  LAST 1356  23,3321   00023 0                     SINTH
 0069    REF   7  LAST 1240  23,3322   00025 0             STORE   THETA                X = ARCCOS(COS) WITH SIGN(SIN)
 0070                        23,3323   77616 0             RVQ


 0071                        23,3324   72545 0   TRIG1     DLOAD   SL1                  (-45,45) OR (135,-135)
 0072    REF  17  LAST 1356  23,3325   00023 0                     SINTH
 0073                        23,3326   77736 0             ASIN
 0074    REF   8  LAST 1356  23,3327   14025 0             STODL   THETA                X = ARCSIN(SIN) WITH SIGN(SIN)
 0075    REF  15  LAST 1356  23,3330   00021 1                     COSTH
 0076                        23,3331   77640 0             BMN
 0077    REF   1             23,3332   47335 1                     TRIG2                IF (135,-135)

 0078                        23,3333   43545 1             DLOAD   RVQ
 0079    REF   9  LAST 1356  23,3334   00025 0                     THETA                X = ARCSIN(SIN)    (-45,45)


 0080                        23,3335   75345 1   TRIG2     DLOAD   SIGN                 (135,-135)
 0081    REF  12  LAST 1249  23,3336   15334 1                     HIDPHALF
 0082    REF  18  LAST 1356  23,3337   00023 0                     SINTH
 0083                        23,3340   77625 0             DSU
 0084    REF  10  LAST 1356  23,3341   00025 0                     THETA
 0085    REF  11  LAST 1356  23,3342   00025 0             STORE   THETA                X = .5 WITH SIGN(SIN) - ARCSIN(SIN)
 0086                        23,3343   77616 0             RVQ                                                (+) - (+) OR (-) - (-)
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R0087        SMNB, NBSM, AND AXISROT, WHICH USED TO APPEAR HERE, HAVE BEEN
R0088    COMBINED IN A ROUTINE CALLED AX*SR*T, WHICH APPEARS AMONG THE POWERED
R0089    FLIGHT SUBROUTINES.
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L          INFLIGHT ALIGNMENT ROUTINES                                                           USER'S PAGE NO.   5      E5 S3

R0090      CALCGA COMPUTES THE CDU DRIVING ANGLES REQUIRED TO BRING THE STABLE MEMBER INTO THE DESIRED ORIENTATION.

R0092      THE INPUTS ARE  1) THE NAVIGATION BASE COORDINATES REFERRED TO ANY COORDINATE SYSTEM. THE THREE HALF-UNIT
R0094      VECTORS ARE STORED AT XNB,YNB, AND ZNB.  2) THE DESIRED STABLE MEMBER COORDINATES REFERRED TO THE SAME
R0096      COORDINATE SYSTEM ARE STORED AT XSM, YSM, AND ZSM.

R0097      THE OUTPUTS ARE THE THREE CDU DRIVING ANGLES AND ARE STORED SP AT THETAD, THETAD +1, AND THETAD +2.

  0099                              23,3344   77601 0   CALCGA    SETPD                      PUSHDOWN  00-05, 16D-21D, 34D-37D
  0100                              23,3345   00001 0                      0
  0101                              23,3346   47375 0             VLOAD    VXV
  0102     REF  11  LAST  822       23,3347   02714 1                      XNB                 XNB = OGA (OUTER GIMBAL AXIS)
  0103     REF   6  LAST  822       23,3350   02700 1                      YSM                 YSM = IGA (INNER GIMBAL AXIS)
  0104                              23,3351   41456 0             UNIT     PUSH                PD0 = UNIT(OGA X IGA) = MGA

  0105                              23,3352   44041 1             DOT      ITA
  0106     REF   7  LAST  822       23,3353   02730 1                      ZNB
  0107     REF  39  LAST 1355       23,3354   00051 0                      S2
  0108     REF  16  LAST 1356       23,3355   24021 1             STOVL    COSTH               COS(OG) = MGA . ZNB
  0109                              23,3356   00001 0                      6
  0110                              23,3357   77641 1             DOT
  0111     REF   7  LAST  822       23,3360   02722 1                      YNB
  0112     REF  19  LAST 1356       23,3361   34023 1             STCALL   SINTH               SIN(OG) = MGA . YNB
  0113     REF  10  LAST 1355       23,3362   47311 1                      ARCTRIG
  0114     REF  20  LAST 1355       23,3363   26760 1             STOVL    OGC
  0115                              23,3364   00001 0                      0

  0116                              23,3365   50235 0             VXV      DOT                 PROVISION FOR MG ANGLE OF 90 DEGREES
  0117     REF  12  LAST 1358       23,3366   02714 1                      XNB
  0118     REF   7  LAST 1358       23,3367   02700 1                      YSM
  0119                              23,3370   77752 1             SL1
  0120     REF  17  LAST 1358       23,3371   24021 1             STOVL    COSTH               COS(MG) = IGA . (MGA X OGA)
  0121     REF   8  LAST 1358       23,3372   02700 1                      YSM
  0122                              23,3373   77641 1             DOT
  0123     REF  13  LAST 1358       23,3374   02714 1                      XNB
  0124     REF  20  LAST 1358       23,3375   34023 1             STCALL   SINTH               SIN(MG) = IGA . OGA
  0125     REF  11  LAST 1358       23,3376   47311 1                      ARCTRIG
  0126     REF   5  LAST 1354       23,3377   02764 0             STORE    MGC

  0127                              23,3400   45246 0             ABS      DSU
  0128     REF   2  LAST  603       23,3401   07527 0                      .166...
  0129                              23,3402   77644 1             BPL
  0130     REF   1                  23,3403   47422 0                      GIMLOCK1            IF ANGLE GREATER THAN 60 DEGREES

  0131                              23,3404   50375 0   CALCGA1   VLOAD    DOT
  0132     REF   7  LAST  822       23,3405   02706 1                      ZSM
  0133                              23,3406   00001 0                      0
  0134     REF  18  LAST 1358       23,3407   24021 1             STOVL    COSTH               COS(IG) = ZSM . MGA
  0135     REF  32  LAST 1354       23,3410   02672 0                      XSM
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 0136                          23,3411   45441 1             DOT    STADR
 0137   REF  21  LAST 1358     23,3412   43754 0             STCALL SINTH            SIN(IG) = XSM . MGA
 0138   REF  12  LAST 1358     23,3413   47311 1                    ARCTRIG

 0139   REF   6  LAST 1354     23,3414   26762 0             STOVL  IGC
 0140   REF  21  LAST 1358     23,3415   02760 1                    OGC
 0141                          23,3416   77634 0             RTB
 01415  REF   6  LAST  607     23,3417   45644 0                    V1STO2S
 0143   REF  23  LAST  774     23,3420   35310 0             STCALL THETAD
 0144   REF  40  LAST 1358     23,3421   00051 0                    S2

 0145                          23,3422   77776 1  GIMLOCK1   EXIT
 0146   REF  34  LAST 1349     23,3423 0 5671 1              TC     ALARM
 0147                          23,3424   00401 1             OCT    00401
 0148   REF  70  LAST 1348     23,3425 0 5547 1              TC     UPFLAG           GIMBAL LOCK HAS OCCURED
 0149   REF   2  LAST  428     23,3426   00056 1             ADRES  GLOKFAIL

 0150   REF 242  LAST 1349     23,3427 0 6006 1              TC     INTPRET
 0151                          23,3430   77650 1             GOTO
 0152   REF   1                23,3431   47404 1                    CALCGA1
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R0153  AXISGEN COMPUTES THE COORDINATES OF ONE COORDINATE SYSTEM REFERRED TO ANOTHER COORDINATE SYSTEM.

R0155  THE INPUTS ARE  1) THE STAR1 VECTOR REFERRED TO COORDINATE SYSTEM A STORED AT STARAD.  2) THE STAR2 VECTOR
R0157  REFERRED TO COORDINATE SYSTEM A STORED AT STARAD +6.  3) THE STAR1 VECTOR REFERRED TO COORDINATE SYSTEM B STORED
R0159  AT LOCATION 6 OF THE VAC AREA.  4) THE STAR2 VECTOR REFERRED TO COORDINATE SYSTEM B STORED AT LOCATION 12D OF
R0161  THE VAC AREA.

R0162  THE OUTPUT DEFINES COORDINATE SYSTEM A REFERRED TO COORDINATE SYSTEM B. THE THREE HALF-UNIT VECTORS ARE STORED
R0164  AT LOCATIONS XDC, XDC +6, XDC +12D, AND STARAD, STARAD +6, STARAD +12D.


0165                       23,3432  66370 0  AXISGEN   AXT,1    SSP              PUSHDOWN  00-30D,34D-37D
0166  REF  11  LAST  787   23,3433  02743 0                     STARAD +6
0167  REF  51  LAST 1341   23,3434  00051 0                     S1
0168  REF  12  LAST 1360   23,3435  02727 1                     STARAD -6

0169                       23,3436  77601 0            SETPD
0170                       23,3437  00001 0                     0
0171                       23,3440  46773 0  AXISGEN1  VLOAD*   VXV*             06D   UA = S1
0172  REF  13  LAST 1360   23,3441  02752 0                     STARAD +12D,1          STARAD +00D   UB = S1
0173  REF  14  LAST 1360   23,3442  02760 1                     STARAD +18D,1
0174                       23,3443  77656 1            UNIT                      12D   VA = UNIT(S1 X S2)
0175  REF  15  LAST 1360   23,3444  06760 0            STORE    STARAD +18D,1          STARAD +06D   VB = UNIT(S1 X S2)
0176                       23,3445  77773 1            VLOAD*
0177  REF  16  LAST 1360   23,3446  02752 0                     STARAD +12D,1

0178                       23,3447  76433 1            VXV*     VSL1
0179  REF  17  LAST 1360   23,3450  02760 1                     STARAD +18D,1    18D   WA = UA X VA
0180  REF  18  LAST 1360   23,3451  06766 0            STORE    STARAD +24D,1          STARAD +12D   WB = UB X VB

0181                       23,3452  77700 0            TIX,1
0182  REF   1              23,3453  47440 1                     AXISGEN1

0183                       23,3454  66160 0            AXC,1    SXA,1
0184                       23,3455  00006 1                     6
0185                       23,3456  00036 1                     30D

0186                       23,3457  66370 0            AXT,1    SSP
0187                       23,3460  00022 1                     18D
0188  REF  52  LAST 1360   23,3461  00051 0                     S1
0189                       23,3462  00006 1                     6

0190                       23,3463  66374 1            AXT,2    SSP
0191                       23,3464  00006 1                     6
0192  REF  41  LAST 1359   23,3465  00052 0                     S2
0193                       23,3466  00002 0                     2

0194                       23,3467  76720 0  AXISGEN2  XCHX,1   VLOAD*
0195                       23,3470  00036 1                     30D              X1=-6 X2=+6    X1=-6 X2=+4    X1=-6 X2=+2
0196                       23,3471  00001 0                     0,1
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0197                       23,3472   62757 0           VXSC*   PDVL*              J=(UA)(UB1)   J=(UA)(UB2)   J=(UA)(UB3)
0198   REF  19  LAST 1360  23,3473   75033 0                   STARAD +6,2
0199                       23,3474   00007 0                   6,1
0200                       23,3475   77757 1           VXSC*
0201   REF  20  LAST 1361  23,3476   75025 1                   STARAD +12D,2
0202                       23,3477   30031 0           STOVL*  24D                K=(VA)(VB1)   J=(VA)(VB2)   J=(VA)(VB3)
0203                       23,3500   00015 0                   12D,1

0204                       23,3501   53357 0           VXSC*   VAD
0205   REF  21  LAST 1361  23,3502   75017 0                   STARAD +18D,2      L=(WA)(WB1)   J=(WA)(WB2)   J=(WA)(WB3)
0206                       23,3503   76455 1           VAD     VSL1
0207                       23,3504   00031 0                   24D
0208                       23,3505   53520 0           XCHX,1  UNIT
0209                       23,3506   00036 1                   30D
0210   REF  11  LAST 1354  23,3507   06736 0           STORE   XDC +18D,1         XDC = L+J+K   YDC = L+J+K   ZDC = L+J+K

0211                       23,3510   77700 0           TIX,1
0212   REF   1             23,3511   47512 1                   AXISGEN3

0213                       23,3512   77704 1 AXISGEN3  TIX,2
0214   REF   1             23,3513   47467 1                   AXISGEN2

0215                       23,3514   77775 1           VLOAD
0216   REF  12  LAST 1361  23,3515   02714 1                   XDC
0217   REF  22  LAST 1361  23,3516   26736 1           STOVL   STARAD
0218   REF   6  LAST 1355  23,3517   02722 1                   YDC
0219   REF  23  LAST 1361  23,3520   26744 1           STOVL   STARAD +6
0220   REF   6  LAST 1355  23,3521   02730 1                   ZDC
0221   REF  24  LAST 1361  23,3522   02752 0           STORE   STARAD +12D

0222                       23,3523   77616 0           RVQ
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 0281                     23,3524   05520 0  QTSN45    2DEC     .1768
 0281                     23,3525   26075 1
 0282                     23,3526   05252 1  .166...   2DEC     .1666666667
 0282                     23,3527   25253 1
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L       POWERED FLIGHT SUBROUTINES                                                              USER'S PAGE NO.   1      E0 S3

 0002   REF   1                 23,2000                      SETLOC POWFLITE
 0003                           23,3530                      BANK

 0004   REF   1                    0142                      EBANK= DEXDEX
 0005   REF   1                                              COUNT* $$/POWFL

R0006       CDUTRIG, CDUTRIG1, CDUTRIG2, AND CD*TR*GS ALL COMPUTE THE SINES AND
R0007   COSINES OF THREE 2'S COMPLEMENT ANGLES AND PLACE THE RESULT, DOUBLE
R0008   PRECISION, IN THE SAME ORDER AS THE INPUTS, AT SINCDU AND COSCDU.   AN
R0009   ADDITIONAL OUTPUT IS THE 1'S COMPLEMENT ANGLES AT CDUSPOT.   THESE
R0010   ROUTINES GO OUT OF THEIR WAY TO LEAVE THE MPAC AREA AS THEY FIND IT,
R0011   EXCEPT FOR THE GENERALLY UNIMPORTANT MPAC +2.   THEY DIFFER ONLY IN
R0012   WHERE THEY GET THE ANGLES, AND IN METHOD OF CALLING.

R0013       CDUTRIG (AND CDUTRIG1, WHICH CAN BE CALLED IN BASIC) COMPUTE THE
R0014   SINES AND COSINES FROM THE CURRENT CONTENTS OF THE CDU REGISTERS.
R0015   THE CONTENTS OF CDUTEMP, ETC., ARE NOT TOUCHED SO THAT THEY MAY
R0016   CONTINUE TO FORM A CONSISTENT SET WITH THE LATEST PIPA READINGS.

R0017       CDUTRIG1 IS LIKE CDUTRIG EXCEPT THAT IT CAN BE CALLED IN BASIC.

R0018       CD*TR*GS FINDS CDU VALUES IN CDUSPOT RATHER THAN IN CDUTEMP.   THIS
R0019   ALLOWS USERS TO MAKE TRANSFORMATIONS USING ARBITRARY ANGLES, OR REAL
R0020   ANGLES IN AN ORDER OTHER THAN X Y Z.   A CALL TO THIS ROUTINE IS
R0021   NECESSARY IN PREPARATION FOR A CALL TO AX*SR*T IN EITHER OF ITS TWO
R0022   MODES (SMNB OR NBSM).   SINCE AX*SR*T EXPECTS TO FIND THE SINES AND
R0023   COSINES IN THE ORDER Y Z X THE ANGLES MUST HAVE BEEN PLACED IN CDUSPOT
R0024   IN THIS ORDER.   CD*TR*GS NEED NOT BE REPEATED WHEN AX*SR*T IS CALLED
R0025   MORE THAN ONCE, PROVIDED THE ANGLES HAVE NOT CHANGED.   NOTE THAT SINCE
R0026   IT CLOBBERS BUF2 (IN THE SINE AND COSINE ROUTINES) CD*TR*GS CANNOT BE
R0027   CALLED USING BANKCALL.   SORRY.

R0028       CD*TR*G IS LIKE CD*TR*GS EXCEPT THAT IT CAN BE CALLED IN
R0029   INTERPRETIVE.

 0030                           23,3530   77776 1  CDUTRIG   EXIT
 0031   REF   1                 23,3531  0 3534 0            TC     CDUTRIGS
 0032   REF 243  LAST 1359      23,3532  0 6006 1            TC     INTPRET
 0033                           23,3533   77616 0            RVQ

 0038   REF  28  LAST 1063      23,3534  3 0032 0  CDUTRIGS CA      CDUX
 0039   REF   9  LAST  778      23,3535  55'175 1            TS     CDUSPOT +4
 0040   REF  17  LAST 1063      23,3536  3 0033 1            CA     CDUY
 0041   REF  10  LAST 1364      23,3537  55'171 0            TS     CDUSPOT
 0042   REF  25  LAST 1063      23,3540  3 0034 0            CA     CDUZ
 0043   REF  11  LAST 1364      23,3541  55'173 1            TS     CDUSPOT +2

 0044                           23,3542  0 0006 1  CD*TR*GS EXTEND
 0045   REF   3  LAST   71      23,3543  22 142 0            QXCH   TEM2
 0046   REF  18  LAST 1182      23,3544  3 4766 1            CAF    FOUR
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L         POWERED FLIGHT SUBROUTINES                                                             USER'S PAGE NO.   2       E0 S3

 0047     REF  31  LAST 1152    23,3545  7 6211 1  TR*GL**P MASK     SIX                MAKE IT EVEN AND SMALLER
 0048     REF   3  LAST   72    23,3546  54 143 0           TS       TEM3
 0049     REF   4  LAST 1365    23,3547  50 143 1           INDEX    TEM3
 0050     REF  12  LAST 1364    23,3550  3 1171 1           CA       CDUSPOT
 0051     REF 652  LAST 1343    23,3551  52 155 1           DXCH     MPAC               STORING 2'S COMP ANGLE, LOADING MPAC
 0052     REF  52  LAST 1178    23,3552  52 127 1           DXCH     VBUF +4            STORING MPAC FOR LATER RESTORATION
 0053     REF   1               23,3553  0 4733 1           TC       USPRCADR
 0054     REF   9  LAST  891    23,3554   51754 0           CADR     CDULOGIC
 0055                           23,3555  0 0006 1           EXTEND
 0056     REF 653  LAST 1365    23,3556  3 0155 0           DCA      MPAC
 0057     REF   5  LAST 1365    23,3557  50 143 1           INDEX    TEM3
 0058     REF  13  LAST 1365    23,3560  53'172 0           DXCH     CDUSPOT            STORING 1'S COMPLEMENT ANGLE
 0059     REF   2  LAST 1365    23,3561  0 4733 1           TC       USPRCADR
 0060     REF   2  LAST 1119    23,3562   01514 0           CADR     COSINE
 0061     REF 654  LAST 1365    23,3563  52 155 1           DXCH     MPAC
 0062     REF   6  LAST 1365    23,3564  50 143 1           INDEX    TEM3
 0063     REF   4  LAST   81    23,3565  53'150 0           DXCH     COSCDU             STORING COSINE
 0064                           23,3566  0 0006 1           EXTEND
 0065     REF   7  LAST 1365    23,3567  5 0143 1           INDEX    TEM3
 0066     REF  14  LAST 1365    23,3570  3 1172 1           DCA      CDUSPOT            LOADING 1'S COMPLEMENT ANGLE
 0067     REF   3  LAST 1365    23,3571  0 4733 1           TC       USPRCADR
 0068     REF   2  LAST 1119    23,3572   01526 1           CADR     SINE +1            SINE +1 EXPECTS ARGUMENT IN A AND L
 0069     REF  53  LAST 1365    23,3573  52 127 1           DXCH     VBUF +4            BRINGING UP PRIOR MPAC TO BE RESTORED
 0070     REF 655  LAST 1365    23,3574  52 155 1           DXCH     MPAC
 0071     REF   8  LAST 1365    23,3575  50 143 1           INDEX    TEM3
 0072     REF   4  LAST   81    23,3576  53'142 0           DXCH     SINCDU
 0073     REF   9  LAST 1365    23,3577  10 143 0           CCS      TEM3
 0074     REF   1               23,3600  1 3545 1           TCF      TR*GL**P
 0075     REF   4  LAST 1364    23,3601  0 0142 0           TC       TEM2
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L       POWERED FLIGHT SUBROUTINES                                                           USER'S PAGE NO.   3      E0 S3

P0076   **************************************************************************************************************

R0078       QUICTRIG, INTENDED FOR GUIDANCE CYCLE USE WHERE TIME IS CRITICAL, IS A MUCH FASTER VERSION OF CD*TR*GS.
R0080   QUICTRIG COMPUTES AND STORES THE SINES AND COSINES OF THE 2'S COMPLEMENT ANGLES AT CDUSPOT, CDUSPOT +2,
R0082   AND CDUSPOT +4.   UNLIKE CD*TR*GS, QUICTRIG DOES NOT LEAVE THE 1'S COMPLEMENT VERSIONS OF THE ANGLES IN
R0084   CDUSPOT.   QUICTRIG'S EXECUTION TIME IS 4.1 MS;   THIS IS 10 TIMES AS FAST AS CD*TR*GS.   QUICTRIG MAY BE
R0086   CALLED FROM INTERPRETIVE AS AN RTB OP-CODE, OR FROM BASIC VIA BANKCALL OR IBNKCALL.

 0090                          23,3602  0 0004 0  QUICTRIG INHINT                                INHINT SINCE DAP USES THE SAME TEMPS
 00901                         23,3603  0 0006 1           EXTEND
 00902  REF  17  LAST 1102     23,3604  22 061 0           QXCH     ITEMP1
 0091   REF  19  LAST 1364     23,3605  3 4766 1           CAF      FOUR
 0092   REF  32  LAST 1365     23,3606  7 6211 1      +4   MASK     SIX
 0093   REF  12  LAST  224     23,3607  54 062 1           TS       ITEMP2
 0094   REF  13  LAST 1366     23,3610  50 062 0           INDEX    ITEMP2
 0095   REF  15  LAST 1365     23,3611  3 1171 1           CA       CDUSPOT
 0096   REF   8  LAST 1073     23,3612  0 5061 0           TC       SPSIN
 0097                          23,3613  0 0006 1           EXTEND
 0098   REF  61  LAST 1235     23,3614  7 4753 0           MP       BIT14                        SCALE DOWN TO MATCH INTERPRETER OUTPUTS
 0099   REF  14  LAST 1366     23,3615  50 062 0           INDEX    ITEMP2
 0100   REF   5  LAST 1365     23,3616  53'142 0           DXCH     SINCDU
 0101   REF  15  LAST 1366     23,3617  50 062 0           INDEX    ITEMP2
 0102   REF  16  LAST 1366     23,3620  3 1171 1           CA       CDUSPOT
 0103   REF   7  LAST 1073     23,3621  0 5060 1           TC       SPCOS
 0104                          23,3622  0 0006 1           EXTEND
 0105   REF  62  LAST 1366     23,3623  7 4753 0           MP       BIT14
 0106   REF  16  LAST 1366     23,3624  50 062 0           INDEX    ITEMP2
 0107   REF   5  LAST 1365     23,3625  53'150 0           DXCH     COSCDU
 0108   REF  17  LAST 1366     23,3626  10 062 1           CCS      ITEMP2
 0109   REF   2  LAST  710     23,3627  1 3606 0           TCF      QUICTRIG +4
 01091  REF  18  LAST 1366     23,3630  3 0061 0           CA       ITEMP1
 0110                          23,3631  0 0003 1           RELINT
 01101  REF 335  LAST 1325     23,3632  0 0000 1           TC       A
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R0111   ****************************************************************************************************************

R0113       THESE INTERFACE ROUTINES MAKE IT POSSIBLE TO CALL AX*SR*T, ETC., IN
R0114   INTERPRETIVE.   LATER, WHERE POSSIBLE, THEY WILL BE ELIMINATED.

R0127       THESE INTERFACE ROUTINES ARE PERMANENT.   ALL RESTORE USER'S EBANK
R0128   SETTING.   ALL ARE STRICT INTERPRETIVE SUBROUTINES, CALLED USING "CALL",
R0129   RETURNING VIA QPRET.   ALL EXPECT AND RETURN THE VECTOR TO BE TRANSFOR-
R0130   MED INTERPRETER-STYLE IN MPAC; COMPONENTS AT MPAC, MPAC +3, AND MPAC +5.

R0131       TRG*SMNB AND TRG*NBSM BOTH EXPECT TO SEE THE 2'S COMPLEMENT ANGLES
R0132   AT CDUSPOT (ORDER Y Z X, AT CDUSPOT, CDUSPOT +2, AND CDUSPOT +4; ODD
R0133   LOCATIONS NEED NOT BE ZEROED).   TRG*NBSM DOES THE NB TO SM TRANSFOR-
R0134   MATION;  TRG*SMNB, VICE VERSA.

R0135       CDU*NBSM DOES ITS TRANSFORMATION USING THE PRESENT CONTENTS OF
R0136   THE CDU COUNTERS.   OTHERWISE IT IS LIKE TRG*NBSM.

R01361      CDU*SMNB IS THE COMPLEMENT OF CDU*NBSM.

 0138                            23,3633   77776 1  *SMNB*    EXIT
 0139   REF   3  LAST 1175       23,3634  0 7466 1  C*MM*N1   TC        MPACVBUF          AX*SR*T EXPECTS VECTOR IN VBUF
 0140   REF  44  LAST 1204       23,3635  4 6214 1            CS        THREE             SIGNAL FOR SM TO NB TRANSFORMATION
 0141   REF   1                  23,3636  0 3651 0  C*MM*N2   TC        AX*SR*T
 0142   REF 244  LAST 1364       23,3637  0 6006 1            TC        INTPRET
 0143                            23,3640   43575 1            VLOAD     RVQ
 0144   REF  54  LAST 1365       23,3641   00123 1                      VBUF

 0148                            23,3642   77776 1  TRG*NBSM  EXIT
 0149   REF   1                  23,3643  0 3542 1            TC        CD*TR*GS
 0150   REF   4  LAST 1367       23,3644  0 7466 1  C*MM*N3   TC        MPACVBUF          FOR AX*SR*T
 0151   REF  45  LAST 1367       23,3645  3 6214 0            CA        THREE             SIGNAL FOR NB TO SM TRANSFORMATION
 0152   REF   1                  23,3646  1 3636 0            TCF       C*MM*N2

R0153       *NBSM* AND *SMNB* EXPECT TO SEE THE SINES AND COSINES (AT SINCDU
R0154   AND COSCDU) RATHER THAN THE ANGLES THEMSELVES.   OTHERWISE THEY ARE
R0155   LIKE TRG*NBSM AND TRG*SMNB.

R0156       NOTE THAT JUST AS CD*TR*GS NEED BE CALLED ONLY ONCE FOR EACH SERIES
R0157   OF TRANSFORMATIONS USING THE SAME ANGLES, SO TOO ONLY ONE OF TRG*NBSM
R0158   AND TRG*SMNB NEED BE CALLED FOR EACH SERIES.   FOR SUBSEQUENT TRANSFOR-
R0159   MATIONS USE *NBSM* AND *SMNB*.

 0162                            23,3647   77776 1  *NBSM*    EXIT
 0163   REF   1                  23,3650  1 3644 0            TCF       C*MM*N3

R0164         AX*SR*T COMBINES THE OLD SMNB AND NBSM.   FOR THE NB TO SM
R0165   TRANSFORMATION, ENTER WITH +3 IN A.   FOR SM TO NB, ENTER WITH -3.
R0166   THE VECTOR TO BE TRANSFORMED ARRIVES, AND IS RETURNED, IN VBUF.
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R0167   AX*SR*T EXPECTS TO FIND THE SINES AND COSINES OF THE ANGLES OF ROTATION
R0168   AT SINCDU AND COSCDU, IN THE ORDER Y Z X.   A CALL TO CD*TR*GS, WITH
R0169   THE 2'S COMPLEMENT ANGLES (ORDER Y Z X) AT CDUSPOT, WILL TAKE CARE OF
R0170   THIS.   HERE IS A SAMPLE CALLING SEQUENCE:-

R0171                                   TC      CDUTRIGS
R0172                                   CS      THREE           ("CA  THREE" FOR NBSM)
R0173                                   TC      AX*SR*T

R0174   THE CALL TO CD*TR*GS NEED NOT BE REPEATED, WHEN AX*SR*T IS CALLED MORE
R0175   THAN ONCE, UNLESS THE ANGLES HAVE CHANGED.

R0176       AX*SR*T IS GUARANTEED SAFE ONLY FOR VECTORS OF MAGNITUDE LESS THAN
R0177   UNITY.   A LOOK AT THE CASE IN WHICH A VECTOR OF GREATER MAGNITUDE
R0178   HAPPENS TO LIE ALONG AN AXIS OF THE SYSTEM TO WHICH IT IS TO BE TRANS-
R0179   FORMED CONVINCES ONE THAT THIS IS A RESTRICTION WHICH MUST BE ACCEPTED.

 0180   REF   2  LAST 1364   23,3651  54 142 1  AX*SR*T  TS      DEXDEX          WHERE IT BECOMES THE INDEX OF INDEXES
 0181                        23,3652   0 0006 1           EXTEND
 0182   REF   1              23,3653  22 145 1           QXCH    RTNSAVER

 0183   REF   3  LAST 1368   23,3654  10 142 1  R*TL**P  CCS     DEXDEX                    +3 --> 0      -3 --> 2
 0184   REF   4  LAST 1368   23,3655   4 0142 1           CS      DEXDEX          THUS:     +2 --> 1      -2 --> 1
 0185   REF  46  LAST 1367   23,3656   6 6214 0           AD      THREE                     +1 --> 2      -1 --> 0
 0186                        23,3657   0 0006 1           EXTEND
 0187   REF 336  LAST 1366   23,3660   5 0000 1           INDEX   A
 0188   REF   1              23,3661   3 3740 1           DCA     INDEXI
 0189   REF   1              23,3662  52 144 1           DXCH    DEXI

 0190   REF 148  LAST 1286   23,3663   3 4770 0           CA      ONE
 0191   REF 121  LAST 1219   23,3664  54 130 1           TS      BUF
 0192                        23,3665   0 0006 1           EXTEND
 0193   REF   2  LAST   72   23,3666   5 0143 1           INDEX   DEXI
 0194   REF  55  LAST 1367   23,3667   4 0123 0           DCS     VBUF
 0195   REF   1              23,3670   1 3672 0           TCF     LOOP1             REALLY BE A SUBTRACT, AND VICE VERSA

 0196   REF 122  LAST 1368   23,3671  52 131 0  LOOP2    DXCH    BUF             LOADING VECTOR COMPONENT, STORING INDEX

 0197   REF 656  LAST 1365   23,3672  52 155 1  LOOP1    DXCH    MPAC
 0198   REF   1              23,3673   3 3736 0           CA      SINESLOC
 0199   REF   3  LAST 1368   23,3674   6 0143 1           AD      DEXI
 0200   REF  78  LAST 1181   23,3675  54 116 0           TS      ADDRWD

 0201   REF  21  LAST 1190   23,3676   0 7056 0           TC      DMPSUB          MULTIPLY BY SIN(CDUANGLE)
 0202   REF   5  LAST 1368   23,3677  10 142 1           CCS     DEXDEX
 0203   REF 657  LAST 1368   23,3700  52 155 1           DXCH    MPAC            NBSM CASE
 0204                        23,3701   1 3704 0           TCF     +3
 0205                        23,3702   0 0006 1           EXTEND                  SMNB CASE
 0206   REF 658  LAST 1368   23,3703   4 0155 1           DCS     MPAC
 0207   REF   1              23,3704  52 134 0           DXCH    TERMITMP
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0208   REF  33  LAST 1366    23,3705  3 6211 0           CA     SIX             SINCDU AND COSCDU (EACH 6 WORDS) MUST
0209   REF  79  LAST 1368    23,3706  26 116 0           ADS    ADDRWD            BE CONSECUTIVE AND IN THAT ORDER

0210                         23,3707  0 0006 1           EXTEND
0211   REF 123  LAST 1368    23,3710  5 0130 0           INDEX  BUF
0212   REF   4  LAST 1368    23,3711  5 0143 1           INDEX  DEX1
0213   REF  56  LAST 1368    23,3712  3 0123 1           DCA    VBUF
0214   REF 659  LAST 1368    23,3713  52 155 1           DXCH   MPAC
0215   REF  22  LAST 1368    23,3714  0 7056 0           TC     DMPSUB          MULTIPLY BY COS(CDUANGLE)
0216   REF 660  LAST 1369    23,3715  52 155 1           DXCH   MPAC
0217   REF   2  LAST 1368    23,3716  20 134 0           DAS    TERM1TMP
0218   REF   3  LAST 1369    23,3717  52 134 0           DXCH   TERM1TMP
0219                         23,3720  20 001 1           DDOUBL
0220   REF 124  LAST 1369    23,3721  50 130 0           INDEX  BUF
0221   REF   5  LAST 1369    23,3722  50 143 1           INDEX  DEX1
0222   REF  57  LAST 1369    23,3723  52 123 0           DXCH   VBUF
0223   REF 125  LAST 1369    23,3724  52 131 0           DXCH   BUF             LOADING INDEX, STORING VECTOR COMPONENT

0224   REF 337  LAST 1368    23,3725  10 000 0           CCS    A               'CAUSE THAT'S WHERE THE INDEX NOW IS
0225   REF   1               23,3726  1 3671 0           TCF    LOOP2

0226                         23,3727  0 0006 1           EXTEND
0227   REF   6  LAST 1368    23,3730  26 142 1           DIM    DEXDEX          DECREMENT MAGNITUDE PRESERVING SIGN

0228   REF   7  LAST 1369    23,3731  10 142 1  TSTPOINT CCS    DEXDEX          ONLY THE BRANCHING FUNCTION IS USED
0229   REF   1               23,3732  1 3654 1           TCF    R*TL**P
0230   REF   2  LAST 1368    23,3733  0 0145 1           TC     RTNSAVER
0231   REF   2  LAST 1369    23,3734  1 3654 1           TCF    R*TL**P
0232   REF   3  LAST 1369    23,3735  0 0145 1           TC     RTNSAVER


0233   REF   6  LAST 1366    23,3736   01141 1  SINESLOC ADRES  SINCDU          FOR USE IN SETTING ADDRWD

0234                         23,3737   00004 0  INDEXI   DEC    4               **********    DON'T    **********
0235                         23,3740   00002 0           DEC    2               **********    TOUCH    **********
0236                         23,3741   00000 1           DEC    0               **********    THESE    **********
0237                         23,3742   00004 0           DEC    4               **********  CONSTANTS  **********

R0238   *****************************************************************************************************************
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L         POWERED FLIGHT SUBROUTINES                                                                 USER'S PAGE NO.   7       E0 S3

R0240     THIS SUBROUTINE COMPUTES INCREMENTAL CHANGES IN CDU(GIMBAL) ANGLES FROM INCREMENTAL CHANGES ABOUT SM AXES. IT
R0242     REQUIRES SM INCREMENTS AS A DP VECTOR SCALED AT ONE REVOLUTION(DTHETASM,+2,+4).  SIN,COS(CDUY,Z,X) ARE IN
R0244     SINCDU,+2,+4 AND COSCDU,+2,+4 RESPECTIVELY,SCALED TO ONE HALF. CDU INCREENTS ARE PLACED IN DCDU,+2,+4 SCALED TO
R0246     ONE REVOLUTION.

R0247              *  COS(IGA)SEC(MGA)           0          -SIN(IGA)SEC(MGA) *
R0248              *                                                          *
R0249              * -COS(IGA)TAN(MGA)           1           SIN(IGA)TAN(MGA) *
R0250              *                                                          *
R0251              *      SIN(IGA)               0              COS(IGA)      *

 0253     REF   1                 23,2000                        SETLOC POWFLITI
 0254                             23,3743                        BANK
 02545 *REF    2 LAST 1364 TO 1370:    139   139*                COUNT* $$/POWFL
 0255                             23,3743   41345 0  SMCDURES DLOAD  DMP
 0256     REF  15  LAST  599      23,3744   03212 0                  DTHETASM
 0257     REF   4  LAST  770      23,3745   01150 1                  COSCDUY

 0258                             23,3746   41325 0          PDDL    DMP
 0259     REF  16  LAST 1370      23,3747   03216 1                  DTHETASM +4
 0260     REF   4  LAST  770      23,3750   01142 1                  SINCDUY

 0261                             23,3751   77621 1          BDSU
 0262                             23,3752   77671 1          DDV
 0263     REF   7  LAST  970      23,3753   01152 0                  COSCDUZ
 0264     REF   7  LAST  602      23,3754   03204 1          STORE   DCDU

 0265                             23,3755   72405 0          DMP     SL1                SCALE
 0266     REF   4  LAST  770      23,3756   01144 1                  SINCDUZ
 0267                             23,3757   77621 1          BDSU

 0268     REF  17  LAST 1370      23,3760   03214 0                  DTHETASM +2
 0269     REF   8  LAST 1370      23,3761   17206 0          STODL   DCDU +2
 0270     REF  18  LAST 1370      23,3762   03212 0                  DTHETASM

 0271                             23,3763   65205 0          DMP     PDDL
 0272     REF   5  LAST 1370      23,3764   01142 1                  SINCDUY
 0273     REF  19  LAST 1370      23,3765   03216 1                  DTHETASM +4

 0274                             23,3766   43205 1          DMP     DAD
 0275     REF   5  LAST 1370      23,3767   01150 1                  COSCDUY
 0276                             23,3770   77752 1          SL1
 0277     REF   9  LAST 1370      23,3771   03210 1          STORE   DCDU +4
 0278                             23,3772   77616 0          RVQ
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L        TIME OF FREE FALL                                                          USER'S PAGE NO.   1       E0 S3

R0001            THE TFF SUBROUTINES MAY BE USED IN EITHER EARTH OR MOON CENTERED COORDINATES. THE TFF ROUTINES NEVER
R0003    KNOW WHICH ORIGIN APPLIES. IT IS THE USER WHO KNOWS, AND WHO SUPPLIES  RONE, VONE AND 1/SQRT(MU)  AT THE
R0005    APPROPRIATE SCALE LEVEL FOR THE PROPER PRIMARY BODY.

R0006            EARTH ORIGIN                 POSITION      -29        METERS
R0007                                         VELOCITY      -7         METERS/CENTISECOND
R0009                                         1/SQRT(MU)    +17        SQRT(CS SQ/METERS CUBED)

R0011            MOON ORIGIN                  POSITION      -27        METERS
R0012                                         VELOCITY      -5         METERS/CENTISECONDS
R0014                                         1/SQRT(MU)    +14        SQRT(CS SQ/METERS CUBED)

R0016    ALL DATA PROVIDED TO AND RECEIVED FROM ANY TFF SUBROUTINE WILL BE AT ONE OF THE LEVELS ABOVE. IN ALL CASES,
R0018    THE FREE FALL TIME IS RETURNED IN CENTISECONDS AT (-28). PROGRAM  TFF/CONIC  WILL GENERATE VONE/RTMU  AND
R0020    LEAVE IT IN  VONE' AT (+10) IF EARTH ORIGIN AND (+9) IF MOON ORIGIN.
R0021            THE USER MUST STORE THE STATE VECTOR IN  RONE, VONE  AND MU IN  THE FORM 1/SQRT(MU) IN  TFF/RTMU
R0023    AT THE PROPER SCALE BEFORE CALLING  TFF/CONIC. SINCE  RONE, VONE  ARE IN THE EXTENDED VERB STORAGE AREA,
R0025    THE USER MUST ALSO LOCK OUT THE EXTENDED VERBS, AND RELEASE THEM WHEN FINISHED.
R0027            PROGRAMS     CALC/TFF  AND  CALC/TPER  ASSUME THAT THE TERMINAL RADIUS IS LESS THAN THE PRESENT
R0029    RADIUS. THIS RESTRICTION CAN BE REMOVED BY A  15 W CODING CHANGE, BUT AT PRESENT IT IS NOT DEEMED NECESSARY.
R0031
R0032            THE FOLLOWING ERASABLE QUANTITIES ARE USED BY THE TFF ROUTINES, AND ARE LOCATED IN THE PUSH LIST.
R0034

A0035                                                                   BELOW      E:   IS USED FOR EARTH ORIGIN SCALE
A0036                                                                              M:   IS USED FOR MOON  ORIGIN SCALE

A0037                                          TFFSW     =        119D  BIT1      0 = CALCTFF          1 = CALCTPER
 0038                            0012          TFFDELQ   =        10D             Q2-Q1                E: (-16)  M: (-15)
 0039                            0014          RMAG1     =        12D             ABVAL(RN)  M         E: (-29)  M: (-27)
A0040                                          RPER      =        14D             PERIGEE RADIUS M     E: (-29)  M: (-27)
 0041                            0016          TFFQ1     =        14D             R.V / SQRT(MUE)      E: (-16)  M: (-15)
A0042                                          SDELF/2                            SIN(THETA) /2
 0043                            0016          CDELF/2   =        14D             COS(THETA) /2
A0044                                          RAPO      =        16D             APOGEE RADIUS  M     E: (-29)  M: (-27)
 0045                            0020          NRTERM    =        16D             TERMINAL RADIUS M    E: (-29+NR)
A0046                                                                                                  M: (-27+NR)
 0047                            0022          RTERM     =        18D             TERMINAL RADIUS M    E: (-29)  M: (-27)
 0048                            0024          TFFVSQ    =        20D             -(V SQUARED/MU)  1/M  E: (20)   M: (18)
 0049                            0026          TFF1/ALF  =        22D             SEMI MAJ AXIS  M   E: (-22-2 NA)
A0050                                                                                                M: (-20-2 NA)
 0051                            0030          TFFRTALF  =        24D             SQRT(ALFA)  E: (10+NA)  M: (9+NA)
 0052                            0032          TFFALFA   =        26D             ALFA  1/M   E: (26-NR)  M: (24-NR)
 0053                            0034          TFFNP     =        28D             SEMI LATUS RECTUM  M  E: (-38+2 NR)
A0054                                                                                                   M: (-36+2 NR)
 0055                            0036          TFF/RTMU  =        30D             1/SQRT(MU)           E: (17)   M: (14)
 0056                            0040          NRMAG     =        32D             PRESENT RADIUS  M    E: (-29+NR)
A0057                                                                                                  M: (-27+NR)
 0058                            0042          TFFX      =        34D
 0059                            0044          TFFTEM    =        36D             TEMPORARY
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A0060                                  REGISTERS S1, S2 ARE UNTOUCHED BY ANY TFF SUBROUTINE
A0061                                  INDEX REGISTERS X1, X2 ARE USED BY ALL TFF SUBROUTINES. THEY ARE ESTAB-
A0062                                  LISHED IN TFF/CONIC AND MUST BE PRESERVED BETWEEN CALLS TO SUBSEQUENT
A0063                                  SUBROUTINES.
A0064                                  -NR                       C(X1) = NORM COUNT OF RMAG
A0065                                  -NA                       C(X2)= NORM COUNT OF SQRT(ABS(ALFA))
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P0066

R0067   SUBROUTINE NAME:      TFFCONIC                                          DATE:     01.29.67
R0069   MOD NO:  0                                                              LOG SECTION:     TIME OF FREE FALL
R0071   MOD BY:  RR BAIRNSFATHER
R0072   MOD NO:  1                 MOD BY:  RR BAIRNSFATHER      DATE:  11 APR 67
R0073   MOD NO:  2                 MOD BY:  RR BAIRNSFATHER      DATE:  21 NOV 67       ADD MOON MU.
R0075   MOD NO:  3                 MOD BY:  RR BAIRNSFATHER      DATE:  21 MAR 68       ACCEPT DIFFERENT EARTH/MOON SCALES
R0077   FUNCTIONAL DESCRIPTION:        THIS SUBROUTINE IS CALLED TO COMPUTE THOSE CONIC PARAMETERS REQUIRED BY THE TFF
R0079            SUBROUTINES AND TO ESTABLISH THEM IN THE PUSH LIST AREA. THE PARAMETERS ARE LISTED UNDER OUTPUT.
R0081            THE EQUATIONS ARE
R0082                   -   -   -
R0083                   H = RN*VN                                               ANGULAR MOMENTUM
R0085                          - -
R0086                   LCP = H.H / MU                                          SEMI LATUS RECTUM
R0088                               -  -
R0089                   ALFA = 2/RN - VN.VN / MU                                RECIPROCAL SEMI MAJ AXIS, SIGNED

R0091            AND ALFA IS POS FOR ELLIPTIC  ORBITS
R0092                          0  FOR PARABOLIC ORBITS
R0093                        NEG FOR HYPERBOLIC ORBITS.
R0094            SUBROUTINE ALSO COMPUTES AND SAVES  RMAG.
R0095   CALLING SEQUENCE:
R0096            TFFCONIC  EXPECTS CALLER TO ENTER WITH CORRECT GRAVITATIONAL CONSTANT IN MPAC, IN THE FORM
R0098            1/SQRT(MU). PROGRAM WILL SAVE IN  TFF/RTMU  . THE SCALE IS DETERMINED BY WHETHER EARTH OR MOON
R0100            ORIGIN IS USED.  THE CALLER MUST LOCK OUT THE EXTENDED VERBS BEFORE PROVIDING STATE VECTOR IN RONE,
R0102            VONE  AT PROPER SCALE. THE EXTENDED VERBS MUST BE RESTORED WHEN THE CALLER IS FINISHED USING THE
R0104            TFF ROUTINES.
R0105            ENTRY POINT  TFFCONMU  EXPECTS THAT  TFF/RTMU  IS ALREADY LOADED.
R0107            TO SPECIFY MU:       DLOAD  CALL                   IF MU ALREADY STORED:    CALL
R0109                                        YOURMU      1/RTMU   E: (17)  M: (14)                TFFCONMU
R0111                                        TFFCONIC
R0112            PUSHLOC = PDL+0, ARBITRARY IF LEQ 18D

R0113   SUBROUTINES CALLED:  NONE
R0114   NORMAL EXIT MODES:   RVQ
R0115   ALARMS:  NONE
R0116   OUTPUT:  THE FOLLOWING ARE STORED IN THE PUSH LIST AREA.
R0117            RMAG1  E:(-29) M:(-27) M  RN, PRESENT RADIUS LENGTH.
R0118            NRMAG  E: (-29+NR)     M  RMAG, NORMALIZED
R0119                   M: (-27+NR)
R0120            X1                    -NR, NORM COUNT
R0121            TFFNP  E: (-38+2NR)    M  LCP, SEMI LATUS RECTUM, WEIGHTED BY NR.       FOR VGAMCALC
R0123                   M: (-36+2NR)
R0124            TFF/RTMU  E:(17)  M:(14)        1/SQRT(MU)
R0125            TFFVSQ E:(20)  M:(18)  1/M   -(V SQ/MU): PRESENT VELOCITY,NORMLIZED.     FOR VGAMCALC
R0127            TFFALFA  E: (26-NR)    1/M   ALFA, WEIGHTED BY NR
R0128                     M: (24-NR)
R0129            TFFRTALF  E: (10+NA)   SQRT(ALFA), NORMALIZED
R0130                      M: (9+NA)
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L       TIME OF FREE FALL                                                        USER'S PAGE NO.  4       E0 53

R0131            X2                      -NA, NORM COUNT
R0132            TFF1/ALF  E: (-22-2NA) SIGNED SEMI MAJ AXIS, WEIGHTED BY NA
R0133                      M: (-20-2NA)
R0134            PUSHLOC AT PDL+0
R0135            THE FOLLOWING  IS STORED IN GENERAL ERASABLE
R0136            VONE'  E:(10)  M:(9)   V/RT(MU), NORMALIZED VELOCITY
R0137   ERASABLE INITIALIZATION REQUIRED:
R0138            RONE   E:(-29)  M:(-27)  M       STATE VECTOR                   LEFT BY CALLER
R0140            VONE   E:(-7)   M:(-5)   M/CS    STATE VECTOR                   LEFT BY CALLER
R0142            TFF/RTMU  E:(17)  M:(14)       1/RT(CS SQ/M CUBE)               IF ENTER VIA  TFFCONMU.
R0144   DEBRIS:  QPRET,    PDL+0 ... PDL+3
R0145

 0147   REF    1             27,2000                      SETLOC TOF-FF
 0148                        27,3151                      BANK

 0149   REF    1                                          COUNT* $$/TFF

 0150   REF    4 LAST  818   27,3151   00037 0   TFFCONIC STORE  TFF/RTMU        1/SQRT(MU)       E: (17)   M: (14)

 0151                        27,3152   53575 0   TFFCONMU VLOAD  UNIT            COME HERE WITH TFFRTMU LOADED.
 0152   REF   16 LAST  793   27,3153   02320 1                   RONE            SAVED RN.  M      E: (-29)  M: (-27)
 0153                        27,3154   77725 1            PDDL                   UR/2 TO PDL+0, +5
 0154                        27,3155   00045 0                   360             MAGNITUDE
 0155   REF    1             27,3156   00015 0            STORE  RMAG1           M     E: (-29)   M: (-27)

 0156                        27,3157   77701 1            NORM
 0157   REF   87 LAST 1341   27,3160   00047 1                   X1              -NR
 0158   REF    4 LAST  819   27,3161   24041 1            STOVL  NRMAG           RMAG  M    E: (-29+NR)  M: (-27+NR)
 0159   REF   12 LAST  793   27,3162   02326 1                   VONE            SAVED VN.  M/CS   E: (-7)    M: (-5)
 0160                        27,3163   77761 1            VXSC
 0161   REF    5 LAST 1374   27,3164   00037 0                   TFF/RTMU        E: (17)    M: (14)
 0162   REF    2 LAST   96   27,3165   02362 1            STORE  VONE'           VN/SQRT(MU)    E: (10)    M: (9)

 0163                        27,3166   47361 0            VXSC   VXV
 0164   REF    5 LAST 1374   27,3167   00041 1                   NRMAG           E: (-29+NR)  M: (-27+NR)
A0165                                                                            UR/2 FROM PDL
 0166                        27,3170   47572 1            VSL1   VSQ             BEFORE:  E:(-19+NR)  M:(-18+NR)
 0167   REF    2 LAST  818   27,3171   14035 1            STODL  TFFNP           LC P  M    E:(-38+2NR)  M:(-36+2NR)
A0168                                                                            SAVE ALSO FOR VGAMCALC
 0169   REF    1             27,3172   15326 1                   TFF1/4
 0170                        27,3173   63271 0            DDV    PDVL            (2/RMAG)  1/M    E:(26-NR)    M:(24-NR)
 0171   REF    6 LAST 1374   27,3174   00041 1                   NRMAG           RMAG  M    E:(-29+NR)  M:(-27+NR)
 0172   REF    3 LAST 1374   27,3175   02362 1                   VONE'           SAVED VN.    E: (10)    M: (9)
 0173                        27,3176   57436 1            VSQ    DCOMP           KEEP MPAC+2 HONEST FOR SQRT.
 0174   REF    2 LAST  818   27,3177   00025 0            STORE  TFFVSQ          -(V SQ/MU)    E:(20)    M:(18)
A0175                                                                            SAVE FOR VGAMCALC
 0176                        27,3200   43257 0            SR*    DAD
 0177                        27,3201   20573 1                   0 -6,1          GET -VSQ/MU    E:(26-NR)    M:(24-NR)
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L        TIME OF FREE FALL                                                         USER'S PAGE NO.  5      E0 53

 0178                          27,3202   77626 0               STADR
A0179                                                                            2/RMAG   FROM PDL+2
 0180    REF   1               27,3203   77744 0               STORE  TFFALFA    ALFA  1/M   E:(26-NR)   M:(24-NR)
 0181                          27,3204   41457 1               SL*    PUSH       TEMP SAVE ALFA    E:(20)   M:(18)
 0182                          27,3205   20173 0                      0 -6,1
 0183                          27,3206   75446 0               ABS    SQRT       E:(10)   M:(9)
 0184                          27,3207   77701 1               NORM
 0185    REF  38  LAST 1342    27,3210   00050 1                      X2         X2 = -NA
 0186    REF   1               27,3211   00031 0               STORE  TFFRTALF   SQRT( ABS(ALFA) )  E:(10+NA)   M:(9+NA)
 0187                          27,3212   75316 1               DSQ    SIGN       NOT SO ACCURATE, BUT OK
A0188                                                                            ALFA FROM PDL+2   E:(20)   M:(18)
 0189                          27,3213   55254 1               BZE    BDDV       SET 1/ALFA =0, TO SHOW SMALL ALFA
 0190                          27,3214   57216 0                      +2
 0191    REF   2  LAST 1374    27,3215   15326 1                      TFF1/4
 0192    REF   1               27,3216   00027 1  +2           STORE  TFF1/ALF   1/ALFA   E:(-22-2 NA)   M:(-20-2 NA)
 0193                          27,3217   77616 0  DUMPCNIC     RVQ

A0194                                                                                               39 W
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L       TIME OF FREE FALL                                                            USER'S PAGE NO.    6      E0 53

R0195   SUBROUTINE NAME:     TFFRP/RA                                                DATE:  01.17.67
R0197   MOD NO:  0                                                                   LOG SECTION:    TIME OF FREE FALL
R0199   MOD BY:  RR BAIRNSFATHER
R0200   MOD NO:  1           MOD BY:  RR BAIRNSFATHER     DATE:  11 APR 67
R0201   MOD NO:  2           MOD BY:  RR BAIRNSFATHER     DATE:  21 MAR 68           ACCEPT DIFFERENT EARTH/MOON SCALES
R0203                                                                                ALSO IMPROVE ACCURACY OF RAPO.
R0205   FUNCTIONAL DESCRIPTION:          USED BY CALCTPER AND TFF DISPLAYS TO CALCULATE PERIGEE RADIUS AND ALSO
R0207            APOGEE RADIUS FOR A GENERAL CONIC.
R0208            PROGRAM GIVES PERIGEE RADIUS AS                  APOGEE RADIUS IS GIVEN BY
R0210                   RP = P /(1+E)                                   RA = (1+E) / ALFA
R0212            WHERE   2
R0213                   E  = 1 - P ALFA
R0214            IF RA IS NEGATIVE OR SHOWS DIVIDE OVERFLOW, THEN RA = POSMAX BECAUSE
R0216                   1. APOGEE RADIUS IS NOT MEANINGFUL FOR HYPERBOLA
R0217                   2. APOGEE RADIUS IS NOT DEFINED FOR PARABOLA
R0218                   3. APOGEE RADIUS EXCEEDS THE SCALING FOR ELLIPSE.
R0219            THIS SUBROUTINE REQUIRES THE SIGNED  RECIPROCAL SEMI MAJ AXIS,  ALFA,  AND SEMI LATUS RECTUM AS DATA.
R0221   CALLING SEQUENCE:  CALL
R0222                                TFFRP/RA
R0223            PUSHLOC = PDL+0, ARBITRARY IF LEQ 10D
R0224            C(MPAC) UNSPECIFIED

R0225   SUBROUTINES CALLED:  NONE
R0226   NORMAL EXIT MODE:    RVQ
R0227            IF ELLIPSE, WITHIN NORMAL SCALING, RAPO IS CORRECT.
R0228            OTHERWISE, RAPO = POSMAX.
R0229   ALARMS:  NONE
R0230   OUTPUT:  STORED IN PUSH LIST AREA. SCALE OF OUTPUT AGREES WITH DATA SUPPLIED TO  TFF/CONIC.
R0232            RPER   E:(-29)  M:(-27)  M      PERIGEE RADIUS                      DESTROYED BY CALCTFF/CALCTPER, TFFTRIG.
R0234            RAPO   E:(-29)  M:(-27)  M      APOGEE  RADIUS                      WILL BE DESTROYED BY CALCTFF/CALCTPER
R0236            PUSHLOC AT PDL+0
R0237   ERASABLE INITIALIZATION REQUIRED:
R0238            TFFALFA E:(26-NR)      M   1/SEMI MAJ AXIS                          LEFT BY TFFCONIC
R0240                    M:(24-NR)
R0241            TFFNP  E: (-38+2NR)    M  LC P, SEMI LATUS RECTUM                   LEFT BY TFFCONIC
R0243                   M: (-36+2NR)
R0244            X1                     -NR, NORM COUNT OF RMAG                      LEFT BY TFFCONIC
R0246            X2                     -NA, NORM COUNT OF ALFA                      LEFT BY TFFCONIC
R0248   DEBRIS:  QPRET,     PDL+0 ... PDL+1
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P0249
 0250                             0020          RAPO     =      16D            APOGEE RADIUS  M  E:(-29)  M:(-27)
 0251                             0016          RPER     =      14D            PERIGEE RADIUS  M  E:(-29)  M:(-27)
A0252
 0253                     27,3220     41345 0   TFFRP/RA DLOAD  DMP
 0254   REF   2  LAST 1375  27,3221     00033 1                     TFFALFA        ALFA  1/M  E:(26-NR)   M:(24-NR)
 0255   REF   3  LAST 1374  27,3222     00035 1                     TFFNP          LC P  M   E:(-38+2NR)   M:(-36+2NR)
 0256                     27,3223     57457 0            SR*    DCOMP          ALFA P (-12+NR)
 0257                     27,3224     20571 0                   0 -8D,1        ALFA P  (-4)
 0258                     27,3225     51415 0            DAD    ABS            (DCOMP GIVES VALID TP RESULT FOR SQRT)
A0259                                                                          (ABS PROTECTS SQRT IF E IS VERY NEAR 0)
 0260   REF   6  LAST  938  27,3226     31771 1                     DP2(-4)
 0261                     27,3227     43366 0            SQRT   DAD            E SQ = (1- P ALFA)   (-4)
 0262   REF   3  LAST 1375  27,3230     15326 1                     TFF1/4
 0263                     27,3231     55206 0            PUSH   BDDV           (1+E)  (-2)  TO PDL+0
 0264   REF   4  LAST 1377  27,3232     00035 1                     TFFNP          LCP  M E:(-38+2NR)   M:(-36+2NR)
 0265                     27,3233     53657 0            SR*    SR*            (DOES SR THEN SL TO AVOID OVFL)
 0266                     27,3234     20601 1                   0,1            X1=-NR
 0267                     27,3235     20572 0                   0 -7,1         (EFFECTIVE SL)
 0268   REF   3  LAST  525  27,3236     14017 1            STODL  RPER           PERIGEE RADIUS  M   E:(-29)   M:(-27)
A0269                                                                          (1+E)  (-2)   FROM PDL+0
 0270                     27,3237     41005 1            DMP    BDV6
 0271   REF   2  LAST 1375  27,3240     00027 1                     TFF1/ALF       E:(-22-2NA)  M:(-20-2NA)
 0272   REF  11  LAST 1334  27,3241     57544 0                     TCDANZIG       CLEAR OVFIND, IF ON.
 0273                     27,3242     53654 0            BZE    SL*
 0274   REF   1             27,3243     57252 0                     MAXRA          SET POSMAX, IF ALFA=0
 0275                     27,3244     57603 0                   0 -5,2         -5+NA
 0276                     27,3245     40057 1            SL*    BOV
 0277                     27,3246     57576 1                   0,2
 0278   REF   2  LAST 1377  27,3247     57252 0                     MAXRA          SET POSMAX IF OVFL.
 0279                     27,3250     77644 1            BPL                   CONTINUE WITH VALID RAPO.
 0280                     27,3251     57254 0                   +3
 0281                     27,3252     77745 1   MAXRA    DLOAD                 RAPO CALC IS NOT VALID. SET RAPO =
 0282   REF   6  LAST  889  27,3253     15344 0                     NEARONE        POSMAX AS A TAG.
 0283   REF   1             27,3254     00021 1   +3       STORE  RAPO           APOGEE RADIUS  M   E:(-29)   M:(-27)
 0284                     27,3255     77616 0   DUMPRPRA RVQ

A0285                                                                                        30 W
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R0286   SUBROUTINE NAME:     CALCTPER  /  CALCTFF                              DATE:     01.29.67
R0288   MOD NO:  0                                                             LOG SECTION:    TIME OF FREE FALL
R0290   MOD BY:  RR BAIRNSFATHER
R0291   MOD NO:  1                   MOD BY:  RR BAIRNSFATHER      DATE:  21 MAR 67
R0292   MOD NO:  2                   MOD BY:  RR BAIRNSFATHER      DATE:  14 APR 67
R0293   MOD NO:  3                   MOD BY:  RR BAIRNSFATHER      DATE:  8JUL 67       NEAR EARTH MUE AND NEG TFF (GONEPAST)
R0295   MOD NO:  4                   MOD BY:  RR BAIRNSFATHER      DATE:  21 NOV 67     ADD VARIABLE MU.
R0297   MOD NO:  5                   MOD BY:  RR BAIRNSFATHER      DATE:  21 MAR 68     ACCEPT DIFFERENT EARTH/MOON SCALES
R0299   FUNCTIONAL DESCRIPTION:      PROGRAM CALCULATES THE FREE-FALL TIME OF FLIGHT FROM PRESENT POSITION  RN  AND
R0301            VELOCITY  VN  TO A RADIUS LENGTH SPECIFIED BY  RTERM  , SUPPLIED BY THE USER. THE POSITION VECTOR
R0303            RN  MAY BE ON EITHER SIDE OF THE CONIC, BUT  RTERM  IS CONSIDERED ON THE INBOUND SIDE.
R0305            THE EQUATIONS ARE

R0306                   Q2 = -SQRT(RTERM (2-RTERM ALFA) - LCP)   (INBOUND SIDE))        LEQ +- LCE/SQRT(ALFA)
R0308                        -  -
R0309                   Q1 = RN.VN / SQRT(MU)                                           LEQ +- LCE/SQRT(ALFA)

R0311                   Z = NUM / DEN                                                   LEQ +- 1/SQRT(ALFA)

R0313            WHERE, IF INBOUND
R0314                   NUM = RTERM - RN                                                LEQ +- 2 LCE/ALFA
R0316                   DEN = Q2+Q1                                                     LEQ +- 2 LCE/SQRT(ALFA)

R0318            AND, IF OUTBOUND
R0319                   NUM = Q2-Q1                                                     LEQ +- 2 LCE/SQRT(ALFA)
R0321                   DEN = 2 - ALFA (RTERM + RN) .                                   LEQ +- 2 LCE

R0323            IF     ALFA ZZ  <  1.0             (FOR ALL CONICS EXCEPT ELLIPSES HAVING ABS(DEL ECC ANOM) G 90 DEG)

R0325            THEN   X = ALFA Z Z
R0326            AND    TFF = (RTERM +RN -2 ZZ T(X) ) Z/SQRT(MU)

R0327                   EXCEPT IF ALFA PNZ, AND IF TFF NEG,
R0328                   THEN   TFF = 2 PI /(ALFA SQRT(ALFA)) + TFF

R0329            OR IF  ALFA ZZ  GEQ  1.0           (FOR ELLIPSES HAVING ABS(DEL ECC ANOM) GEQ 90 DEG)

R0331            THEN   X = 1/ALFA Z Z
R0332            AND    TFF = (PI/SQRT(ALFA) -Q2 +Q1 +2(X T(X) -1) /ALFA Z) /ALFA SQRT(MU)

R0334            WHERE  T(X) IS A POLYNOMIAL APPROXIMATION TO THE SERIES
R0335                              2     2                        2
R0336                   1/3 -X/5 +X /7 -X /9 ...                 (X   <  1.0)

R0337   CALLING SEQUENCE:  TIME TO RTERM                        TIME TO PERIGEE
R0339                      CALL                                 CALL
R0340                             CALCTFF                              CALCTPER
R0342                      C(MPAC) = TERMNL RAD  M              C(MPAC) = PERIGEE RAD  M
R0344            FOR EITHER,   E: (-29)    M: (-27)
R0345            FOR EITHER, PUSHLOC = PDL+0 , ARBITRARY IF LEQ 8D.
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L         TIME OF FREE FALL                                                                          USER'S PAGE NO.   9       EC S3

R0346     SUBROUTINES CALLED:  T(X),  VIA RTB
R0347     NORMAL EXIT MODE:  RVQ
R0348                HOWEVER, PROGRAM EXITS WITH ONE OF THE FOLLOWING VALUES FOR TFF (-28) CS  IN MPAC. USER MUST STORE.
R0350                        A.  TFF= FLIGHT TIME. NORMAL CASE FOR POSITIVE FLIGHT TIME LESS THAN ONE ORBITAL PERIOD.
R0352                        B.  (THIS OPTION IS NO LONGER USED.)
R0353                        C.  TFF = POSMAX.  THIS INDICATES THAT THE CONIC FROM THE PRESENT POSITION WILL NOT RETURN TO
R0355                            THE SPECIFIED ALTITUDE.  ALSO INDICATES OUTBOUND PARABOLA OR HYPERBOLA.
R0357     OUTPUT:    C(MPAC)  (-28)  CS       TIME OF FLIGHT, OR TIME TO PERIGEE
R0358                TFFX      (0)            X,                                      LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0360                NRTERM   E: (-29+NR)     M  RTERM, WEIGHTED BY NR                LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0362                          M: (-27+NR)
R0363                TFFTEM   E: (-59+2NR)    LCP Z Z SGN(SDELF)                      LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0365                          M: (-55+2NR)   LCP /ALFA SGN(SDELF)                    LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0367                NOTE:  TFFTEM = PDL 36D AND WILL BE DESTROYED BY .:UNIT:.
R0368                RMAG1  E:(-29)  M:(-27)  PDL 12 NOT TOUCHED.
R0369                TFFQ1  E:(-16)  M:(-15)  PDL 14D
R0370                TFFDELQ E:(-16) M:(-15)  PDL 10D
R0371                PUSHLOC AT PDL+0
R0372     ERASABLE INITIALIZATION REQUIRED:
R0373                RONE    E:(-29)  M:(-27)  M   STATE VECTOR                       LEFT BY USER
R0375                VONE'  E:(+10)  M:(+9)    VN/SQRT(MU)                            LEFT BY TFF/CONIC
R0377                RMAG1  E:(-29)  M:(-27)  PRESENT RADIUS,  M                      LEFT BY TFFCONIC
R0379                C(MPAC)E:(-29)  M:(-27)  RTERM, TERMINAL RADIUS LENGTH, M        LEFT BY USER

R0381                THE FOLLOWING ARE STORED IN THE PUSH LIST AREA.
R0382                TFF/RTMU  E:(17)  M:(14)  1/SQRT(MU)                             LEFT BY TFFCONIC.
R0384                NRMAG  E: (-29+NR)  M  RMAG, NORMALIZED                          LEFT BY TFFCONIC
R0386                        M: (-27+NR)
R0387                X1                        -NR, NORM COUNT                        LEFT BY TFFCONIC
R0389                TFFNP  E: (-38+2NR)  M   LCP, SEMI LATUS RECTUM, WEIGHT  NR      LEFT BY TFFCONIC
R0391                        M: (-36+2NR)
R0392                TFFALFA  E: (26-NR)     1/M  ALFA, WEIGHT  NR                    LEFT BY TFFCONIC
R0394                           M: (24-NR)
R0395                TFFRTALF  E:(10+NA)     SQRT(ALFA), NORMALIZED                   LEFT BY TFFCONIC
R0397                            M:(9+NA)
R0398                X2                        -NA, NORM COUNT                        LEFT BY TFFCONIC
R0400                TFF1/ALF  E: (-22-2NA)  SIGNED SEMIMAJ AXIS, WEIGHTED BY NA      LEFT BY TFFCONIC
R0402                            M: (-20-2NA)
R0403     DEBRIS:    QPRET,    PDL+0 ... PDL+3
R0404                RTERM  E:(-29)  M:(-27)  RTERM, TERMINAL RADIUS LENGTH
R0405                RAPO   E:(-29)  M:(-27)  PDL 16D  (=NRTERM)
R0406                RPER   E:(-29)  M:(-27)  PDL 14D   (=TFFQ1)
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P0407
 0408                        27,3256  77614 1  CALCTPER SETGO                ENTER WITH RPER  IN MPAC
 0409   REF   1              27,3257  03436 0                   TFFSW
 0410                        27,3260  57263 1                   +3
 0411                        27,3261  77614 1  CALCTFF  CLEAR                ENTER WITH RTERM IN MPAC
 0412   REF   2  LAST 1380   27,3262  03676 0                   TFFSW
 0413   REF   3  LAST  814   27,3263  00023 0  +3       STORE   RTERM        E: (-29)  M: (-27)
 0414                        27,3264  77657 0           SL*
 0415                        27,3265  20201 0                   0,1          X1=-NR
 0416   REF   6  LAST  819   27,3266  00021 1           STORE   NRTERM       RTERM  E: (-29+NR)  M: (-27+NR)
 0417                        27,3267  44205 0           DMP     BDSU
 0418   REF   3  LAST 1377   27,3270  00033 1                   TFFALFA      ALFA  E: (26-NR)  M: (24-NR)
 0419   REF   4  LAST 1377   27,3271  15326 1                   TFF1/4
 0420                        27,3272  41206 0           PUSH    DMP          (2-ALFA RTERM)  (-3)  TO PDL+0
 0421   REF   7  LAST 1380   27,3273  00021 1                   NRTERM       E: (-29+NR)  M: (-27+NR)
 0422                        27,3274  53725 1           PDDL    SR*          RTERM(2-ALFA RTERM) TO PDL+2
A0423                                                                        E: (-32+NR)   M: (-30+NR)
 0424   REF   5  LAST 1377   27,3275  00035 1                   TFFNP        LC P  E:(-38+2NR)  M:(-36+2NR)
 0425                        27,3276  20573 1                   0 -6,1       X1 = -NR
 0426                        27,3277  43276 0           DCOMP   DAD          DUE TO SHIFTS, KEEP PRECISION FOR SQRT
A0427                                                                        RTERM(2-ALFA RTERM) FROM PDL+2
A0428                                                                        E: (-32+NR)  M: (-30+NR)
 0429                        27,3300  77657 0           SR*                  LEAVE  E: (-32)  M: (-30)
 0430                        27,3301  20601 1                   0,1          X1 = -NR
 0431                        27,3302  71214 0           BOFF    DLOAD        CHECK TFF / TPER SWITCH
 0432   REF   3  LAST 1380   27,3303  03756 0                   TFFSW
 0433                        27,3304  57306 0                   +2           IF TFF, CONTINUE
 0434   REF   1              27,3305  15336 0                   TFFZEROS     IF TPER, SET Q2 = 0
 0435                        27,3306  75440 0  +2       BMN     SQRT         E: (-16)  M: (-15)

 0436   REF   1              27,3307  57441 1                   MAKTFF1      NO FREE FALL CONIC TO RTERM FROM HERE
A0437                                                                        RESET PDL, SET TFF=POSMAX, AND EXIT.

 0438                        27,3310  41076 0           DCOMP   BOVB         RT IS ON INBOUND SIDE.  ASSURE OVFIND=0
 0439   REF  12  LAST 1377   27,3311  57544 0                   TCDANZIG     ANY PORT IN A STORM.
 0440   REF   3  LAST  820   27,3312  24045 0           STOVL   TFFTEM       Q2   E: (-16)  M: (-15)
 0441   REF   4  LAST 1374   27,3313  02362 1                   VONE'        VN/SQRT(MU) E: (10)  M: (9)
 0442                        27,3314  52441 1           DOT     SL3
 0443   REF  17  LAST 1374   27,3315  02320 1                   RONE         SAVED RN.  E: (-29)  M: (-27)
 0444   REF   1              27,3316  00017 1           STORE   TFFQ1        Q1, SAVE FOR GONEPAST TEST.
A0445                                                                        E: (-16)  M: (-15)
 0446                        27,3317  44240 1           BMN     BDSU
 0447   REF   1              27,3320  57341 0                   INBOUND      USE ALTERNATE Z
 0448   REF   4  LAST 1380   27,3321  00045 0                   TFFTEM       Q2  E: (-16)  M: (-15)

A0449                                          OUTBOUND  Z CALC CONTINUES HERE

 0450   REF   2  LAST  819   27,3322  14043 0           STODL   TFFX         NUM=Q2-Q1  E: (-16)  M: (-15)
 0451   REF   4  LAST 1380   27,3323  00033 1                   TFFALFA      ALFA  E: (26-NR)  M: (24-NR)
 0452                        27,3324  44205 0           DMP     BDSU
 0453   REF   7  LAST 1374  27,3325   00041 1                    NRMAG           RMAG  E: (-29+NR)  M: (-27+NR)
A0454                                                                            (2-RTERM ALFA)  (-3) FROM PDL+0
 0455                       27,3326   51406 1   SAVEDEN   PUSH   ABS             DEN TO PDL+0  E: (-3) OR (-16)
A0456                                                                                          M: (-3) OR (-15)
 0457                       27,3327   40015 1             DAD    BOV             INDETERMINANCY TEST
 0458   REF   1             27,3330   31763 1                    LIM(-22)        =1.0-B(-22)
 0459   REF   1             27,3331   57352 1                    TFFXTEST        GO IF DEN >/= B(-22)
 0460                       27,3332   65345 0             DLOAD  PDDL            SET DEN=0  OTHERWISE
 0461   REF   2  LAST 1380  27,3333   15336 0                    TFFZEROS
A0462                                                                            XCH ZERO WITH PDL+0
 0463                       27,3334   57545 1             DLOAD  DCOMP
 0464   REF   5  LAST 1380  27,3335   00033 1                    TFFALFA         ALFA  E: (26-NR)  M: (24-NR)
 0465                       27,3336   71240 1             BMN    DLOAD           FOR TPER: Z INDET AT DELE/2=0 AND 90.
 0466   REF   1             27,3337   57446 0                    TFFELI          ASSUME 90, AND LEAVE 0 IN PDL: 1/Z=0/N

A0467                                                                            Z INDET. AT PERIGEE FOR PARAB OR HYPERB.
 0468                       27,3340   77616 0   DUMPTFF1  RVQ                    RETURN  TFF =0

A0469                                           INBOUND   Z  CALC CONTINUES HERE
 0470                       27,3341   77745 1   INBOUND   DLOAD                  RESET PDL+0
 0471                       27,3342   45345 1             DLOAD  DSU             ALTERNATE Z CALC
 0472   REF   4  LAST 1380  27,3343   00023 0                    RTERM           E: (-29)  M: (-27)
 0473   REF   2  LAST 1374  27,3344   00015 0                    RMAG1           E: (-29)  M: (-27)
 0474   REF   3  LAST 1380  27,3345   14043 0             STODL  TFFX            NUM=RTERM-RN  E: (-29)  M: (-27)
 0475   REF   5  LAST 1380  27,3346   00045 0                    TFFTEM          Q2  E: (-16)  M: (-15)
 0476                       27,3347   52015 1             DAD    GOTO
 0477   REF   2  LAST 1380  27,3350   00017 1                    TFFQ1           Q1  E: (-16)  M: (-15)
 0478   REF   1             27,3351   57326 1                    SAVEDEN         DEN = Q2+Q1   E: (-16)  M: (-15)

 0479                       27,3352   65215 1   TFFXTEST  DAD    PDDL             (ABS(DEN) TO PDL+2))  E: (-3) OR (-16)
A0480                                                                                                   M: (-3) OR (-15)
 0481   REF   1             27,3353   31765 1                    DP(-22)         RESTORE ABS(DEN) TO MPAC
 0482   REF   4  LAST 1381  27,3354   00043 0                    TFFX            NUM E:(-16) OR (-29)  M:(-15) OR (-27)
 0483                       27,3355   53605 1             DMP    SR*
 0484   REF   2  LAST 1375  27,3356   00031 0                    TFFRTALF        SQRT(ALFA)  E: (10+NA)  M: (9+NA)
 0485                       27,3357   57201 0                    0 -3,2          X2=-NA
 0486                       27,3360   77671 1             DDV                    C(MPAC) =NUM SQRT(ALFA)  E:(-3) OR (-16)
A0487                                                                                                     M:(-3) OR (-15)
A0488                                                                            ABS(DEN) FROM PDL+2  E:(-3) OR (-16)
A0489                                                                                                 M:(-3) OR (-15)
 0490                       27,3361   40145 0             DLOAD  BOV             (THE DLOAD IS SHARED WITH TFFELL)
 0491   REF   5  LAST 1381  27,3362   00043 0                    TFFX            NUM  E: (-16) OR (-29)  M:(-15) OR (-27)
 0492   REF   1             27,3363   57444 1                    TFFELL          USE EQN FOR DELE GEQ 90, LEQ -90

A0493                                           OTHERWISE, CONTINUE FOR GENERAL CONIC FOR TFF EQN

 0494                       27,3364   45471 1             DDV    STADR
A0495                                                                            DEN FROM PDL+0   E: (-3) OR (-16)
A0496                                                                                             M: (-3) OR (-15)
 0497   REF   6  LAST 1381  27,3365   77732 1             STORE  TFFTEM          Z  SAVE FOR SIGN OF SDELF.
```

```
A0498                                                                   E: (-13)  M: (-12)
 0499                        27,3366   63406 0          PUSH    DSQ     Z TO PDL+0
 0500                        27,3367   41206 0          PUSH    DMP     Z SQ TO PDL+2  E: (-26)  M: (-24)
 0501  REF   6  LAST 1380    27,3370   00035 1                  TFFNP   LC P  E: (-38+2NR)  M: (-36+2NR)
 0502                        27,3371   75261 0          SL      SIGN
 0503                        27,3372   20206 1                  5
 0504  REF   7  LAST 1381    27,3373   00045 0                  TFFTEM  AFFIX SIGN FOR SDELF (ENTRY DISPLAY)
 0505  REF   8  LAST 1382    27,3374   14045 0          STODL   TFFTEM  P ZSQ  E: (-59+2NR)  M: (-55+2NR)
A0506                                                                   (ARG IS USED IN TFF/TRIG)
A0507                                                                   ZSQ FROM PDL+2   E: (-26)  M: (-24)
 0508                        27,3375   41206 0          PUSH    DMP     RESTORE PUSH LOC
 0509  REF   6  LAST 1381    27,3376   00033 1                  TFFALFA ALFA  E: (26-NR)  M: (24-NR)
 0510                        27,3377   77657 0          SL*
 0511                        27,3400   20201 0                  0,1     X1=-NR
 0512  REF   6  LAST 1381    27,3401   00043 0          STORE   TFFX    X
 0513                        27,3402   41234 1          RTB     DMP
 0514  REF   1               27,3403   57526 1                  T(X)     POLY
A0515                                                                   ZSQ FROM PDL+2  E: (-26)  M: (-24)
 0516                        27,3404   44302 0          SR2     BDSU    2 ZSQ T(X)  E: (-29)  M: (-27)
 0517  REF   5  LAST 1381    27,3405   00023 0                  RTERM   RTERM  E: (-29)  M: (-27)
 0518                        27,3406   41215 1          DAD     DMP
 0519  REF   3  LAST 1381    27,3407   00015 0                  RMAG1   E: (-29)  M: (-27)
A0520                                                                   Z FROM PDL+0  E: (-13)  M: (-12)
 0521                        27,3410   51042 0          SR3     BPL     TFF SQRT(MU)   E: (-45)  M: (-42)
 0522  REF   1               27,3411   57432 0                  ENDTFF  (NO PUSH UP)
 0523                        27,3412   75206 1          PUSH    SIGN    TFF SQRT(MU)  TO PDL+0
 0524  REF   3  LAST 1381    27,3413   00017 1                  TFFQ1   Q1 FOR GONEPAST TEST
 0525                        27,3414   71244 0          BPL     DLOAD   GONE PAST ?
 0526  REF   1               27,3415   57436 1                  NEGTFF  YES. TFF < 0 .
 0527  REF   3  LAST 1377    27,3416   00027 1                  TFF1/ALF 1/ALFA  E: (-22-2NA)  M: (-20-2NA)
 0528                        27,3417   51076 1          DCOMP   BPL     ALFA > 0 ?
 0529  REF   2  LAST 1382    27,3420   57436 1                  NEGTFF  NO. TFF IS NEGATIVE.

A0530                                             CORRECT FOR ORBITAL PERIOD.

 0531                        27,3421   77676 0          DCOMP           YES. CORRECT FOR ORB PERIOD.
 0532                        27,3422   56205 0          DMP     DDV
 0533  REF   1               27,3423   31761 0                  PI/16   2 PI (-5)
 0534  REF   3  LAST 1381    27,3424   00031 0                  TFFRTALF SQRT(ALFA)  E: (10+NA)  M: (9+NA)
 0535                        27,3425   53657 0          SL*     SL*
 0536                        27,3426   57602 1                  0 -4,2  X2=-NA
 0537                        27,3427   57602 1                  0 -4,2
 0538                        27,3430   43257 0          SL*     DAD
 0539                        27,3431   57576 1                  0,2
A0540                                                                   TFF SQRT(MU) FROM PDL+0  E:(-45) M:(-42)
 0541                        27,3432   40005 0  ENDTFF  DMP     BOV     TFF SQRT(MU) IN MPAC     E:(-45) M:(-42)
 0542  REF   6  LAST 1374    27,3433   00037 0                  TFF/RTMU E: (17)  M: (14)
 0543  REF   1               27,3434   57442 1                  MAXTFF  SET POSMAX IF OVFL.

 0544                        27,3435   77616 0  DUMPTFF2 RVQ            RETURN  TFF  (-28) CS IN MPAC.
```

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L        TIME OF FREE FALL                                                                    USER'S PAGE NO.  13       E0 S3

 0545                         27,3436   77745 1  NEGTFF    DLOAD
A0546                                                                        TFF SQRT(MU)  FROM PDL+0 , NEGATIVE.
 0547                         27,3437   77650 1            GOTO
 0548    REF   2  LAST 1382   27,3440   57432 0                      ENDTFF

 0549                         27,3441   77745 1  MAXTFF1   DLOAD                 RESET PDL
 0550                         27,3442   43545 1  MAXTFF    DLOAD     RVQ
 0551    REF   7  LAST 1377   27,3443   15344 0                      NEARONE

R0552    TIME OF FLIGHT ELLIPSE WHEN DEL (ECCENTRIC ANOM) GEQ 90 AND LEQ -90.

A0553                                                                        NUM FROM TFFX.  E: (-16) OR (-29)
A0554                                                                                        M: (-15) OR (-27)
 0555                         27,3444   77712 0  TFFELL    SL2                   NUM  E:(-14) OR (-27)  M:(-13) OR (-25)
 0556                         27,3445   41465 0            BDDV      PUSH        TEMP SAVE D/N IN PDL+0
A0557                                                                        DEN FROM PDL+0 E:(-3)/(-16) M:(-3)/(-15)
A0558                                                                        N/D TO PDL+0  E: (11)  M: (10)
 0559                         27,3446   45345 1  TFFEL1    DLOAD     DSU         (ENTER WITH D/N=0 IN PDL+0)
 0560    REF   9  LAST 1382   27,3447   00045 0                      TFFTEM      Q2  E: (-16)  M: (-15)
 0561    REF   4  LAST 1382   27,3450   00017 1                      TFFQ1       Q1  E: (-16)  M: (-15)
 0562    REF   1              27,3451   14013 0            STODL     TFFDELQ     Q2-Q1  E: (-16)  M: (-15)
A0563                                                                        D/N FROM PDL+0
 0564                         27,3452   77626 0            STADR
 0565    REF  10  LAST 1383   27,3453   77732 1            STORE     TFFTEM      D/N  E: (11)  M: (10)
 0566                         27,3454   53605 1            DMP       SL*
 0567    REF   4  LAST 1382   27,3455   00027 1                      TFF1/ALF    1/ALFA E: (-22-2NA)  M: (-20-2NA)
 0568                         27,3456   57576 1                      0,2         1/ALFA Z  E: (-11-NA)  M: (-10-NA)
 0569                         27,3457   41206 0            PUSH      DMP         TO PDL+0
 0570    REF  11  LAST 1383   27,3460   00045 0                      TFFTEM      1/Z  E: (11)  M: (10)
 0571                         27,3461   41057 0            SL*       BOVB
 0572                         27,3462   57576 1                      0,2         X2= -NA
 0573    REF  16  LAST 1324   27,3463   45761 0                      SIGNMPAC    IN CASE X= 1.0, CONTINUE
 0574    REF   7  LAST 1382   27,3464   00043 0            STORE     TFFX        X=1/ALFA ZSQ
 0575                         27,3465   41234 1            RTB       DMP
 0576    REF   2  LAST 1382   27,3466   57526 1                      T(X)        POLY
 0577    REF   8  LAST 1383   27,3467   00043 0                      TFFX
 0578                         27,3470   45242 1            SR3       DSU
 0579    REF   2  LAST  938   27,3471   31767 0                      DP2(-3)
 0580                         27,3472   41405 0            DMP       PUSH        2(X T(X)-1) /Z ALFA  E: (-15-NA)
A0581                                                                                             M: (-14-NA)
A0582                                                                        1/ALFA Z FROM PDL+0  E: (-11-NA)
A0583                                                                                             M: (-10-NA)
 0584                         27,3473   41345 0            DLOAD     DMP         GET SIGN FOR SDELF
 0585    REF  12  LAST 1383   27,3474   00045 0                      TFFTEM      1/Z  E: (11)  M: (10)
 0586    REF   4  LAST 1382   27,3475   00015 0                      RMAG1       E: (-29)  M: (-27)
 0587                         27,3476   43312 0            SL2       DAD
 0588    REF   5  LAST 1383   27,3477   00017 1                      TFFQ1       Q1  E: (-16)  M: (-15)
 0589    REF  13  LAST 1383   27,3500   14045 0            STODL     TFFTEM      (Q1+R 1/Z)  =SGN OF SDELF E:(-16) M:(-15
 0590    REF   7  LAST 1382   27,3501   00035 1                      TFFNP       LC P E: (-38+2NR) M: (-36+2NR)
 0591                         27,3502   53605 1            DMP       SL*         CALC FOR ARG FOR TFF/TRIG.
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L        TIME OF FREE FALL                                                                  USER'S PAGE NO.  14       E0 S3

 0592    REF   5  LAST 1383   27,3503   00027 1                 TFF1/ALF        1/ALFA   E:(-22-2NA)  M:(-20-2NA)
 0593                         27,3504   57575 1                 1,2             X2=-NA
 0594                         27,3505   53765 0         SIGN    SL*
 0595    REF  14  LAST 1383   27,3506   00045 0                 TFFTEM          AFFIX SIGN FOR SDELF
 0596                         27,3507   57576 1                 0,2
 0597    REF  15  LAST 1384   27,3510   14045 0         STODL   TFFTEM          P/ALFA  E:(-59+2NR)  M:(-55+2NR)
A0598                                                                           (ARG FOR USE IN TFF/TRIG)
 0599    REF   6  LAST 1384   27,3511   00027 1                 TFF1/ALF        1/ALFA E:(-22-2NA)  M:(-20-2NA)
 0600                         27,3512   41366 1         SQRT    DMP
 0601    REF   2  LAST 1382   27,3513   31761 0                 PI/16           PI (-4)
 0602                         27,3514   77615 0         DAD
A0603                                                                           2(XT(X)-1)/Z ALFA FROM PDL E:(-15-NA)
A0604                                                                                                      M:(-14-NA)
 0605                         27,3515   45257 0         SL*     DSU
 0606                         27,3516   57577 0                 0 -1,2
 0607    REF   2  LAST 1383   27,3517   00013 0                 TFFDELQ         Q2-Q1  E: (-16)  M: (-15)
 0608                         27,3520   53605 1         DMP     SL*
 0609    REF   7  LAST 1384   27,3521   00027 1                 TFF1/ALF        1/ALFA  E:(-22-2NA)  M:(-20-2NA)
 0610                         27,3522   57601 1                 0 -3,2
 0611                         27,3523   52057 1         SL*     GOTO
 0612                         27,3524   57602 1                 0 -4,2
 0613    REF   3  LAST 1383   27,3525   57432 0                 ENDTFF          TFF SQRT(MU) IN MPAC E:(-45) M:(-42)
```

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L        TIME OF FREE FALL                                                                USER'S PAGE NO.  15       E0 S3

P0614    PROGRAM NAME:       T(X)                                                      DATE:     01.17.67
R0616    MOD NO:  0                                                                    LOG SECTION:    TIME OF FREE FALL
R0618    MOD BY:  RR BAIRNSFATHER
R0619    FUNCTIONAL DESCRIPTION:       THE POLYNOMIAL T(X) IS USED BY TIME OF FLIGHT SUBROUTINES  CALCTFF AND
R0621             CALCTPER TO APPROXIMATE THE SERIES
R0622                                   2       3
R0623                     1/3 -X/5 +X /7 -X /9 ...

R0624             WHERE  X = ALFA Z Z          IF ALFA Z Z  LEQ 1
R0625                    X = 1/(ALFA Z Z )  IF ALFA Z Z    G  1

R0626             ALSO   X IS NEG FOR HYPERBOLIC ORBITS
R0627                    X = 0 FOR PARABOLIC ORBITS
R0628                    X IS POSITIVE FOR ELLIPTIC ORBITS
R0629             FOR FLIGHT 278, THE POLYNOMIAL  T(X) IS FITTED OVER THE RANGE  (0,+1)  AND HAS A MAXIMUM
R0631             DEVIATION FROM THE SERIES OF  2 E-5         (T(X) IS A CHEBYCHEV  TYPE FIT AND WAS OBTAINED USING
R0633             MAC PROGRAM AUTCURFIT294RRB  AND IS VALID TO THE SAME TOLERANCE OVER THE RANGE  (-.08,+1). )
R0635    CALLING SEQUENCE:  RTB
R0636                                T(X)
R0637             C(MPAC) = X

R0638    SUBROUTINES CALLED:  NONE
R0639    NORMAL EXIT MODE:    TC   DANZIG
R0640    ALARMS:  NONE
R0641    OUTPUT:  C(MPAC) = T(X)
R0642    ERASABLE INITIALIZATION REQUIRED:
R0643             C(MPAC)  =  X
R0644    DEBRIS:  NONE

 0645    REF  10  LAST 1292    27,3526  0 7171 1  T(X)      TC      POLY
 0646                          27,3527   00004 0            DEC     4                      N-1
 0647                          27,3530   12525 0            2DEC    3.333333333 E-1
 0647                          27,3531   12525 0
 0648                          27,3532   71463 0            2DEC*   -1.999819135 E-1 *
 0648                          27,3533   57703 1
 0649                          27,3534   04423 0            2DEC*   1.418148467  E-1 *
 0649                          27,3535   17645 0
 0650                          27,3536   74604 0            2DEC*   -1.01310997  E-1 *
 0650                          27,3537   43667 1
 0651                          27,3540   01626 1            2DEC*   5.609004986  E-2 *
 0651                          27,3541   37256 1
 0652                          27,3542   77404 1            2DEC*   -1.536156925 E-2 *
 0652                          27,3543   52071 0
 0653    REF  60  LAST 1316    27,3544  0 6030 1  ENDT(X)   TC      DANZIG

 0654    REF   1               27,3544            TCDANZIG =       ENDT(X)
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L         TIME OF FREE FALL                                                                       USER'S PAGE NO.  16       E0 S3

P0655     TFF CONSTANTS
 0657     REF    1                34,2000                           SETLOC TOF-FF1
 0658                             34,3756                           BANK

 06585    REF    1                                                  COUNT* $$/TFF
A0659                                                                             NOTE _   NOTE _ ADJUSTED MUE FOR NEAR EARTH TRAJ.

A0662                             34,3756   24775 1  MUBURU    2DEC*   15993752247E55B817* CUBEMODI6DED EARTH MU
 0662                             34,3757   30424 0
A0663                                                                             NOTE _   NOTE _ ADJUSTED MUE FOR NEAR EARTH TRAJ.

A0664                                                MUM       =       4.902 778  E8      M CUBE /CS SQ

A0665                                                RTMUM     2DEC*   2.21422176 E4 B-18*
 0666                             34,3760   06220 1  PI/16     2DEC    3.141592653 B-4
 0666                             34,3761   37553 0
 0667                             34,3762   37777 1  LIM(-22) 2OCT    37777 37700      1.0 -B(-22)
 0667                             34,3763   37700 1
 0668                             34,3764   00000 1  DP(-22)   2OCT    00000 00100      B(-22)
 0668                             34,3765   00100 0
 0669                             34,3766   04000 0  DP2(-3)   2DEC    1  B-3
 0669                             34,3767   00000 1
 0670                             34,3770   02000 0  DP2(-4)   2DEC    1 B-4            1/16
 0670                             34,3771   00000 1
R0671     RPAD1     2DEC    6373338 B-29     M  (-29)  =20 909 901.57 FT

 0672     REF    4  LAST  547   22,3172              RPAD1     =       RPAD
 0674     REF   12  LAST  941   26,3343              NEARONE   EQUALS DPPOSMAX
 0675     REF   31  LAST 1354   26,3335              TFFZEROS EQUALS HI6ZEROS
 0676     REF    4  LAST  941   26,3325              TFF1/4    EQUALS HIDP1/4
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    0002   REF    2  LAST   602   15,2000                     SETLOC STARTAB
    0003                          15,3437                     BANK

    0004   REF    1                                           COUNT* $$/STARS
    0500                          15,3437   15264 0           2DEC   +.8345006310 B-1      STAR 37   X
    0500                          15,3440   07253 1
    0501                          15,3441   74133 0           2DEC   -.2388718657 B-1      STAR 37   Y
    0501                          15,3442   45130 1
    0502                          15,3443   70034 1           2DEC   -.4965369357 B-1      STAR 37   Z
    0502                          15,3444   53644 1
    0503                          15,3445   15015 1           2DEC   +.8141988673 B-1      STAR 36   X
    0503                          15,3446   35262 1
    0504                          15,3447   67072 0           2DEC   -.5553601830 B-1      STAR 36   Y
    0504                          15,3450   57521 0
    0505                          15,3451   02552 1           2DEC   +.1692786800 B-1      STAR 36   Z
    0505                          15,3452   27310 0
    0506                          15,3453   07210 0           2DEC   +.4542117996 B-1      STAR 35   X
    0506                          15,3454   34714 1
    0507                          15,3455   67300 0           2DEC   -.5390337930 B-1      STAR 35   Y
    0507                          15,3456   47414 0
    0508                          15,3457   13262 0           2DEC   +.7093195408 B-1      STAR 35   Z
    0508                          15,3460   27671 1
    0509                          15,3461   05101 1           2DEC   +.3205423120 B-1      STAR 34   X
    0509                          15,3462   34175 0
    0510                          15,3463   70717 1           2DEC   -.4434583652 B-1      STAR 34   Y
    0510                          15,3464   46031 1
    0511                          15,3465   62467 0           2DEC   -.8370169081 B-1      STAR 34   Z
    0511                          15,3466   45023 1
    0512                          15,3467   10655 0           2DEC   +.5524232365 B-1      STAR 33   X
    0512                          15,3470   16340 1
    0513                          15,3471   63237 1           2DEC   -.7930716636 B-1      STAR 33   Y
    0513                          15,3472   45012 0
    0514                          15,3473   73711 1           2DEC   -.2566435348 B-1      STAR 33   Z
    0514                          15,3474   62337 1
    0515                          15,3475   07207 0           2DEC   +.4540867784 B-1      STAR 32   X
    0515                          15,3476   34100 1
    0516                          15,3477   61751 0           2DEC   -.8777450759 B-1      STAR 32   Y
    0516                          15,3500   60311 1
    0517                          15,3501   02344 0           2DEC   +.1528685033 B-1      STAR 32   Z
    0517                          15,3502   11437 1
    0518                          15,3503   03243 1           2DEC   +.2074288490 B-1      STAR 31   X
    0518                          15,3504   10132 0
    0519                          15,3505   62031 1           2DEC   -.8718956797 B-1      STAR 31   Y
    0519                          15,3506   55616 0
    0520                          15,3507   70716 0           2DEC   -.4435890882 B-1      STAR 31   Z
    0520                          15,3510   43617 0
    0521                          15,3511   01747 1           2DEC   +.1219537054 B-1      STAR 30   X
    0521                          15,3512   01335 0
    0522                          15,3513   63532 0           2DEC   -.7702168243 B-1      STAR 30   Y
    0522                          15,3514   54217 1
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L          STAR TABLES                                                                      USER'S PAGE NO.   2       E0 53

 0523                             15,3515   12010 0          2DEC    +.6260138474 B-1      STAR 30    Z
 0523                             15,3516   11614 1
 0524                             15,3517   76152 0          2DEC    -.1120382967 B-1      STAR 29    X
 0524                             15,3520   45651 1
 0525                             15,3521   60371 1          2DEC    -.9695442116 B-1      STAR 29    Y
 0525                             15,3522   57632 1
 0526                             15,3523   03370 0          2DEC    +.2177876068 B-1      STAR 29    Z
 0526                             15,3524   03556 1
 0527                             15,3525   76127 1          2DEC    -.1142900725 B-1      STAR 28    X
 0527                             15,3526   67425 0
 0528                             15,3527   72436 0          2DEC    -.3400201762 B-1      STAR 28    Y
 0528                             15,3530   61577 0
 0529                             15,3531   61041 0          2DEC    -.9334474056 B-1      STAR 28    Z
 0529                             15,3532   46271 1
 0530                             15,3533   72303 1          2DEC    -.3511952476 B-1      STAR 27    X
 0530                             15,3534   40213 0
 0531                             15,3535   62637 1          2DEC    -.8242322268 B-1      STAR 27    Y
 0531                             15,3536   74356 1
 0532                             15,3537   70711 1          2DEC    -.4441881743 B-1      STAR 27    Z
 0532                             15,3540   46567 1
 0533                             15,3541   67366 0          2DEC    -.5324545035 B-1      STAR 26    X
 0533                             15,3542   44175 1
 0534                             15,3543   64424 1          2DEC    -.7163035719 B-1      STAR 26    Y
 0534                             15,3544   41241 0
 0535                             15,3545   07156 1          2DEC    +.4510004372 B-1      STAR 26    Z
 0535                             15,3546   23036 0
 0536                             15,3547   63330 1          2DEC    -.7860186221 B-1      STAR 25    X
 0536                             15,3550   75735 1
 0537                             15,3551   67512 0          2DEC    -.5221457573 B-1      STAR 25    Y
 0537                             15,3552   62476 0
 0538                             15,3553   05227 0          2DEC    +.3309660611 B-1      STAR 25    Z
 0538                             15,3554   10611 0
 0539                             15,3555   64757 0          2DEC    -.6895375091 B-1      STAR 24    X
 0539                             15,3556   51701 0
 0540                             15,3557   71233 0          2DEC    -.4185354938 B-1      STAR 24    Y
 0540                             15,3560   53334 0
 0541                             15,3561   66425 1          2DEC    -.5910719617 B-1      STAR 24    Z
 0541                             15,3562   76017 0
 0542                             15,3563   66546 0          2DEC    -.5812217481 B-1      STAR 23    X
 0542                             15,3564   64151 0
 0543                             15,3565   73256 1          2DEC    -.2911759648 B-1      STAR 23    Y
 0543                             15,3566   65757 1
 0544                             15,3567   14120 1          2DEC    +.7598669864 B-1      STAR 23    Z
 0544                             15,3570   32444 1
 0545                             15,3571   61251 0          2DEC    -.9168160791 B-1      STAR 22    X
 0545                             15,3572   56124 0
 0546                             15,3573   72307 0          2DEC    -.3506241694 B-1      STAR 22    Y
 0546                             15,3574   65764 1
 0547                             15,3575   74742 0          2DEC    -.1910784362 B-1      STAR 22    Z
 0547                             15,3576   65735 0
 0548                            15,3577   70607 1           2DEC      -.4521486548 B-1       STAR 21    X
 0548                            15,3600   77742 0
 0549                            15,3601   77151 1           2DEC      -.0495728431 B-1       STAR 21    Y
 0549                            15,3602   74615 0
 0550                            15,3603   61600 0           2DEC      -.8905639377 B-1       STAR 21    Z
 0550                            15,3604   60003 1
 0551                            15,3605   60605 1           2DEC      -.9524366380 B-1       STAR 20    X
 0551                            15,3606   64345 1
 0552                            15,3607   77026 0           2DEC      -.0597677121 B-1       STAR 20    Y
 0552                            15,3610   54200 1
 0553                            15,3611   73160 1           2DEC      -.2988181236 B-1       STAR 20    Z
 0553                            15,3612   42475 1
 0554                            15,3613   60430 0           2DEC      -.9657334280 B-1       STAR 19    X
 0554                            15,3614   66614 1
 0555                            15,3615   00653 1           2DEC      +.0521664164 B-1       STAR 19    Y
 0555                            15,3616   13072 0
 0556                            15,3617   04042 0           2DEC      +.2542392790 B-1       STAR 19    Z
 0556                            15,3620   27232 1
 0557                            15,3621   62162 0           2DEC      -.8610673209 B-1       STAR 18    X
 0557                            15,3622   44274 0
 0558                            15,3623   07322 0           2DEC      +.4632386329 B-1       STAR 18    Y
 0558                            15,3624   33165 0
 0559                            15,3625   03265 0           2DEC      +.2096974909 B-1       STAR 18    Z
 0559                            15,3626   32741 1
 0560                            15,3627   63467 1           2DEC      -.7745052221 B-1       STAR 17    X
 0560                            15,3630   50064 0
 0561                            15,3631   11655 1           2DEC      +.6149043688 B-1       STAR 17    Y
 0561                            15,3632   11373 0
 0562                            15,3633   75477 1           2DEC      -.1484394758 B-1       STAR 17    Z
 0562                            15,3634   77366 1
 0563                            15,3635   70425 0           2DEC      -.4661511162 B-1       STAR 16    X
 0563                            15,3636   51217 1
 0564                            15,3637   07505 0           2DEC      +.4772744503 B-1       STAR 16    Y
 0564                            15,3640   32504 1
 0565                            15,3641   13726 0           2DEC      +.7449243154 B-1       STAR 16    Z
 0565                            15,3642   15341 0
 0566                            15,3643   72157 1           2DEC      -.3613649782 B-1       STAR 15    X
 0566                            15,3644   66255 0
 0567                            15,3645   11142 0           2DEC      +.5745656444 B-1       STAR 15    Y
 0567                            15,3646   32737 0
 0568                            15,3647   64200 1           2DEC      -.7343634472 B-1       STAR 15    Z
 0568                            15,3650   43016 1
 0569                            15,3651   71316 0           2DEC      -.4122762536 B-1       STAR 14    X
 0569                            15,3652   64201 0
 0570                            15,3653   16400 1           2DEC      +.9063680102 B-1       STAR 14    Y
 0570                            15,3654   36737 1
 0571                            15,3655   01364 1           2DEC      +.0923326629 B-1       STAR 14    Z
 0571                            15,3656   14350 1
 0572                            15,3657   75051 1           2DEC      -.1824340636 B-1       STAR 13    X
 0572                            15,3660   60001 0
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0573                    15,3661   17027 1         2DEC    +.9404062129 B-1     STAR 13    Y
0573                    15,3662   31661 1
0574                    15,3663   73321 0         2DEC    -.2869738089 B-1     STAR 13    Z
0574                    15,3664   43422 1
0575                    15,3665   77007 0         2DEC    -.0616090080 B-1     STAR 12    X
0575                    15,3666   51442 1
0576                    15,3667   11514 1         2DEC    +.6031289258 B-1     STAR 12    Y
0576                    15,3670   32502 1
0577                    15,3671   63215 1         2DEC    -.7952608559 B-1     STAR 12    Z
0577                    15,3672   47106 0
0578                    15,3673   02140 0         2DEC    +.1367280274 B-1     STAR 11    X
0578                    15,3674   02335 0
0579                    15,3675   12716 1         2DEC    +.6814364033 B-1     STAR 11    Y
0579                    15,3676   12356 1
0580                    15,3677   13401 0         2DEC    +.7189922632 B-1     STAR 11    Z
0580                    15,3700   37404 0
0581                    15,3701   03154 1         2DEC    +.2007345455 B-1     STAR 10    X
0581                    15,3702   15267 0
0582                    15,3703   17403 0         2DEC    +.9691236271 B-1     STAR 10    Y
0582                    15,3704   01743 0
0583                    15,3705   75552 1         2DEC    -.1431958012 B-1     STAR 10    Z
0583                    15,3706   76050 0
0584                    15,3707   05465 0         2DEC    +.3502769546 B-1     STAR  9    X
0584                    15,3710   17001 0
0585                    15,3711   16221 1         2DEC    +.8927907521 B-1     STAR  9    Y
0585                    15,3712   27572 1
0586                    15,3713   04420 0         2DEC    +.2832502918 B-1     STAR  9    Z
0586                    15,3714   14273 1
0587                    15,3715   06440 1         2DEC    +.4101921571 B-1     STAR  8    X
0587                    15,3716   11323 0
0588                    15,3717   07767 0         2DEC    +.4989947555 B-1     STAR  8    Y
0588                    15,3720   30366 1
0589                    15,3721   14155 0         2DEC    +.7633784305 B-1     STAR  8    Z
0589                    15,3722   23047 0
0590                    15,3723   13176 0         2DEC    +.7028937840 B-1     STAR  7    X
0590                    15,3724   03307 0
0591                    15,3725   13247 1         2DEC    +.7078988678 B-1     STAR  7    Y
0591                    15,3726   03342 1
0592                    15,3727   01070 1         2DEC    +.0694227718 B-1     STAR  7    Z
0592                    15,3730   26607 1
0593                    15,3731   10557 1         2DEC    +.5448995598 B-1     STAR  6    X
0593                    15,3732   32115 0
0594                    15,3733   10404 0         2DEC    +.5317389073 B-1     STAR  6    Y
0594                    15,3734   00124 0
0595                    15,3735   65500 1         2DEC    -.6483349473 B-1     STAR  6    Z
0595                    15,3736   72703 0
0596                    15,3737   00151 1         2DEC    +.0128995818 B-1     STAR  5    X
0596                    15,3740   25431 0
0597                    15,3741   00077 1         2DEC    +.0078096205 B-1     STAR  5    Y
0597                    15,3742   37176 0
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L         STAR TABLES                                                                  USER'S PAGE NO.   5       E0 S3

  0598                            15,3743   17777 0          2DEC    +.9998862988 B-1    STAR  5   Z
  0598                            15,3744   02143 0
  0599                            15,3745   07675 1          2DEC    +.4918322686 B-1    STAR  4   X
  0599                            15,3746   02702 0
  0600                            15,3747   03420 1          2DEC    +.2207092653 B-1    STAR  4   Y
  0600                            15,3750   01470 0
  0601                            15,3751   62414 1          2DEC    -.8422520048 B-1    STAR  4   Z
  0601                            15,3752   50541 1
  0602                            15,3753   07506 0          2DEC    +.4773424940 B-1    STAR  3   X
  0602                            15,3754   14361 0
  0603                            15,3755   01674 0          2DEC    +.1168141178 B-1    STAR  3   Y
  0603                            15,3756   36075 0
  0604                            15,3757   15736 1          2DEC    +.8709182540 B-1    STAR  3   Z
  0604                            15,3760   21775 1
  0605                            15,3761   16745 0          2DEC    +.9342466124 B-1    STAR  2   X
  0605                            15,3762   13112 1
  0606                            15,3763   02620 1          2DEC    +.1739271769 B-1    STAR  2   Y
  0606                            15,3764   31757 0
  0607                            15,3765   73011 0          2DEC    -.3113400137 B-1    STAR  2   Z
  0607                            15,3766   60052 0
  0608                            15,3767   15776 0          2DEC    +.8747608555 B-1    STAR  1   X
  0608                            15,3770   01237 0
  0609                            15,3771   00330 1          2DEC    +.0264803244 B-1    STAR  1   Y
  0609                            15,3772   35521 1
  0610                            15,3773   07573 1          2DEC    +.4838307948 B-1    STAR  1   Z
  0610                            15,3774   21256 0
  0611                            15,3775   16004 1  CATLOG  DEC     7172
```

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L        AGC BLOCK TWO SELF-CHECK                                               USER'S PAGE NO.   1       E0 S3

R0001    PROGRAM DESCRIPTION                                                   DATE  20 DECEMBER 1967
R0003    PROGRAM NAME -  SELF-CHECK                                            LOG SECTION AGC BLOCK TWO SELF-CHECK
R0005    MOD NO - 1                                                            ASSEMBLY SUBROUTINE UTILITYM REV 25
R0007    MOD BY - GAUNTT


R0008    FUNCTIONAL DESCRIPTION

R0009          PROGRAM HAS TWO MAIN PARTS. THE FIRST IS SELF-CHECK WHICH RUNS AS A ZERO PRIORITY JOB WITH NO CORE SET, AS
R0011    PART OF THE BACK-UP IDLE LOOP. THE SECOND IS SHOW-BANKSUM WHICH RUNS AS A REGULAR EXECUTIVE JOB WITH ITS OWN
R0013    STARTING VERB.
R0014          THE PURPOSE OF SELF-CHECK IS TO CHECK OUT VARIOUS PARTS OF THE COMPUTER AS OUTLINED BELOW IN THE OPTIONS.
R0016          THE PURPOSE OF SHOW-BANKSUM IS TO DISPLAY THE SUM OF EACH BANK , ONE AT A TIME.
R0020          IN ALL THERE ARE  7 POSSIBLE OPTIONS IN THIS BLOCK II VERSION OF SELF-CHECK. MORE DETAIL DESCRIPTION MAY BE
R0022    FOUND IN E-2065 BLOCK II AGC SELF-CHECK AND SHOW BANKSUM BY EDWIN D. SMALLY DECEMBER 1966, AND ADDENDA 2 AND 3.
R0024          THE DIFFERENT OPTIONS ARE CONTROLLED BY PUTTING DIFFERENT NUMBERS IN THE SMODE REGISTER (NOUN 27). BELOW IS
R0026    A DESCRIPTION OF WHAT PARTS OF THE COMPUTER THAT ARE CHECKED BY THE OPTIONS, AND THE CORRESPONDING NUMBER, IN
R0028    OCTAL, TO LOAD INTO SMODE.
R0032    +-4   ERASABLE MEMORY
R0033    +-5   FIXED MEMORY
R0034    +-1,2,3,6,7,10    EVERYTHING IN OPTIONS 4 AND 5.
R0036    -0    SAME AS +-10 UNTIL AN ERROR IS DETECTED.
R0037    +0    NO CHECK, PUTS COMPUTER INTO THE BACKUP IDLE LOOP.


R0038    WARNINGS

R0039          USE OF E MEMORY RESERVED FOR SELF-CHECK (EVEN IN IDLE LOOP) AS TEMP STORAGE BY OTHER PROGRAMS IS DANGEROUS.
R0041          SMODE SET GREATER THAN OCT 10 PUTS COMPUTER INTO BACKUP IDLE LOOP.


R0042    CALLING SEQUENCE

R0043          TO CALL SELF-CHECK KEY IN
R0044                V 21 N 27 E  OPTION NUMBER E
R0047          TO CALL SHOW-BANKSUM KEY IN
R0048                V 91 E          DISPLAYS FIRST BANK
R0049                V 33 E          PROCEED, DISPLAYS NEXT BANK


R0050    EXIT MODES, NORMAL AND ALARM

R0051          SELF-CHECK NORMALLY CONTINUES INDEFINITELY UNLESS THERE IS AN ERROR DETECTED. IF SO + OPTION NUMBERS PUT
R0053    COMPUTER INTO BACKUP IDLE LOOP, - OPTION NUMBERS RESTART THE OPTION.
R0054          THE -0 OPTION PROCEEDS FROM THE LINE FOLLOWING THE LINE WHERE THE ERROR WAS DETECTED.
R0057          SHOW-BANKSUM PROCEEDS UNTIL A TERMINATE IS KEYED IN (V 34 E). THE COMPUTER IS PUT INTO THE BACKUP IDLE LOOP
R0059


R0060    OUTPUT
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L         AGC BLOCK TWO SELF-CHECK                                                       USER'S PAGE NO.   2        E0 S3

R0061            SELF-CHECK UPON DETECTING AN ERROR LOADS THE SELF-CHECK ALARM CONSTANT (01102) INTO THE FAILREG SET AND
R0063     TURNS ON THE ALARM LIGHT. THE OPERATOR MAY THEN DISPLAY THE THREE FAILREGS BY KEYING IN V 05 N 09 E. FOR FURTHER
R0065     INFORMATION HE MAY KEY IN V 05 N 08 E, THE DSKY DISPLAY IN R1 WILL BE ADDRESS+1 OF WHERE THE ERROR WAS DETECTED,
R0067     IN R2 THE BBCON OF SELF-CHECK, AND IN R3 THE TOTAL NUMBER OF ERRORS DETECTED BY SELF-CHECK SINCE THE LAST MAN
R0069     INITIATED FRESH START (SLAP1).
R0073            SHOW-BANKSUM STARTING WITH BANK 0 DISPLAYS IN R1 THE BANK SUM (A +-NUMBER EQUAL TO THE BANK NUMBER), IN R2
R0075     THE BANK NUMBER, AND IN R3 THE BUGGER WORD.


R0076     ERASABLE INITIALIZATION REQUIRED

R0077            ACCOMPLISHED BY FRESH START
R0078                   SMODE SET TO +0


R0079     DEBRIS

R0080            ALL EXITS FROM THE CHECK OF ERASABLE (ERASCHK) RESTORE ORIGINAL CONTENTS TO REGISTERS UNDER CHECK.
R0082     EXCEPTION IS A RESTART. RESTART THAT OCCURS DURING ERASCHK RESTORES ERASABLE, UNLESS THERE IS EVIDENCE TO DOUBT
R0084     E MEMORY, IN WHICH CASE PROGRAM THEN DOES A FRESH START (DOFSTART).


  0086    REF    1                 43,2000                        SETLOC SELFCHEC
  0087                             43,3166                        BANK

  0088    REF    1                                                COUNT* $$/SELF
  0089    REF   62  LAST 1204        4770              SBIT1      EQUALS BIT1
  0090    REF   38  LAST 1204        4767              SBIT2      EQUALS BIT2
  0091    REF   42  LAST 1204        4766              SBIT3      EQUALS BIT3
  0092    REF   36  LAST 1204        4765              SBIT4      EQUALS BIT4
  0093    REF   31  LAST 1120        4764              SBIT5      EQUALS BIT5
  0094    REF   33  LAST 1161        4763              SBIT6      EQUALS BIT6
  0095    REF   38  LAST 1201        4762              SBIT7      EQUALS BIT7
  0096    REF   31  LAST 1226        4761              SBIT8      EQUALS BIT8
  0097    REF   25  LAST 1038        4760              SBIT9      EQUALS BIT9
  0098    REF   28  LAST 1204        4757              SBIT10     EQUALS BIT10
  0099    REF   31  LAST 1210        4756              SBIT11     EQUALS BIT11
  0100    REF   27  LAST 1204        4755              SBIT12     EQUALS BIT12
  0101    REF   40  LAST 1204        4754              SBIT13     EQUALS BIT13
  0102    REF   63  LAST 1366        4753              SBIT14     EQUALS BIT14
  0103    REF   45  LAST 1204        4752              SBIT15     EQUALS BIT15

  0104    REF  248  LAST 1331        4772              S+ZERO     EQUALS ZERO
  0105    REF   63  LAST 1393        4770              S+1        EQUALS BIT1
  0106    REF   39  LAST 1393        4767              S+2        EQUALS BIT2
  0107    REF   47  LAST 1368        6214              S+3        EQUALS THREE
  0108    REF   20  LAST 1366        4766              S+4        EQUALS FOUR
  0109    REF   27  LAST 1140        4773              S+5        EQUALS FIVE
  0110    REF   34  LAST 1369        6211              S+6        EQUALS SIX
  0111    REF   17  LAST 1204        4774              S+7        EQUALS SEVEN
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 0112   REF  13  LAST 1194      4350            S8BITS    EQUALS LOW8            00377
 0113   REF   9  LAST 1092      5004            CNTRCON   =      OCT50           USED IN CNTRCHK
 0114                        43,3166   00061 0  ERASCON1  OCTAL  00061           USED IN ERASCHK
 0115                        43,3167   01373 1  ERASCON2  OCTAL  01373           USED IN ERASCHK
 0116   REF   9  LAST 1204      5024            ERASCON6  =      OCT1400         USED IN ERASCHK
 0117   REF   4  LAST  632      5030            ERASCON3  EQUALS V06N49          USED IN ERASCHK
 0118                        43,3170   01773 0  ERASCON4  OCTAL  01773           USED IN ERASCHK
 0119   REF  17  LAST 1130      5041            S10BITS   EQUALS LOW10           01777, USED IN ERASCHK
 0120   REF   4  LAST  962      5050            SBNK03    EQUALS PRIO6           06000, USED IN ROPECHK
 0121   REF   6  LAST 1204      4344            -MAXADRS  =      HI5             FOR ROPECHK
 0122   REF   2  LAST  536      5010            SIXTY     EQUALS SUPER011
 0123                        43,3171   60017 1  SUPRCON   OCTAL  60017           USED IN ROPECHK
 0124                        43,3172   17777 0  S13BITS   OCTAL  17777
 0125                        43,3173   25252 0  CONC+S1   OCTAL  25252           USED IN CYCLSHFT
 0126                        43,3174   52400 1  CONC+S2   OCTAL  52400           USED IN CYCLSHFT
 0127                        43,3175   76777 1  ERASCON5  OCTAL  76777
 0128   REF   2  LAST  224      5736            S-7       =      OCT77770
 0129   REF   3  LAST 1114      6061            S-4       EQUALS NEG4
 0130   REF   4  LAST  578      7700            S-3       EQUALS NEG3
 0131   REF  10  LAST 1208      7701            S-2       EQUALS NEG2
 0132   REF  26  LAST 1204      7702            S-1       EQUALS NEGONE
 0133   REF  17  LAST 1102      4771            S-ZERO    EQUALS NEG0

 0134   REF  44  LAST 1235   E3,1400                      EBANK= LST1
 0135   REF   3  LAST  273   43,3176   01371 0  ADRS1     ADRES  SKEEP1
 0136   REF   4  LAST 1218   43,3177   03270 1  SELFADRS  ADRES  SELFCHK         SELFCHK RETURN ADDRESS. SHOULD BE PUT
A0137                                                                            IN SELFRET WHEN GOING FROM SELFCHK TO
A0138                                                                            SHOWSUM AND PUT IN SKEEP1 WHEN GOING
A0139                                                                            FROM SHOWSUM TO SELF-CHECK.

 0140   REF   6  LAST  198   43,3200  3 1360 0  PRERRORS  CA     ERESTORE        IS IT NECESSARY TO RESTORE ERASABLE
 0141                        43,3201  0 0006 1            EXTEND
 0142   REF   1              43,3202  1 3211 1            BZF    ERRORS          NO
 0143                        43,3203  0 0006 1            EXTEND
 0144   REF   3  LAST  198   43,3204  3 1376 1            DCA    SKEEP5
 0145   REF   3  LAST  198   43,3205  51'377 0            INDEX  SKEEP7
 0146                        43,3206  52 001 1            DXCH   0000            RESTORE THE TWO ERASABLE REGISTERS
 0147   REF   2  LAST  273   43,3207  3 4772 1            CA     S+ZERO
 0148   REF   7  LAST 1394   43,3210  55'360 1            TS     ERESTORE
 0149                        43,3211  0 0004 0  ERRORS    INHINT
 0150   REF 276  LAST 1317   43,3212  3 0002 0            CA     Q
 0151   REF   3  LAST  393   43,3213  55'357 0            TS     SFAIL           SAVE Q FOR FAILURE LOCATION
 0152   REF   4  LAST  788   43,3214  55'363 1            TS     ALMCADR         FOR DISPLAY WITH BBANK AND ERCOUNT
 0153   REF   3  LAST  194   43,3215  25'365 0            INCR   ERCOUNT         KEEP TRACK OF NUMBER OF MALFUNCTIONS.
 0154   REF   2  LAST  788   43,3216  0 5673 0  TCALARM2  TC     ALARM2
 0155                        43,3217   01102 0            OCT    01102           SELF-CHECK MALFUNCTION INDICATOR
 0156   REF   5  LAST  283   43,3220  11'362 0            CCS    SMODE
 0157   REF   3  LAST 1394   43,3221  3 4772 1  SIDLOOP   CA     S+ZERO
 0158   REF   6  LAST 1394   43,3222  55'362 0            TS     SMODE
 0159   REF   5  LAST 1394   43,3223  0 3270 1            TC     SELFCHK         GO TO IDLE LOOP
 0160   REF   4  LAST 1394   43,3224  0 1357 1             TC       SFAIL              CONTINUE WITH SELF-CHECK

 0161   REF 338  LAST 1369   43,3225  10 000 0  -1CHK      CCS      A
 0162   REF   1              43,3226  1 3200 1             TCF      PRERRORS
 0163   REF   2  LAST 1395   43,3227  1 3200 1             TCF      PRERRORS
 0164   REF 339  LAST 1395   43,3230  10 000 0             CCS      A
 0165   REF   3  LAST 1395   43,3231  1 3200 1             TCF      PRERRORS
 0166   REF 277  LAST 1394   43,3232  0 0002 0             TC       Q

 0167                        43,3233  0 0006 1  SMODECHK   EXTEND
 0168   REF   4  LAST 1394   43,3234  23'371 0             QXCH     SKEEP1
 0169   REF   1              43,3235  0 3264 1             TC       CHECKNJ            CHECK FOR NEW JOB
 0170   REF   7  LAST 1394   43,3236  11'362 0             CCS      SMODE
 0171   REF   1              43,3237  0 3244 0             TC       SOPTIONS
 0172   REF   1              43,3240  0 3235 0             TC       SMODECHK +2        TO BACKUP IDLE LOOP
 0173   REF   2  LAST 1395   43,3241  0 3244 0             TC       SOPTIONS
 0174   REF   2  LAST   87   43,3242  25'366 0             INCR     SCOUNT
 0175   REF   5  LAST 1395   43,3243  0 1371 0             TC       SKEEP1             CONTINUE WITH SELF-CHECK

 0176   REF   1              43,3244  6 5736 0  SOPTIONS   AD       S-7
 0177                        43,3245  0 0006 1             EXTEND
 0178                        43,3246  6 3250 0             BZMF     +2                 FOR OPTIONS BELOW NINE.
 0179   REF   1              43,3247  0 3221 0  BNKOPTN    TC       SIDLOOP            ILLEGAL OPTION.  GO TO IDLE LOOP.
 0180   REF   3  LAST 1395   43,3250  25'366 0             INCR     SCOUNT             FOR OPTIONS BELOW NINE.
 0181   REF   1              43,3251  6 4774 1             AD       S+7

 0182   REF 340  LAST 1395   43,3252  50 000 1             INDEX    A
 0183   REF   1              43,3253  0 3254 1             TC       SOPTION1
 0184   REF   6  LAST 1395   43,3254  0 1371 0  SOPTION1   TC       SKEEP1             WAS TC+TCF
 0185   REF   7  LAST 1395   43,3255  0 1371 0  SOPTION2   TC       SKEEP1             WAS IN:OUT1
 0186   REF   8  LAST 1395   43,3256  0 1371 0  SOPTION3   TC       SKEEP1             WAS COUNTCHK
 0187   REF   1              43,3257  0 3271 0  SOPTION4   TC       ERASCHK
 0188   REF   1              43,3260  0 3452 1  SOPTION5   TC       ROPECHK
 0189   REF   9  LAST 1395   43,3261  0 1371 0  SOPTION6   TC       SKEEP1
 0190   REF  10  LAST 1395   43,3262  0 1371 0  SOPTION7   TC       SKEEP1
 0191   REF  11  LAST 1395   43,3263  0 1371 0  SOPTON10   TC       SKEEP1             CONTINUE WITH SELF-CHECK

 0192                        43,3264  0 0006 1  CHECKNJ    EXTEND
 0193   REF   7  LAST 1220   43,3265  23'361 1             QXCH     SELFRET            SAVE RETURN ADDRESS WHILE TESTING NEWJOB
 0194   REF  56  LAST 1259   43,3266  0 4655 0             TC       POSTJUMP           TO SEE IF ANY JOBS HAVE BECOME ACTIVE.
 0195   REF   2  LAST 1215   43,3267   03177 0             CADR     ADVAN

 0196   REF   2  LAST 1395   43,3270  0 3233 0  SELFCHK    TC       SMODECHK           ** CHARLEY, COME IN HERE

R0197   SKEEP7 HOLDS LOWEST OF TWO ADDRESSES BEING CHECKED.
R0198   SKEEP6 HOLDS B(X+1).
R0199   SKEEP5 HOLDS B(X).
R0200   SKEEP4 HOLDS C(EBANK) DURING ERASLOOP AND CHECKNJ.
R0201   SKEEP3 HOLDS LAST ADDRESS BEING CHECKED (HIGHEST ADDRESS).
R0202   SKEEP2 CONTROLS CHECKING OF NON-SWITCHABLE ERASABLE MEMORY WITH BANK NUMBERS IN EB.
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L         AGC BLOCK TWO SELF-CHECK                                                         USER'S PAGE NO.  5       E3 S4

R0204     ERASCHK TAKES APPROXMATELY 7 SECONDS
 0205     REF    2  LAST  273   43,3271  3 4770 0  ERASCHK  CA       S+1
 0206     REF    3  LAST  273   43,3272  55'372 1           TS       SKEEP2
 0207     REF    4  LAST 1394   43,3273  3 4772 1  0EBANK   CA       S+ZERO
 0208     REF   35  LAST 1194   43,3274  54 003 0           TS       EBANK
 0209     REF    1              43,3275  3 5030 1           CA       ERASCON3         01461
 0210     REF    4  LAST 1394   43,3276  55'377 1           TS       SKEEP7           STARTING ADDRESS
 0211     REF    1              43,3277  3 5041 1           CA       S10BITS          01777
 0212     REF    3  LAST  273   43,3300  55'373 0           TS       SKEEP3           LAST ADDRESS CHECKED
 0213     REF    1              43,3301  0 3321 1           TC       ERASLOOP

 0214     REF    1              43,3302  3 5024 1  E1345678 CA       ERASCON6         01400
 0215     REF    5  LAST 1396   43,3303  55'377 1           TS       SKEEP7           STARTING ADDRESS
 0216     REF    2  LAST 1396   43,3304  3 5041 1           CA       S10BITS          01777
 0217     REF    4  LAST 1396   43,3305  55'373 0           TS       SKEEP3           LAST ADDRESS CHECKED
 0218     REF    2  LAST 1396   43,3306  0 3321 1           TC       ERASLOOP

 0219     REF    2  LAST 1396   43,3307  3 5024 1  2EBANK   CA       ERASCON6         01400
 0220     REF    6  LAST 1396   43,3310  55'377 1           TS       SKEEP7           STARTING ADDRESS
 0221     REF    1              43,3311  3 3170 1           CA       ERASCON4         01773
 0222     REF    5  LAST 1396   43,3312  55'373 0           TS       SKEEP3           LAST ADDRESS CHECKED
 0223     REF    3  LAST 1396   43,3313  0 3321 1           TC       ERASLOOP

 0224     REF    4  LAST 1396   43,3314  55'372 1  NOEBANK  TS       SKEEP2           +0
 0225     REF    1              43,3315  3 3166 0           CA       ERASCON1         00061
 0226     REF    7  LAST 1396   43,3316  55'377 1           TS       SKEEP7           STARTING ADDRESS
 0227     REF    1              43,3317  3 3167 1           CA       ERASCON2         01373
 0228     REF    6  LAST 1396   43,3320  55'373 0           TS       SKEEP3           LAST ADDRESS CHECKED

 0229                           43,3321  0 0004 0  ERASLOOP INHINT
 0230     REF   36  LAST 1396   43,3322  3 0003 1           CA       EBANK            STORES C(EBANK)
 0231     REF    3  LAST  198   43,3323  55'374 1           TS       SKEEP4
 0232                           43,3324  0 0006 1           EXTEND
 0233     REF    8  LAST 1396   43,3325  5 1377 0           NDX      SKEEP7
 0234                           43,3326  3 0001 0           DCA      0001
 0235     REF    4  LAST 1394   43,3327  53'376 0           DXCH     SKEEP5           STORES C(X) AND C(X+1) IN SKEEP6 AND 5.
 0236     REF    9  LAST 1396   43,3330  3 1377 0           CA       SKEEP7
 0237     REF    8  LAST 1394   43,3331  55'360 1           TS       ERESTORE         IF RESTART, RESTORE C(X) AND C(X+1)
 0238     REF  177  LAST 1231   43,3332  54 001 1           TS       L
 0239     REF  178  LAST 1396   43,3333  24 001 0           INCR     L
 0240     REF  341  LAST 1395   43,3334  50 000 1           NDX      A
 0241                           43,3335  52 001 1           DXCH     0000             PUTS OWN ADDRESS IN X AND X +1
 0242     REF   10  LAST 1396   43,3336  51'377 0           NDX      SKEEP7
 0243                           43,3337  4 0001 1           CS       0001             CS  X+1
 0244     REF   11  LAST 1396   43,3340  51'377 0           NDX      SKEEP7
 0245                           43,3341  6 0000 1           AD       0000             AD X
 0246     REF    1              43,3342  0 3225 1           TC       -1CHK
 0247     REF    9  LAST 1396   43,3343  3 1360 0           CA       ERESTORE         HAS ERASABLE BEEN RESTORED
 0248                           43,3344  0 0006 1           EXTEND
 0249     REF    1              43,3345  1 3371 0           BZF      ELOOPFIN         YES, EXIT ERASLOOP.
```

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L        AGC BLOCK TWO SELF-CHECK                                                             USER'S PAGE NO.  6      E3 S4

 0250                            43,3346  0 0006 1           EXTEND
 0251    REF  12  LAST 1396      43,3347  5 1377 0           NDX      SKEEP7
 0252                            43,3350  4 0001 1           DCS      0000              COMPLEMENT OF ADDRESS OF X AND X+1
 0253    REF  13  LAST 1397      43,3351  51'377 0           NDX      SKEEP7
 0254                            43,3352  52 001 1           DXCH     0000              PUT COMPLEMENT OF ADDRESS OF X AND X+1
 0255    REF  14  LAST 1397      43,3353  51'377 0           NDX      SKEEP7
 0256                            43,3354  4 0000 0           CS       0000              CS  X
 0257    REF  15  LAST 1397      43,3355  51'377 0           NDX      SKEEP7
 0258                            43,3356  6 0001 0           AD       0001              AD X+1
 0259    REF   2  LAST 1396      43,3357  0 3225 1           TC       -1CHK
 0260    REF  10  LAST 1396      43,3360  3 1360 0           CA       ERESTORE          HAS ERASABLE BEEN RESTORED
 0261                            43,3361  0 0006 1           EXTEND
 0262    REF   2  LAST 1396      43,3362  1 3371 0           BZF      ELOOPFIN          YES, EXIT ERASLOOP.
 0263                            43,3363  0 0006 1           EXTEND
 0264    REF   5  LAST 1396      43,3364  3 1376 1           DCA      SKEEP5
 0265    REF  16  LAST 1397      43,3365  51'377 0           NDX      SKEEP7
 0266                            43,3366  52 001 1           DXCH     0000              PUT B(X) AND B(X+1) BACK INTO X AND X+1
 0267    REF   5  LAST 1396      43,3367  3 4772 1           CA       S+ZERO
 0268    REF  11  LAST 1397      43,3370  55'360 1           TS       ERESTORE          IF RESTART, DO NOT RESTORE C(X), C(X+1)
 0269                            43,3371  0 0003 1  ELOOPFIN RELINT
 0270    REF   2  LAST 1395      43,3372  0 3264 1           TC       CHECKNJ           CHECK FOR NEW JOB
 0271    REF   4  LAST 1396      43,3373  3 1374 0           CA       SKEEP4            REPLACES B(EBANK)
 0272    REF  37  LAST 1396      43,3374  54 003 0           TS       EBANK
 0273    REF  17  LAST 1397      43,3375  25'377 0           INCR     SKEEP7
 0274    REF  18  LAST 1397      43,3376  4 1377 1           CS       SKEEP7
 0275    REF   7  LAST 1396      43,3377  6 1373 1           AD       SKEEP3
 0276                            43,3400  0 0006 1           EXTEND
 0277                            43,3401  1 3403 1           BZF      +2
 0278    REF   4  LAST 1396      43,3402  0 3321 1           TC       ERASLOOP          GO TO NEXT ADDRESS IN SAME BANK
 0279    REF   5  LAST 1396      43,3403  11'372 1           CCS      SKEEP2
 0280    REF   1                 43,3404  0 3314 1           TC       NOEBANK
 0281    REF   6  LAST 1397      43,3405  25'372 0           INCR     SKEEP2            PUT +1 IN SKEEP2.
 0282    REF  38  LAST 1397      43,3406  3 0003 1           CA       EBANK
 0283    REF   1                 43,3407  6 4760 1           AD       SBIT9
 0284    REF  39  LAST 1397      43,3410  54 003 0           TS       EBANK
 0285    REF   1                 43,3411  6 3175 1           AD       ERASCON5          76777, CHECK FOR BANK E2
 0286                            43,3412  0 0006 1           EXTEND
 0287    REF   1                 43,3413  1 3307 1           BZF      2EBANK
 0288    REF  40  LAST 1397      43,3414  10 003 0           CCS      EBANK
 0289    REF   1                 43,3415  0 3302 0           TC       E134567B          GO TO EBANKS 1,3,4,5,6, AND 7
 0290    REF   3  LAST 1396      43,3416  3 5024 1           CA       ERASCON6          END OF ERASCHK
 0291    REF  41  LAST 1397      43,3417  54 003 0           TS       EBANK
R0292    CNTRCHK PERFORMS A CS OF ALL REGISTERS FROM OCT. 60 THROUGH OCT. 10.
R0293    INCLUDED ARE ALL COUNTERS, T6-1, CYCLE AND SHIFT, AND ALL RUPT REGISTERS
 0294    REF   1                 43,3420  3 5004 0  CNTRCHK  CA       CNTRCON           00050
 0295    REF   7  LAST 1397      43,3421  55'372 1  CNTRLOOP TS       SKEEP2
 0296    REF   1                 43,3422  6 4765 1           AD       SBIT4             +10 OCTAL
 0297    REF 342  LAST 1396      43,3423  50 000 1           INDEX    A
 0298                            43,3424  4 0000 0           CS       0000
 0299    REF   8  LAST 1397      43,3425  11'372 1           CCS      SKEEP2
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L         AGC BLOCK TWO SELF-CHECK                                                     USER'S PAGE NO.   7       E3 S4

 0300     REF    1                  43,3426  0 3421 0                TC       CNTRLOOP

R0301     CYCLSHFT CHECKS THE CYCLE AND SHIFT REGISTERS
 0302     REF    1                  43,3427  3 3173 1  CYCLSHFT CA       CONC+S1              25252
 0303     REF   36  LAST 1196       43,3430  54 0020 1               TS       CYR                  C(CYR) = 12525
 0304     REF   25  LAST 1186       43,3431  54 0022 0               TS       CYL                  C(CYL) = 52524
 0305     REF   26  LAST 1186       43,3432  54 0021 0               TS       SR                   C(SR) = 12525
 0306     REF   11  LAST 1109       43,3433  54 0023 1               TS       EDOP                 C(EDOP) = 00125
 0307     REF   37  LAST 1398       43,3434  6 0020 0                AD       CYR                  37777          C(CYR) = 45252
 0308     REF   26  LAST 1398       43,3435  6 0022 1                AD       CYL                  00-12524       C(CYL) = 25251
 0309     REF   27  LAST 1398       43,3436  6 0021 1                AD       SR                   00-25251       C(SR) = 05252
 0310     REF   12  LAST 1398       43,3437  6 0023 0                AD       EDOP                 00-25376       C(EDOP) = +0
 0311     REF    1                  43,3440  6 3174 0                AD       CONC+S2              C(CONC+S2) = 52400
 0312     REF    3  LAST 1397       43,3441  0 3225 1                TC       -1CHK
 0313     REF   38  LAST 1398       43,3442  6 0020 0                AD       CYR                  45252
 0314     REF   27  LAST 1398       43,3443  6 0022 1                AD       CYL                  72523
 0315     REF   28  LAST 1398       43,3444  6 0021 1                AD       SR                   77775
 0316     REF   13  LAST 1398       43,3445  6 0023 0                AD       EDOP                 77775
 0317     REF    3  LAST 1396       43,3446  6 4770 0                AD       S+1                  77776
 0318     REF    4  LAST 1398       43,3447  0 3225 1                TC       -1CHK

 0319     REF    4  LAST 1395       43,3450  25'367 1                INCR     SCOUNT +1
 0320     REF    3  LAST 1395       43,3451  0 3233 0                TC       SMODECHK
R0321     SKEEP1 HOLDS SUM
R0322     SKEEP2 HOLDS PRESENT CONTENTS OF ADDRESS IN ROPECHK AND SHOWSUM ROUTINES
R0323     SKEEP2 HOLDS BANK NUMBER IN LOW ORDER BITS DURING SHOWSUM DISPLAY
R0324     SKEEP3 HOLDS PRESENT ADDRESS (00000 TO 01777 IN COMMON FIXED BANKS)
R0325                                 (04000 TO 07777 IN FXFX BANKS)
R0326     SKEEP3 HOLDS BUGGER WORD DURING SHOWSUM DISPLAY
R0327     SKEEP4 HOLDS BANK NUMBER AND SUPER BANK NUMBER
R0328     SKEEP5 COUNTS 2 SUCCESSIVE TC SELF WORDS
R0329     SKEEP6 CONTROLS ROPECHK OR SHOWSUM OPTION
R0330     SKEEP7 CONTROLS WHEN ROUNTINE IS IN COMMON FIXED OR FIXED FIXED BANKS

 0331     REF    1                  43,3452  3 4771 1  ROPECHK  CA       S-ZERO               *
 03311    REF    4  LAST  273       43,3453  55'376 0               TS       SKEEP6               * -0 FOR ROPECHK.
 03312    REF    6  LAST 1397       43,3454  3 4772 1  STSHOSUM CA       S+ZERO               * SHOULD BE ROPECHK

 0332     REF    5  LAST 1397       43,3455  55'374 1               TS       SKEEP4               BANK NUMBER
 0333     REF    4  LAST 1398       43,3456  3 4770 0               CA       S+1
 0334     REF   19  LAST 1397       43,3457  55'377 1  COMMFX   TS       SKEEP7
 0335     REF    7  LAST 1398       43,3460  3 4772 1               CA       S+ZERO
 0336     REF   12  LAST 1395       43,3461  55'371 1               TS       SKEEP1
 0337     REF    8  LAST 1397       43,3462  55'373 0               TS       SKEEP3
 0338     REF    5  LAST 1398       43,3463  3 4770 0               CA       S+1
 0339     REF    6  LAST 1397       43,3464  55'375 0               TS       SKEEP5               COUNTS DOWN 2 TC SELF WORDS
 0340     REF    6  LAST 1398       43,3465  3 1374 0  COMADRS  CA       SKEEP4
 0341     REF  179  LAST 1396       43,3466  54 0001 1              TS       L                    TO SET SUPER BANK
 0342     REF    7  LAST 1394       43,3467  7 4344 1               MASK     HI5
 0343     REF    9  LAST 1398       43,3470  6 1373 1               AD       SKEEP3
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0344  REF   2  LAST  367   43,3471  0 4671 0            TC      SUPDACAL       SUPER DATA CALL
0345  REF   1              43,3472  0 3515 0            TC      ADSUM
0346  REF   1              43,3473  6 4756 1            AD      SBIT11         02000
0347  REF   1              43,3474  0 3526 0            TC      ADRSCHK

0348  REF 343  LAST 1397   43,3475  4 0000 0  FXFX      CS      A
0349  REF  20  LAST 1398   43,3476  55'377 1            TS      SKEEP7
0350                       43,3477  0 0006 1            EXTEND
0351                       43,3500  1 3503 0            BZF     +3
0352  REF   1              43,3501  3 4755 1            CA      SBIT12         04000, STARTING ADDRESS OF BANK  2
0353                       43,3502  0 3504 0            TC      +2
0354  REF   1              43,3503  3 5050 1            CA      SBNK03         06000, STARTING ADDRESS OF BANK  3
0355  REF  10  LAST 1398   43,3504  55'373 0            TS      SKEEP3
0356  REF   8  LAST 1398   43,3505  3 4772 1            CA      S+ZERO
0357  REF  13  LAST 1398   43,3506  55'371 1            TS      SKEEP1
0358  REF   6  LAST 1398   43,3507  3 4770 0            CA      S+1
0359  REF   7  LAST 1398   43,3510  55'375 0            TS      SKEEP5         COUNTS DOWN 2 TC SELF WORDS
0360  REF  11  LAST 1399   43,3511  51'373 1  FXADRS    INDEX   SKEEP3
0361                       43,3512  3 0000 1            CA      0000
0362  REF   2  LAST 1399   43,3513  0 3515 0            TC      ADSUM
0363  REF   2  LAST 1399   43,3514  0 3526 0            TC      ADRSCHK

0364  REF   9  LAST 1397   43,3515  55'372 1  ADSUM     TS      SKEEP2
0365  REF  14  LAST 1399   43,3516  6 1371 0            AD      SKEEP1
0366  REF  15  LAST 1399   43,3517  55'371 1            TS      SKEEP1
0367  REF   9  LAST 1399   43,3520  3 4772 1            CAF     S+ZERO
0368  REF  16  LAST 1399   43,3521  6 1371 0            AD      SKEEP1
0369  REF  17  LAST 1399   43,3522  55'371 1            TS      SKEEP1
0370  REF  10  LAST 1399   43,3523  4 1372 1            CS      SKEEP2
0371  REF  12  LAST 1399   43,3524  6 1373 1            AD      SKEEP3
0372  REF 278  LAST 1395   43,3525  0 0002 0            TC      Q

0373  REF 344  LAST 1399   43,3526  22 000 1  ADRSCHK   LXCH    A
0374  REF  13  LAST 1399   43,3527  3 1373 1            CA      SKEEP3
0375  REF  18  LAST 1394   43,3530  7 5041 0            MASK    LOW10          RELATIVE ADDRESS
0376  REF   1              43,3531  6 4344 0            AD      -MAXADRS       SUBTRACT MAX RELATIVE ADDRESS = 1777
0377                       43,3532  0 0006 1            EXTEND
0378  REF   1              43,3533  1 3622 0            BZF     SOPTION        CHECKSUM FINISHED IF LAST ADDRESS.
0379  REF   8  LAST 1399   43,3534  11'375 0            CCS     SKEEP5         IS CHECKSUM FINISHED
0380                       43,3535  0 3540 0            TC      +3             NO
0381                       43,3536  0 3540 0            TC      +2             NO
0382  REF   2  LAST 1399   43,3537  0 3622 1            TC      SOPTION        GO TO ROPECHK SHOWSUM OPTION
0383  REF 180  LAST 1398   43,3540  10 001 1            CCS     L              -0 MEANS A TC SELF WORD.
0384  REF   1              43,3541  0 3550 1            TC      CONTINU
0385  REF   2  LAST 1399   43,3542  0 3550 1            TC      CONTINU
0386  REF   3  LAST 1399   43,3543  0 3550 1            TC      CONTINU
0387  REF   9  LAST 1399   43,3544  11'375 0            CCS     SKEEP5
0388  REF   4  LAST 1399   43,3545  0 3551 0            TC      CONTINU +1
0389  REF   1              43,3546  3 7702 0            CA      S-1
0390  REF   5  LAST 1399   43,3547  0 3551 0            TC      CONTINU +1     AD IN THE BUGGER WORD
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0391   REF   7  LAST 1399   43,3550  3 4770 0  CONTINU   CA       S+1          MAKE SURE TWO CONSECUTIVE TC SELF WORDS
0392   REF  10  LAST 1399   43,3551  55'375 0            TS       SKEEP5
03921  REF   5  LAST 1398   43,3552  11'376 0            CCS      SKEEP6       *
03922  REF  22  LAST 1220   43,3553  10 067 1            CCS      NEWJOB       * +1, SHOWSUM
03923  REF   4  LAST  882   43,3554  0 5152 1            TC       CHANG1       *
03924                       43,3555  0 3557 0            TC       +2           *
0393   REF   3  LAST 1397   43,3556  0 3264 1            TC       CHECKNJ      -0 IN SKEEP6 FOR ROPECHK

0394   REF  14  LAST 1399   43,3557  25'373 1  ADRS+1    INCR     SKEEP3
0395   REF  21  LAST 1399   43,3560  11'377 1            CCS      SKEEP7
0396   REF   1              43,3561  0 3465 0            TC       COMADRS
0397   REF   2  LAST 1400   43,3562  0 3465 0            TC       COMADRS
0398   REF   1              43,3563  0 3511 1            TC       FXADRS
0399   REF   2  LAST 1400   43,3564  0 3511 1            TC       FXADRS

0400   REF   7  LAST 1398   43,3565  4 1374 1  NXTBNK    CS       SKEEP4
0401   REF   1              43,3566  6 3655 1            AD       LSTBNKCH     LAST BANK TO BE CHECKED
0402                        43,3567  0 0006 1            EXTEND
0403   REF   1              43,3570  1 2764 1            BZF      ENDSUMS      END OF SUMMING OF BANKS
0404   REF   8  LAST 1400   43,3571  3 1374 0            CA       SKEEP4
0405   REF   2  LAST 1399   43,3572  6 4756 1            AD       SBIT11
0406   REF   9  LAST 1400   43,3573  55'374 1            TS       SKEEP4       37 TO 40 INCRMTS SKEEP4 BY END RND CARRY
0407   REF   1              43,3574  0 3600 1            TC       CHKSUPR
0408   REF   1              43,3575  3 4752 0  17TO20    CA       SBIT15
0409   REF  10  LAST 1400   43,3576  27'374 1            ADS      SKEEP4       SET FOR BANK 20
0410   REF   1              43,3577  0 3614 1            TC       GONXTBNK
0411   REF   8  LAST 1398   43,3600  7 4344 1  CHKSUPR   MASK     HI5
0412                        43,3601  0 0006 1            EXTEND
0413   REF   1              43,3602  1 3612 0            BZF      NXTSUPR      INCREMENT SUPER BANK
0414   REF   1              43,3603  6 3172 0  27TO30    AD       S13BITS
0415                        43,3604  0 0006 1            EXTEND
0416                        43,3605  1 3607 1            BZF      +2           BANK SET FOR 30
0417   REF   2  LAST 1400   43,3606  0 3614 1            TC       GONXTBNK
0418   REF   1              43,3607  3 5010 0            CA       SIXTY        FIRST SUPER BANK
0419   REF  11  LAST 1400   43,3610  27'374 1            ADS      SKEEP4
0420   REF   3  LAST 1400   43,3611  0 3614 1            TC       GONXTBNK
0421   REF   1              43,3612  6 3171 0  NXTSUPR   AD       SUPRCON      SET BNK 30 + INCR SUPR BNK AND CANCEL
0422   REF  12  LAST 1400   43,3613  27'374 1            ADS      SKEEP4       ERC BIT OF THE 37 TO 40 ADVANCE.
0423   REF  22  LAST 1400   43,3614  11'377 1  GONXTBNK  CCS      SKEEP7
0424   REF   1              43,3615  0 3457 1            TC       COMMFX
0425   REF   8  LAST 1400   43,3616  3 4770 0            CA       S+1
0426   REF   1              43,3617  0 3475 1            TC       FXFX
0427   REF   1              43,3620  3 4762 0            CA       SBIT7        HAS TO BE LARGER THAN NO OF FXSW BANKS.
0428   REF   2  LAST 1400   43,3621  0 3457 1            TC       COMMFX

0429   REF  13  LAST 1400   43,3622  3 1374 0  SUPTION   CA       SKEEP4
0430   REF   9  LAST 1400   43,3623  7 4344 1            MASK     HI5          = BANK BITS
0431   REF   5  LAST  364   43,3624  0 4333 0            TC       LEFT5
0432   REF 161  LAST 1399   43,3625  54 001 1            TS       L            BANK NUMBER BEFORE SUPER BANK
0433   REF  14  LAST 1400   43,3626  3 1374 0            CA       SKEEP4
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 0434   REF   1                 43,3627  7 4350 1              MASK    S8BITS              = SUPER BANK BITS
 0435                           43,3630  0 0006 1              EXTEND
 0436   REF   1                 43,3631  1 3637 1              BZF     SOPT                BEFORE SUPER BANK
 0437   REF  29  LAST 1398      43,3632  54 0021 0             TS      SR                  SUPER BANK NECESSARY
 0438   REF 182  LAST 1400      43,3633  3 0001 0              CA      L
 0439   REF  18  LAST 1393      43,3634  7 4774 0              MASK    SEVEN
 0440   REF  30  LAST 1401      43,3635  6 0021 1              AD      SR
 0441   REF 183  LAST 1401      43,3636  54 0001 1             TS      L                   BANK NUMBER WITH SUPER BANK
 0442   REF   6  LAST 1400      43,3637  3 1376 1  SOPT        CA      SKEEP6              *
 0443                           43,3640  0 0006 1              EXTEND                      *
 0444                           43,3641  1 3643 1              BZF     +2                  * ON -0 CONTINUE WITH ROPE CHECK.
 0445   REF   1                 43,3642  0 2746 0              TC      SDISPLAY            * ON +1 GO TO DISPLAY OF SUM.
 0446   REF  18  LAST 1399      43,3643  11'371 1              CCS     SKEEP1              FORCE SUM TO ABSOLUTE VALUE.
 04461                          43,3644  0 3646 0              TC      +2
 04462                          43,3645  0 3647 1              TC      +2
 04463  REF   9  LAST 1400      43,3646  6 4770 0              AD      S+1
 04464  REF  19  LAST 1401      43,3647  55'371 1              TS      SKEEP1
 0447   REF 184  LAST 1401      43,3650  4 0001 1  BNKCHK      CS      L                   = - BANK NUMBER
 0448   REF  20  LAST 1401      43,3651  6 1371 0              AD      SKEEP1
 0449   REF   2  LAST 1399      43,3652  6 7702 0              AD      S-1
 0450   REF   5  LAST 1398      43,3653  0 3225 1              TC      -1CHK               CHECK SUM
 0451   REF   2  LAST  273      43,3654  0 3565 1              TC      NXTBNK

 0454   REF  23  LAST 1400         0067                        EBANK=  NEWJOB
 0455                           43,3655    66100 0  LSTBNKCH   BBCON*                      * CONSTANT, LAST BANK.

 0456   REF  13  LAST  941      30,2000                        SBANK=  LOWSUPER
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L         PHASE TABLE MAINTENANCE                                                              USER'S PAGE NO.  1      57

P0001             SUBROUTINE TO UPDATE THE PROGRAM NUMBER DISPLAY ON THE DSKY.

 0004   REF   6  LAST 1207        4000                            SETLOC FFTAG1
 0005                             5344                            BANK

 00055  REF   2 LAST  236 TO  241:      19      19*               COUNT* $$/PHASE
 0006   REF 279  LAST 1399        5344  50 002 0  NEWMODEX INDEX  Q                  UPDATE MODREG. ENTRY FOR MODE IN FIXED.
 0007                             5345  3 0000 1           CAF    0
 0008   REF 280  LAST 1402        5346  24 002 0           INCR   Q

 0009   REF  16  LAST  781        5347  55'214 0  NEWMODEA TS     MODREG             ENTRY FOR MODE IN A.
 0014                             5350  3 5353 1  MMDSPLAY CAF    +3                 DISPLAY MAJOR MODE.
 0015   REF  29  LAST 1317        5351  22 006 1  PREBJUMP LXCH   BBANK              PUTS BBANK IN L
 0016   REF   8  LAST 1329        5352  1 4660 1           TCF    BANKJUMP           PUTS Q INTO A
 0017   REF   1                   5353   20463 1           CADR   SETUPDSP

R0018             RETURN TO CALLER +3 IF MODE = THAT AT CALLER +1. OTHERWISE RETURN TO CALLER +2.

 0020   REF 281  LAST 1402        5354  50 002 0  CHECKMM  INDEX  Q
 0021                             5355  4 0000 0           CS     0
 0022   REF  17  LAST 1402        5356  6 1214 1           AD     MODREG
 0023                             5357  0 0006 1           EXTEND
 0024   REF   7  LAST 1219        5360  1 6710 0           BZF    Q+2
 0025   REF   4  LAST  420        5361  1 6706 1           TCF    Q+1                NO MATCH

 0028   REF   1               10,2000                         SETLOC PHASETAB
 0029                         10,2463                         BANK

 0030   REF   1                                               COUNT* $$/PHASE
 0031                         10,2463  0 0004 0  SETUPDSP INHINT
 0032   REF  30  LAST 1098    10,2464  52 071 0           DXCH   RUPTREG1           SAVE CALLER-S RETURN 2CADR
 0034   REF   4  LAST  740    10,2465  0 5120 1           TC     NOVAC30            EITHER A TASK OR JOB CAN COMETO NEWMODEX
 0035   REF  18  LAST 1402       1214                     EBANK= MODREG
 0036   REF   2  LAST  391    10,2466   03377 1           2CADR  DSPMMJOB
 0036                         10,2467   60102 1
 0037   REF  31  LAST 1402    10,2470  52 071 0           DXCH   RUPTREG1
 0038                         10,2471  0 0003 1           RELINT
 0039   REF  14  LAST  833    10,2472  52 006 0           DXCH   Z                  RETURN

 0040   REF   1               40,3377            DSPMMJOB EQUALS DSPMMJB

 0042   REF   7  LAST 1402       4000                     SETLOC FFTAG1
 0043                            5362                     BANK
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R0044  PHASCHNG IS THE MAIN WAY OF MAKING PHASE CHANGES FOR RESTARTS.  THERE ARE THREE FORMS OF PHASCHNG, KNOWN AS TYPE
R0046  A, TYPE B, AND TYPE C. THEY ARE ALL CALLED AS FOLLOWS, WHERE OCT XXXXX   CONTAINS THE PHASE INFORMATION,

A0048                                          TC      PHASCHNG
A0049                                          OCT     XXXXX

R0050  TYPE A IS CONCERNED WITH FIXED PHASE CHANGES, THAT IS, PHASE INFORMATIONTHAT IS STORED PERMANENTLY.  THESE
R0052  OPTIONS ARE, WHERE G STANDS FOR A GROUP AND .X FOR THE PHASE,

R0053                  G.0             INACTIVE, WILLNOT PERMIT A GROUP G RESTART
R0055                  G.1             WILL CAUSE THE LAST DISPLAY TO BE REACTIVATED, USED MAINLY IN MANNED FLIGHTS
R0057                  G.EVEN          A DOUBLE TABLE RESTART, CAN CAUSE ANY COMBINATION OF TWO JOBS, TASKS, AND/OR
R0059                                  LONGCALL TO BE RESTARTED.
R0060                  G.ODD NOT .1    A SINGLE TABLE RESTART, CAN CAUSE EITHER A JOB, TASK, OR LONGCALL RESTART

R0062  THIS INFORMATION IS PUT INTO THE OCTAL WORD AFTER TC PHASCHNG AS FOLLOWS

R0063                  TL0 00P PPP PPP GGG                                         ,

R0065  WHERE EACH LETTER OR NUMBER STANDS FOR A BIT.  THE G:S STAND FOR THE GROUP, OCTAL 1 - 7, THE P:S FOR THE PHASE,
R0067  OCTAL 0 - 127.  0:S MUST BE 0.         IF ONE WISHES TO HAVE THE TBASE OF GROUP G TO BE SET AT THIS TIME,
R0069  T IS SET TO 1, OTHERWISE IT IS SET TO 0.  SIMIARLY IF ONE WISHES TO SET LONGBASE, THEN L IS SET TO 1, OTHERWISE
R0071  IT IS SET TO 0.  SOME EXAMPLES,

A0072                                          TC      PHASCHNG        THIS WILL CAUSE GROUP 3 TOBE SET TO 0,
A0073                                          OCT     00003           MAKING GROUP 3 INACTIVE

A0074                                          TC      PHASCHNG        IF A RESTART OCCURS THIS WOULD CAUSE
A0075                                          OCT     00012           GROUP 2 TO RESTART THE LAST DISPLAY

A0076                                          TC      PHASCHNG        THIS SETS THE TBASE OF GROUP 4 AND IN
A0077                                          OCT     40064           CASE OF A RESTART WOULD START UP THE TWO
A0078                                                                  THINGS LOCATED IN THE DOUBLE 4.6 RESTART
A0079                                                                  LOCATION
A0080                                          TC      PHASCHNG        THIS SETS LONGBASE AND UPON A RESTART
A0081                                          OCT     20135           CAUSES 5.13 TO BE RESTARTED  (SINCE
A0082                                                                  LONGBASE WAS SET THIS SINGLE ENTRY
A0083                                                                  SHOULD BE A LONGCALL)
A0084                                          TC      PHASCHNG        SINCE BOTH TBASE4 AND LONGBASE ARE SET,
A0085                                          OCT     60124           4.12 SHOULD CONTAIN BOTH A TASK AND A
A0086                                                                  LONGCALL TO BE RESTARTED

R0087  TYPE C PHASCHNG CONTAINS THE VARIABLE TYPE OF PHASCHNG INFORMATION. INSTEAD OF THE INFORMATION BEING IN A
R0089  PERMANENT FORM, ONE STORES THE DESIRED RESTART INFORMATION IN A VARIABKE LOCATION. THE BITS ARE AS FOLLOWS,

R0091                  TL0 1AD XXX CJW GGG

R0092  WHERE EACH LETTER OR NUMBER STANDS FOR A BIT.  THE G:S STAND FOR THE GROUP, OCTAL 1 - 7.  IF THE RESTART IS TO
R0094  BE BY WAITLIST, W IS SET TO 1, IF IT IS A JOB, J IS SET TO 1, IF IT IS A LONGCALL, C IS SET TO 1. ONLY ONE OF
R0096  THESE THREE BIT S MAY BE SET.  X:S ARE IGNORED  1 MUST BE 1, AND 0 MUST  BE 0.  AGAIN T STANDS FOR THE TBASE,
R0098   AND L FOR LONGBASE.  THE BITS A AND D ARE CONCERNED WITH THE VARIABLE INFORMATION. IF D IS SET TO 1, A PRIORITY
R0100   OR DELTA TIME WILL BE READ FROM THE NEXT LOCATION AFTER THE OCTAL INFORMATION, IF THIS IS TO BE INDIRECT, THAT
R0102   IS, THE NAME OF A LOCATION COMT+INING THE INFORMATION (DELTA TIME ONLY), THEN THIS IS GIVEN AS THE -GENADR OF
R0104   THAT LOCATION WHICH CONTAINS THE DELTA TIME.  IF THE OLD PRIORITY OR DELTA TIME IS TO BE USED, THAT WHICH IS
R0106   ALREADY IN THE VARIABLE STORAGE, THEN D IS SET TO 0. NEXT THE A BIT IS USED.  IF IT IS SET TO 0, THE ADDRESS
R0108   THAT WOULD BE RESTARTED DURING A RESTART IS THE NEXT LOCATION AFTER THE  PHASE INFORMATION, THAT IS, EITHER
R0110   (TC PHASCHNG) +2 OR +3, DEPENDING ON WHETHER D HAD BEEN SET OR NOT.  IF A IS SET TO 1, THEN THE ADDRESS THAT
R0112   WCULD BE RESTARTED IS THE 2CADR THAT IS READ FROM THE NEXT TWO LOCATIONS.  EXAMPLES,

A0114                                   AD        TC        PHASCHNG          THIS WOULD CAUSE LOCATION AD +3 TO BE
A0115                                   AD+1      OCT       05023             RESTARTED BY GROUP THREE WITHA PRIORITY
A0116                                   AD+2      OCT       23000             OF 23.  NOTE UPON RETURNING IT WOULD
A0117                                   AD+3                                  ALSO GO TO AD+3

A0118                                   AD        TC        PHASCHNG          GROUP  1 WOULD CAUSE CAUSE CALLCALL TO
A0119                                   AD+1      OCT       27441             BE STARTED AS A LONGCALL FROM THE TIME
A0120                                   AD+2     -GENADR    DELTIME           STORED IN LONGBASE (LONGBASE WAS SET) BY
A0121                                   AD+3      2CADR     CALLCALL          A DELTATIME STORED IN DELTIME.  THE
A0122                                   AD+4                                  BBCON OF THE 2CADR SHOULD CONTAIN THE E
A0123                                   AD+5                                  BANK OF DELTIME. PHASCHNG RETURNS TO
A0124                                                                         LOCATION AD+5

R0125   NCTE THAT IF A VARIABLE PRIORITY IS GIVEN FOR A JOB, THE JOB WILL BE RESTARTED AS A NOVAC IF THE PRIORITY IS
R0127   NEGATIVE, AS A FINDVAC IF THE PRIORITY IS POSITIVE.

R0128   TYPE 6 PHASCHNG IS A COMBINATION OF VARIABLE AND FIXED PHASE CHANGES. IT WILL START UP A JOB AS INDICATED
R0130   BELOW AND ALSO START UP ONE FIXED RESTART, THAT IS EITHER AN G.I OR  A G.ODD OR THE FIRST ENTRY OF G.EVEN
R0132   DOUBLE ENTRY.  THE BIT INFORMATION IS AS FOLLOWS,

R0133                     TL1 DAP PPP PPP GGG

R0134   WHERE EACH LETTER OR NUMBER STANDS FOR A BIT.  THE G:S STAND FOR THE GROUP, OCTAL 1 - 7. THE P:S FOR THE FIXED
R0136   PHASE INFORMATION, OCTAL 0 - 127. 1 MUST BE 1.  AND AGAIN T STANDS FOR THE TBASE AND L FOR LONGBASE. D THIS
R0138   TIME STANDS ONLY FOR PRIORITY SINCE THIS WILL BE CONSIDERED A JOB, AND IT MUST BE GIVEN DIRECTLY IF GIVEN.
R0140   AGAIN A STANDS FOR THE ADDRESS OF THE LOCATION TO BE RESTARTED, 1 IF THE 2CADR IS GIVEN , OR 0 IF IT IS TO BE
R0142   THE NEXT LOCATION.(THE RETURN LOCATION OF PHASCHNG) EXAMPLES,

A0143                                   AD        TC        PHASCHNG          TBASE IS SET AND ARESTART CAUSE GROUP 3
A0144                                   AD+1      OCT       56043             TO START THE JOB AJOBAJOB WITH PRIORITY
A0145                                   AD+2      OCT       31000             31 AND THE FIRST ENTRY OF 3.4SPOT(WE CAN
A0146                                   AD+3      2CADR     AJOBAJOB          ASSUME IT IS A TASK SINCE WE SET TBASE3)
A0147                                   AD+4                                  UPON RETURN FROM PHASCHNG CONTROL WOULD
A0148                                   AD+5                                  GO TO AD+5

A0149                                   AD        TC        PHASCHNG          UPON A RESTART THE LAST DISPLAY WOULD BE
A0150                                   AD+1      OCT       10015             RESTARTED AND A JOB WITH THE PREVIOUSLY
A0151                                   AD+2                                  STORED PRIORITY WOULD BE BEGUN AT AD+2
A0152                                                                         BY MEANS OF GROUP 5
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R0153   THE NOVAC-FINDVAC CHOICE FOR JOBS HOLDS HERE ALSO - NEGATIVE PRIORITY CAUSES A NOVAC CALL, POSITIVE A FINDVAC.

R0155   SUMMARY OF BITS
R0156   TYPE A          TL0 00P PPP PPP GGG
R0157   TYPE B          TL1 DAP PPP PPP GGG
R0158   TYPE C          TL0 1AD XXX CJW GGG
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L        PHASE TABLE MAINTENANCE                                                USER'S PAGE NO.   5       E0 S3

P0159    2PHSCHNG IS USED WHEN ONE WISHES TO START UP A GROUP OR CHANGE A GROUP WHILE UNDER THE CONTROL OF A DIFFERENT
R0161    GROUP. FOR EXAMPLE, CHANGE THE PHASE OF GROUP 3 WHILE THE PORTION OF THE PROGRAM IS UNDER GROUP 5. ALL 2PHSCHNG
R0163    CALLS ARE MADE IN THE FOLLOWING MANNER,

A0164                                                        TC       2PHSCHNG
A0165                                                        OCT      XXXXX
A0166                                                        OCT      YYYYY

R0167    WHERE OCT XXXXX MUST BE OF TYPE A AND OCT YYYYY MAY BE OF EITHER TYPE A OR TYPE B OR TYPEC.  THERE IS ONE
R0169    DIFFERENCE --- NOTE- IF LONGBASE IS TO BE SET THIS INFORMATION IS GIVEN IN THE OCT YYYYY INFORMATION, IT WILL
R0171    BE DISREGARDED IF GIVEN WITH THE OCT XXXXX INFORMATION. A COUPLE OF EXAMPLES MAY HELP,

A0173                                               AD       TC       2PHSCHNG          SET TBASE3 AND IF A RESTART OCCURS START
A0174                                               AD+1     OCT      40083             THE TWO ENTRIES IN 3.8 TABLE LOCATION
A0175                                               AD+2     OCT      05025             THIS IS OF TYPE C, SET THE JOB TO BE
A0176                                               AD+3     OCT      18000             TO BE LOCATION AD+4, WITH A PRIORITY 18,
A0177                                               AD+4                                FOR GROUP 5 PHASE INFORMATION

 0178    REF   3 LAST 1402 TO 1402:    14     33*            COUNT* $$/PHASE
 0179                              5362  0 0004 0  2PHSCHNG INHINT                       THE ENTRY FOR A DOUBLE PHASE CHANGE
 0180    REF 282  LAST 1402        5363  50 002 0           NDX      Q
 0181                              5364  3 0000 1           CA       0
 0182    REF 283  LAST 1406        5365  24 002 0           INCR     Q
 0183    REF   1                   5366  54 072 0           TS       TEMPP2

 0184    REF   1                   5367  7 4774 0           MASK     OCT7
 0185                              5370  6 0000 1           DOUBLE
 0186    REF   1                   5371  54 071 0           TS       TEMPG2

 0187    REF   2  LAST 1406        5372  3 0072 1           CA       TEMPP2
 0188    REF   1                   5373  7 5050 0           MASK     OCT17770           NEED ONLY 17700, BUT WHY GET A NEW CONST.
 0189                              5374  0 0006 1           EXTEND
 0190    REF  28  LAST 1393        5375  7 4755 0           MP       BIT12
 0191    REF   3  LAST 1406        5376  56 072 1           XCH      TEMPP2

 0192    REF  46  LAST 1393        5377  7 4752 1           MASK     BIT15
 0193    REF   1                   5400  54 066 0           TS       TEMPSW2            INDICATES WHETHER TO SET TBASE OR NOT

 0194    REF 104  LAST 1348        5401  1 5405 1           TCF      PHASCHNG +3


 0195                              5402  0 0004 0  PHASCHNG INHINT
 0196    REF 149  LAST 1368        5403  3 4770 0           CA       ONE                INDICATESWE CAME FROM A PHASCHNG ENTRY
 0197    REF   2  LAST 1406        5404  54 066 0           TS       TEMPSW2

 0198    REF 284  LAST 1406        5405  50 002 0     +3    NDX      Q
 0199                              5406  3 0000 1           CA       0
 0200    REF 285  LAST 1406        5407  24 002 0           INCR     Q
 0201    REF   1                   5410  54 065 0           TS       TEMPSW
 0202                                 5411  0 0006 1             EXTEND
 0203   REF   1                       5412  3 5415 1             DCA     ADRPCHN2       OFF TO SWITCHED BANK
 0204                                 5413  52 006 0             DTCB

 0205   REF  45  LAST 1394   E3,1400                             EBANK=  LST1
 0206   REF   1                       5414   02473 0  ADRPCHN2  2CADR   PHSCHNG2
 0206   REF   1                       5415   20063 0


 0207   REF   1                       5416  22 073 0  ONEORTWO  LXCH    TEMPBBCN
 0208   REF  30  LAST 1402            5417  22 006 1            LXCH    BBANK
 0209   REF   2  LAST 1407            5420  22 073 0            LXCH    TEMPBBCN

 0210   REF   1                       5421  7 5053 0            MASK    OCT14000       SEE WHAT KIND OF PHASE CHANGE IT IS
 0211   REF 345  LAST 1399            5422  10 000 0            CCS     A
 0212   REF   1                       5423  1 5464 0            TCF     CHECKB          IT IS OF TYPE :B:

 0213   REF   1                       5424  3 0062 0            CA      TEMPP
 0214   REF  39  LAST 1393            5425  7 4762 1            MASK    BIT7
 0215   REF 346  LAST 1407            5426  10 000 0            CCS     A               SHALL WE USE THE OLD PRIORITY
 0216   REF   1                       5427  1 5451 0            TCF     GETPRIO         NO GET A NEW PRIORITY (OR DELTA T)

 0217   REF   4  LAST  238            5430  50 061 0  OLDPRIO   NDX     TEMPG           USE THE OLD PRIORITY (OR DELTA T)
 0218   REF   1                       5431  3 1256 1            CA      PHSPRDT1 -2
 0219   REF   1                       5432  54 070 1    -1      TS      TEMPPR

 0220   REF   2  LAST 1407            5433  3 0062 0  CON1      CA      TEMPP          SEE IF A 2CADR IS GIVEN
 0221   REF  32  LAST 1393            5434  7 4761 1            MASK    BIT8
 0222   REF 347  LAST 1407            5435  10 000 0            CCS     A
 0223   REF   1                       5436  1 5455 1            TCF     GETNEWNM

 0224   REF 286  LAST 1406            5437  3 0002 0            CA      Q
 0225   REF   1                       5440  54 063 0            TS      TEMPNM
 0226   REF   1                       5441  3 0006 1            CA      BB
 0227                                 5442  0 0006 1            EXTEND                 PICK UP USERS SUPERBANK
 0228   REF  21  LAST 1232            5443  04 007 1            ROR     SUPERBNK
 0229   REF   1                       5444  54 064 1            TS      TEMPBB

 0230   REF   1                       5445  3 5450 0  TOCON2    CA      CON2ADR        BACK TO SWITCHED BANK
 0231   REF   3  LAST 1407            5446  22 073 0            LXCH    TEMPBBCN
 0232                                 5447  52 006 0            DTCB

 0233   REF   1                       5450   02561 1  CON2ADR   GENADR  CON2

 0234   REF 287  LAST 1407            5451  50 002 0  GETPRIO   NDX     Q              DON:T CARE IF DIRECT OR INDIRECT
 0235                                 5452  3 0000 1            CA      0              LEAVE THAT DECISION TO RESTARTS
 0236   REF 288  LAST 1407            5453  24 002 0            INCR    Q              OBTAIN RETURN ADDRESS
 0237   REF   1                       5454  1 5432 0            TCF     CON1 -1

 0238                                 5455  0 0006 1  GETNEWNM  EXTEND
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L        PHASE TABLE MAINTENANCE                                                          USER'S PAGE NO.   7       E0 53

 0239    REF 289  LAST 1407      5456  5 0002 0             INDEX   Q
 0240                            5457  3 0001 0             DCA     0
 0241    REF   2  LAST 1407      5460  52 064 1             DXCH    TEMPNM
 0242    REF  62  LAST 1234      5461  3 4767 0             CA      TWO
 0243    REF 290  LAST 1408      5462  26 002 1             ADS     Q                             OBTAIN RETURN ADDRESS

 0244    REF   1                 5463  1 5445 0             TCF     TOCON2

 0245    REF   5  LAST  700      5053              OCT14000 EQUALS  PRIO14
 0246    REF  19  LAST 1366      0061              TEMPG    EQUALS  ITEMP1
 0247    REF  18  LAST 1366      0062              TEMPP    EQUALS  ITEMP2
 0248    REF   3  LAST   69      0063              TEMPNM   EQUALS  ITEMP3
 0249    REF   3  LAST   69      0064              TEMPBB   EQUALS  ITEMP4
 0250    REF   2  LAST   69      0065              TEMPSW   EQUALS  ITEMP5
 0251    REF   3  LAST  167      0066              TEMPSW2  EQUALS  ITEMP6
 0252    REF  32  LAST 1402      0070              TEMPPR   EQUALS  RUPTREG1
 0253    REF   8  LAST  592      0071              TEMPG2   EQUALS  RUPTREG2
 0254    REF   5  LAST 1106      0072              TEMPP2   EQUALS  RUPTREG3

 0255    REF   5  LAST 1106      0073              TEMPBBCN EQUALS  RUPTREG4
 0256    REF  31  LAST 1407      0006              BB       EQUALS  BBANK


 0258    REF   2  LAST 1402   10,2000                       SETLOC  PHASETAB
 0259                         10,2473                       BANK

 0260    REF   3  LAST  223   E3,1436                       EBANK=  PHSNAME1
 0261    REF   2 LAST 1402 TO 1406:      8      8*          COUNT*  $$/PHASE
 0262    REF   4  LAST 1407   10,2473  22 073 0    PHSCHNG2 LXCH    TEMPBBCN
 0263    REF   2  LAST 1406   10,2474  3 0065 1             CA      TEMPSW
 0264    REF   2  LAST 1406   10,2475  7 4774 0             MASK    OCT7
 0265                         10,2476  6 0000 1             DOUBLE
 0266    REF   5  LAST 1407   10,2477  54 061 1             TS      TEMPG

 0267    REF   3  LAST 1408   10,2500  3 0065 1             CA      TEMPSW
 0268    REF   2  LAST 1406   10,2501  7 5056 0             MASK    OCT1777O
 0269                         10,2502  0 0006 1             EXTEND
 0270    REF  29  LAST 1406   10,2503  7 4755 0             MP      BIT12
 0271    REF   3  LAST 1407   10,2504  54 062 1             TS      TEMPP

 0272    REF   4  LAST 1408   10,2505  3 0065 1             CA      TEMPSW
 0273    REF   2  LAST  107   10,2506  7 4076 0             MASK    OCT60000
 0274    REF   5  LAST 1408   10,2507  56 065 1             XCH     TEMPSW
 0275    REF   2  LAST 1407   10,2510  7 5053 0             MASK    OCT14000
 0276    REF 348  LAST 1407   10,2511  10 000 0             CCS     A

 0277    REF   1              10,2512  1 5416 0             TCF     ONEORTWO

 0278    REF   4  LAST 1408   10,2513  3 0062 0             CA      TEMPP                         START STORING THE PHASE INFORMATION
 0279    REF   6  LAST 1408   10,2514  50 061 0             NDX     TEMPG
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L          PHASE TABLE MAINTENANCE                                                                    USER'S PAGE NO.   8       E3 S3

 0280   REF   3  LAST  223   10,2515  55'154 1             TS       PHASE1 -2

 0281   REF   3  LAST 1406   10,2516  10 066 0  BELOW1     CCS      TEMPSW2           IS IT A PHASCHNG OR A 2PHSCHNG
 0282   REF   1              10,2517  1 2533 1             TCF      BELOW2            IT:S A PHASCHNG

 0283                        10,2520  1 2521 1             TCF      +1                IT:S A 2PHSCHNG
 0284   REF   4  LAST 1406   10,2521  4 0072 0             CS       TEMPP2
 0285   REF   5  LAST 1409   10,2522  22 072 1             LXCH     TEMPP2
 0286   REF   2  LAST 1406   10,2523  50 071 1             NDX      TEMPG2
 0287   REF   5  LAST  238   10,2524  53'154 1             DXCH     -PHASE1 -2

 0288   REF   4  LAST 1409   10,2525  10 066 0             CCS      TEMPSW2
 0289                        10,2526  12 527 1             NOOP                       CAN:T GET HERE
 0290   REF   2  LAST 1409   10,2527  1 2533 1             TCF      BELOW2

 0291   REF  23  LAST 1102   10,2530  4 0025 1             CS       TIME1
 0292   REF   3  LAST 1409   10,2531  50 071 1             NDX      TEMPG2
 0293   REF   4  LAST  396   10,2532  55'255 0             TS       TBASE1 -2

 0294   REF   6  LAST 1408   10,2533  10 065 0  BELOW2     CCS      TEMPSW            SEE IF WE SHOULD SET TBASE OR LONGBASE
 0295   REF   1              10,2534  1 2547 1             TCF      BELOW3            SET LONGBASE ONLY
 0296   REF   1              10,2535  1 2552 0             TCF      BELOW4            SET NEITHER

 0297   REF  24  LAST 1409   10,2536  4 0025 1             CS       TIME1             SET TBASE TO BEGIN WITH
 0298   REF   7  LAST 1408   10,2537  50 061 0             NDX      TEMPG
 0299   REF   5  LAST 1409   10,2540  55'255 0             TS       TBASE1 -2

 0300   REF   7  LAST 1409   10,2541  3 0065 1             CA       TEMPSW             SHALL WE NOW SET LONGBASE
 0301   REF   1              10,2542  6 2545 1             AD       BIT14COM
 0302   REF 349  LAST 1408   10,2543  10 000 0             CCS      A
 0303                        10,2544  12 545 0             NOOP                       ***** CANT GET HERE *****
 0304                        10,2545   17777 0  BIT14COM   OCT      17777             ***** CANT GET HERE *****
 0305   REF   2  LAST 1409   10,2546  1 2552 0             TCF      BELOW4            NO WE NEED ONLY SET TBASE

 0306                        10,2547  0 0006 1  BELOW3     EXTEND                     SET LONGBASE
 0307   REF  35  LAST 1329   10,2550  3 0025 0             DCA      TIME2
 0308   REF   1              10,2551  53'303 1             DXCH     LONGBASE

 0309   REF   5  LAST 1408   10,2552  4 0062 1  BELOW4     CS       TEMPP             AND STORE THE FINAL PART OF THE PHASE
 0310   REF   8  LAST 1409   10,2553  50 061 0             NDX      TEMPG
 0311   REF   6  LAST 1409   10,2554  55'153 0             TS       -PHASE1 -2

 0312   REF 291  LAST 1408   10,2555  3 0002 0             CA       Q
 0313   REF   5  LAST 1408   10,2556  22 073 0             LXCH     TEMPBBCN
 0314                        10,2557  0 0003 1             RELINT
 0315                        10,2560  52 006 0             DTCB
 0316   REF   6  LAST 1409   10,2561  22 073 0  CON2       LXCH     TEMPBBCN

 0317   REF   6  LAST 1409   10,2562  3 0062 0             CA       TEMPP
 0318   REF   9  LAST 1409   10,2563  50 061 0             NDX      TEMPG
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L        PHASE TABLE MAINTENANCE                                                        USER'S PAGE NO.   9      E3 S3

0319   REF   4  LAST 1409   10,2564  55'154 1                TS      PHASE1 -2

0320   REF   2  LAST 1407   10,2565  3 0070 0                CA      TEMPPR
0321   REF  10  LAST 1409   10,2566  50 061 0                NDX     TEMPG
0322   REF   2  LAST 1407   10,2567  55'256 0                TS      PHSPRDT1 -2

0323                        10,2570  0 0006 1                EXTEND
0324   REF   3  LAST 1408   10,2571  3 0064 0                DCA     TEMPNM
0325   REF  11  LAST 1410   10,2572  50 061 0                NDX     TEMPG
0326   REF   4  LAST 1408   10,2573  53'435 0                DXCH    PHSNAME1 -2

0327   REF   1              10,2574  1 2516 0                TCF     BELOW1

0329   REF   8  LAST 1402      4000                          SETLOC  FFTAG1
0330                           5464                          BANK

0331   REF   4 LAST 1406 TO 1408:    66     99*              COUNT*  $$/PHASE
0332   REF  30  LAST 1408      5464  7 4755 0  CHECKB        MASK    BIT12           SINCE THIS IS OF TYPE B, THIS BIT SHOULD
0333   REF 350  LAST 1409      5465  10 000 0                CCS     A                BE HERE IF WE ARE TO GET A NEW PRIORITY
0334   REF   2  LAST 1407      5466  1 5451 0                TCF     GETPRIO         IT IS, SO GET NEW PRIORITY

0335   REF   1                 5467  1 5430 1                TCF     OLDPRIO         IT ISN:T, USE THE OLD PRIORITY
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 0002   REF   2  LAST  230   01,2000                        SETLOC RESTART
 0003                        01,3467                        BANK

 0004   REF   5  LAST 1410   E3,1436                        EBANK= PHSNAME1        GOPROG MUST SWITCH TO THIS EBANK

 0005   REF   1                                             COUNT* $$/RSROU
 0006   REF 661  LAST 1369   01,3467  3 0161 1  RESTARTS CA     MPAC +5           GET GROUP NUMBER -1
 0007                        01,3470  6 0000 1              DOUBLE                 SAVE FOR INDEXING
 0008   REF   1              01,3471  54 155 1              TS     TEMP2G

 0009   REF   1              01,3472  3 3127 0              CA     PHS2CADR          SET UP EXIT IN CASE IT IS AN EVEN
 0010   REF   1              01,3473  54 157 0              TS     TEMPSWCH          TABLE PHASE

 0011   REF   1              01,3474  3 3526 0              CA     RTRNCADR          TO SAVE TIME ASSUME IT WILL GET NEXT
 0012   REF   1              01,3475  54 707 0              TS     GOLOC +2          GROUP AFTER THIS

 0013   REF   1              01,3476  3 0154 1              CA     TEMPPHS
 0014   REF  10  LAST 1394   01,3477  7 5024 0              MASK   OCT1400
 0015   REF 351  LAST 1410   01,3500  10 000 0              CCS    A                 IS IT A VARIABLE OR TABLE RESTART
 0016   REF   1              01,3501  1 3512 0              TCF    ITSAVAR           IT:S A VARIABLE RESTART

 0017   REF   2  LAST 1411   01,3502  10 154 0  GETPART2 CCS    TEMPPHS           IS IT AN X.1 RESTART
 0018   REF 352  LAST 1411   01,3503  10 000 0              CCS    A
 0019   REF   1              01,3504  1 3612 0              TCF    ITSATBL           NO, ITS A TABLE RESTART

 0020   REF   6  LAST 1408   01,3505  3 5053 1              CA     PRIO14            IT IS AN X.1 RESTART, THEREFORE START
 0021   REF  37  LAST 1313   01,3506  0 5135 0  FVACCADR TC     FINDVAC           THE DISPLAY RESTART ROUTINE (=GENADR)
 0022   REF  46  LAST 1407   E3,1400                        EBANK= LST1
 0023   REF   1              01,3507   03263 0              2CADR  INITDSP
 0023   REF   1              01,3510   20063 0

 0024   REF   2  LAST 1411   01,3511  0 3526 0              TC     RTRNCADR          FINISHED WITH THIS GROUP, GET NEXT ONE

 0025   REF  11  LAST 1411   01,3512  7 5024 0  ITSAVAR  MASK   OCT1400           IS IT TYPE B ?
 0026   REF 353  LAST 1411   01,3513  10 000 0              CCS    A
 0027   REF   1              01,3514  1 3563 0              TCF    ITSLIKEB          YES,IT IS TYPE B

 0028                        01,3515  0 0006 1              EXTEND                   STORE THE JOB (OR TASK) 2CADR FOR EXIT
 0029   REF   2  LAST 1411   01,3516  5 0155 0              NDX    TEMP2G
 0030   REF   6  LAST 1411   01,3517  3 1437 0              DCA    PHSNAME1
 0031   REF   2  LAST 1411   01,3520  52 706 1              DXCH   GOLOC

 0032   REF   3  LAST 1411   01,3521  3 0154 1              CA     TEMPPHS           SEE IF THIS IS A JOB, TASK, OR A LONGCAL
 0033   REF   3  LAST 1408   01,3522  7 4774 0              MASK   OCT7
 0034   REF   2  LAST 1258   01,3523  6 7701 0              AD     MINUS2
 0035   REF 354  LAST 1411   01,3524  10 000 0              CCS    A
 0036   REF   1              01,3525  1 3675 1              TCF    ITSLNGCL          ITS A LONGCALL

 0037   REF   4  LAST  329   01,3526  0 4651 1  RTRNCADR TC     SWRETURN          CANT GET HERE
 0038   REF   1              01,3527  1 3531 1              TCF    ITSAWAIT
 0039    REF   1                01,3530  1 3576 1             TCF      ITSAJOB         ITS A JOB

 0040    REF   1                01,3531  3 3463 0  ITSAWAIT CA       WTLTCADR        SET UP WAITLIST CALL
 0041    REF   3  LAST 1411     01,3532  54 704 0             TS       GOLOC -1

 0042    REF   3  LAST 1411     01,3533  50 155 0             NDX      TEMP2G          DIRECTLY STORED
 0043    REF   3  LAST 1410     01,3534  3 1260 1             CA       PHSPRDT1
 0044    REF 355  LAST 1411     01,3535  10 000 0  TIMETEST CCS      A               IS IT AN IMMEDIATE RESTART
 0045    REF 356  LAST 1412     01,3536  24 000 1             INCR     A               NO,
 0046    REF   1                01,3537  1 3542 0             TCF      FINDTIME        FIND OUT WHEN IT SHOULD BEGIN

 0047    REF   1                01,3540  1 5470 0             TCF      ITSINDIR        STORED INDIRECTLY

 0048    REF   1                01,3541  1 3561 1             TCF      IMEDIATE        IT WANTS AN IMMEDIATE RESTART

R0049    ***** THIS MUST BE IN FIXED FIXED *****

 0051    REF   3  LAST  640        4000                       SETLOC FFTAG2
 0052                              5470                       BANK

 0053    REF   1                                              COUNT* $$/RSROU
 0054    REF   4  LAST 1412        5470  22 706 0  ITSINDIR LXCH     GOLOC +1        GET THE CORRECT E BANK IN CASE THIS IS
 0055    REF   2  LAST 1407        5471  22 006 1             LXCH     BB              SWITCHED ERRASIBLE

 0056    REF 357  LAST 1412        5472  50 000 1             NDX      A               GET THE TIME INDIRECTLY
 0057                              5473  3 0001 0             CA       1

 0058    REF   3  LAST 1412        5474  22 006 1             LXCH     BB              RESTORE THE BB AND GOLOC
 0059    REF   5  LAST 1412        5475  22 706 0             LXCH     GOLOC +1

 0060    REF   2  LAST 1412        5476  1 3542 0             TCF      FINDTIME        FIND OUT WHEN IT SHOULD BEGIN

R0061    ***** YOU  MAY RETURN TO  SWITCHED FIXED *****

 0063    REF   3  LAST 1411     01,2000                       SETLOC RESTART
 0064                           01,3542                       BANK

 0065    REF   2 LAST 1411 TO 1412:     43     43*            COUNT* $$/RSROU
 0066                           01,3542  4 0000 0  FINDTIME COM                      MAKE NEGITIVE SINCE IT WILL BE SUBTRACTD
 0067    REF 185  LAST 1401     01,3543  54 001 1             TS       L               AND SAVE
 0068    REF   4  LAST 1412     01,3544  50 155 0             NDX      TEMP2G
 0069    REF   6  LAST 1409     01,3545  4 1257 1             CS       TBASE1
 0070                           01,3546  0 0006 1             EXTEND
 0071    REF  25  LAST 1409     01,3547  60 025 0             SU       TIME1
 0072    REF 358  LAST 1412     01,3550  10 000 0             CCS      A
 0073                           01,3551  4 0000 0             COM
 0074    REF   6  LAST 1039     01,3552  6 7663 0             AD       OCT37776
 0075    REF 150  LAST 1406     01,3553  6 4770 0             AD       ONE
 0076    REF 186  LAST 1412     01,3554  6 0001 0             AD       L
 0077    REF 359  LAST 1412     01,3555  10 000 0             CCS      A
```

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L         RESTARTS ROUTINE                                                                          USER'S PAGE NO.   3        E3 53

 0078     REF 249  LAST 1393    01,3556  3 4772 1     -3      CAF     ZERO
 0079                           01,3557  1 3561 1             TCF     +2
 0080                           01,3560  1 3561 1             TCF     +1
 0081     REF 151  LAST 1412    01,3561  6 4770 0  IMEDIATE AD      ONE
 0082     REF   6  LAST 1412    01,3562  0 0704 1             TC      GOLOC -1
 0083     REF   3  LAST 1411    01,3563  3 3526 0  ITSLIKEB CA      RTRNCADR         TYPE B,                SO STORE RETURN IN
 0084     REF   2  LAST 1411    01,3564  54 157 0             TS      TEMPSWCH         TEMPSWCH IN CASE OF AN EVEN PHASE

 0085     REF   1               01,3565  3 3133 0             CA      PRT2CADR         SET UP EXIT TO GET TABLE PART OF THIS
 0086     REF   7  LAST 1413    01,3566  54 707 0             TS      GOLOC +2         VARIABLE TYPE OF PHASE

 0087     REF   4  LAST 1411    01,3567  3 0154 1             CA      TEMPPHS          MAKE THE PHASE LOOK RIGHT FOR THE TABLE
 0088     REF   1               01,3570  7 6043 1             MASK    OCT177           PART OF THIS VARIABLE PHASE
 0089     REF   5  LAST 1413    01,3571  54 154 0             TS      TEMPPHS

 0090                           01,3572  0 0006 1             EXTEND
 0091     REF   5  LAST 1412    01,3573  5 0155 0             NDX     TEMP2G           OBTAIN THE JOB:S 2CADR
 0092     REF   7  LAST 1411    01,3574  3 1437 0             DCA     PHSNAME1
 0093     REF   8  LAST 1413    01,3575  52 706 1             DXCH    GOLOC

 0094     REF   6  LAST 1413    01,3576  50 155 0  ITSAJOB  NDX     TEMP2G           NOW ADD THE PRIORITY AND LET:S GO
 0095     REF   4  LAST 1412    01,3577  3 1260 1             CA      PHSPRDT1
 0096     REF   9  LAST 1413    01,3600  54 704 0  CHKNOVAC TS      GOLOC -1         SAVE PRIO UNTIL WE SEE IF ITS
 0097                           01,3601  0 0006 1             EXTEND                   A FINDVAC OR A NOVAC
 0098     REF   1               01,3602  6 3606 1             BZMF    ITSNOVAC

 0099     REF   1               01,3603  3 3506 1             CAF     FVACCADR         POSITIVE, SET UP FINDVAC CALL
 0100     REF  10  LAST 1413    01,3604  56 704 1             XCH     GOLOC -1         PICK UP PRIO,
 0101     REF  11  LAST 1413    01,3605  0 0704 1             TC      GOLOC -1         AND GO

 0102     REF   1               01,3606  3 5310 0  ITSNOVAC CAF     NOVACADR         NEGATIVE,
 0103     REF  12  LAST 1413    01,3607  56 704 1             XCH     GOLOC -1         SET UP NOVAC CALL,
 0104                           01,3610  4 0000 0             COM                      CORRECT PRIO,
 0105     REF  13  LAST 1413    01,3611  0 0704 1             TC      GOLOC -1         AND GO

 0106     REF  39  LAST 1398    01,3612  54 020 1  ITSATBL  TS      CYR              FIND OUT IF THE PHASE IS ODD OR EVEN
 0107     REF  40  LAST 1413    01,3613  10 020 1             CCS     CYR
 0108                           01,3614  1 3615 1             TCF     +1               IT:S EVEN
 0109     REF   1               01,3615  1 3713 0             TCF     ITSEVEN

 0110     REF   4  LAST 1413    01,3616  3 3526 0             CA      RTRNCADR         IN CASE THIS IS THE SECOND PART OF A
 0111     REF  14  LAST 1413    01,3617  54 707 0             TS      GOLOC +2         TYPE B RESTART, WE NEED PROPER EXIT

 0112     REF   6  LAST 1413    01,3620  3 0154 1             CA      TEMPPHS          SET UP POINTER FOR FINDING OUR PLACE IN
 0113     REF  31  LAST 1401    01,3621  54 021 0             TS      SR               THE RESTART TABLES
 0114     REF  32  LAST 1413    01,3622  6 0021 1             AD      SR
 0115     REF   7  LAST 1413    01,3623  50 155 0             NDX     TEMP2G
 0116     REF   1               01,3624  6 2001 1             AD      SIZETAB +1
 0117     REF   1               01,3625  54 156 1             TS      POINTER
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L        RESTARTS ROUTINE                                                                USER'S PAGE NO.   4      E3 S3

 0118                             01,3626  0 0006 1  CONTBL2  EXTEND                     FIND OUT WHAT:S IN THE TABLE
 0119    REF   2  LAST 1413       01,3627  5 0156 0           NDX     POINTER
 0120    REF   1                  01,3630  3 2002 1           DCA     CADRTAB            GET THE 2CADR

 0121    REF  15  LAST 1413       01,3631  22 706 0           LXCH    GOLOC +1           STORE THE BB INFORMATION

 0122    REF 360  LAST 1412       01,3632  10 000 0           CCS     A                  IS IT A JOB OR IS IT  TIMED
 0123    REF 361  LAST 1414       01,3633  24 000 1           INCR    A                  POSITIVE, MUST BE A JOB
 0124    REF   1                  01,3634  1 3707 0           TCF     ITSAJOB2

 0125    REF 362  LAST 1414       01,3635  24 000 1           INCR    A                  MUST BE EITHER A WAITLIST OR LONGCALL
 0126    REF  16  LAST 1414       01,3636  54 705 1           TS      GOLOC              LET-S STORE THE CORRECT CADR

 0127    REF   2  LAST 1412       01,3637  3 3463 0           CA      WTLTCADR           SET UP OUR EXIT TO WAITLIST
 0128    REF  17  LAST 1414       01,3640  54 704 0           TS      GOLOC -1

 0129    REF  18  LAST 1414       01,3641  3 0706 0           CA      GOLOC +1           NOW FIND OUT IF IT IS A WAITLIST CALL
 0130    REF  29  LAST 1393       01,3642  7 4757 1           MASK    BIT10              THIS SHOULD BE ONE IF WE HAVE -BB
 0131    REF 363  LAST 1414       01,3643  10 000 0           CCS     A                  FOR THAT MATTER SO SHOULD BE BITS 9,8,7,
A0132                                                                                    6,5, AND LAST BUT NOT LEAST (PERHAPS NOT
A0133                                                                                    IN IMPORTANCE ANYWAY. BIT 4
 0134    REF   1                  01,3644  1 3702 0           TCF     ITSWTLST           IT IS A WAITLIST CALL

 0135    REF   3  LAST 1414       01,3645  50 156 0           NDX     POINTER            OBTAIN THE ORIGINAL DELTA T
 0136    REF   1                  01,3646  3 2000 0           CA      PRDTTAB            ADDRESS FOR THIS LONGCALL

 0137    REF   1                  01,3647  1 5477 1           TCF     ITSLGCL1           NOW GO GET THE DELTA TIME

R0138    ***** THIS MUST BE IN FIXED FIXED *****

 0140    REF   4  LAST 1412          4000                     SETLOC FFTAG2
 0141                                5477                     BANK

 0142    REF   2 LAST 1412 TO 1412:     7       7*            COUNT*  $$/RSROU
 0143    REF  19  LAST 1414          5477  22 706 0  ITSLGCL1 LXCH    GOLOC +1           OBTAIN THE CORRECT E BANK
 0144    REF   4  LAST 1412          5500  22 006 1           LXCH    BB
 0145    REF  20  LAST 1414          5501  22 706 0           LXCH    GOLOC +1           AND PRESERVE OUR E AND F BANKS

 0146                                5502  0 0006 1           EXTEND                     GET THE DELTA TIME
 0147    REF 364  LAST 1414          5503  5 0000 1           NDX     A
 0148                                5504  3 0001 0           DCA     0

 0149    REF  21  LAST 1414          5505  22 706 0           LXCH    GOLOC +1           RESTORE OUR E AND F BANK
 0150    REF   5  LAST 1414          5506  22 006 1           LXCH    BB                 RESTORE THE TASKS E AND F BANKS
 0151    REF  22  LAST 1414          5507  22 706 0           LXCH    GOLOC +1           AND PRESERVE OUR L

 0152    REF   1                     5510  1 3650 0           TCF     ITSLGCL2           NOW LET:S PROCESS THIS LONGCALL

R0153    ***** YOU  MAY RETURN TO  SWITCHED FIXED *****
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0155   REF   4  LAST 1412    01,2000                           SETLOC RESTART
0156                         01,3650                           BANK

0157   REF   3 LAST 1412 TO 1414:    70     113*               COUNT* $$/RSROU
0158   REF   8  LAST 1235    01,3650  53'305 1  ITSLGCL2 DXCH   LONGTIME

0159                         01,3651  0 0006 1           EXTEND                   CALCULATE TIME LEFT
0160   REF  36  LAST 1409    01,3652  4 0025 1           DCS    TIME2
0161   REF   9  LAST 1415    01,3653  21'305 1           DAS    LONGTIME
0162                         01,3654  0 0006 1           EXTEND
0163   REF   2  LAST 1409    01,3655  3 1303 0           DCA    LONGBASE
0164   REF  10  LAST 1415    01,3656  21'305 1           DAS    LONGTIME

0165   REF  11  LAST 1415    01,3657  11'304 0           CCS    LONGTIME          FIND OUT HOW THIS SHOULD BE RESTARTED
0166   REF   1               01,3660  1 3670 1           TCF    LONGCLCL
0167                         01,3661  1 3663 0           TCF    +2
0168   REF   2  LAST 1412    01,3662  1 3556 0           TCF    IMEDIATE -3
0169   REF  12  LAST 1415    01,3663  11'305 1           CCS    LONGTIME +1
0170   REF   2  LAST 1415    01,3664  1 3670 1           TCF    LONGCLCL
0171                         01,3665  13 666 0           NOOP                     CAN:T GET HERE     *********
0172   REF   3  LAST 1415    01,3666  1 3556 0           TCF    IMEDIATE -3
0173   REF   4  LAST 1415    01,3667  1 3561 1           TCF    IMEDIATE

0174   REF   1               01,3670  3 3137 1  LONGCLCL CA     LGCLCADR          WE WILL GO TO LONGCALL
0175   REF  23  LAST 1414    01,3671  54 704 0           TS     GOLOC -1

0176                         01,3672  0 0006 1           EXTEND                   PREPARE OUR ENTRY TO LONGCALL
0177   REF  13  LAST 1415    01,3673  3 1305 0           DCA    LONGTIME
0178   REF  24  LAST 1415    01,3674  0 0704 1           TC     GOLOC -1

0179   REF   3  LAST 1414    01,3675  3 3463 0  ITSLNGCL CA     WTLTCADR          ASSUME IT WILL GO TO WAITLIST
0180   REF  25  LAST 1415    01,3676  54 704 0           TS     GOLOC -1

0181   REF   8  LAST 1413    01,3677  50 155 0           NDX    TEMP2G
0182   REF   5  LAST 1413    01,3700  4 1260 0           CS     PHSPRDT1          GET THE DELTA T ADDRESS

0183   REF   2  LAST 1414    01,3701  1 5477 1           TCF    ITSLGCL1          NOW GET THE DELTA TIME

0184   REF  26  LAST 1415    01,3702  4 0706 1  ITSWTLST CS     GOLOC +1          CORRECT THE BBCON INFORMATION
0185   REF  27  LAST 1415    01,3703  54 706 1           TS     GOLOC +1

0186   REF   4  LAST 1414    01,3704  50 156 0           NDX    POINTER           GET THE DT AND FIND OUT IF IT WAS STORED
0187   REF   2  LAST 1414    01,3705  3 2000 0           CA     PRIOTTAB          DIRECTLY OR INDIRECTLY

0188   REF   1               01,3706  1 3535 0           TCF    TIMETEST          FIND OUT HOW THE TIME IS STORED

0189   REF  28  LAST 1415    01,3707  56 705 0  ITSAJOB2 XCH    GOLOC             STORE THE CADR

0190   REF   5  LAST 1415    01,3710  50 156 0           NDX    POINTER           ADD THE PRIORITY AND LET:S GO
0191   REF   3  LAST 1415    01,3711  3 2000 0           CA     PRIOTTAB
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 0192   REF   1                 01,3712  1 3600 0             TCF     CHKNOVAC

 0193   REF   3  LAST 1413      01,3713  3 0157 1  ITSEVEN    CA      TEMPSWCH          SET UP FOR EITHER THE SECOND PART OF THE
 0194   REF  29  LAST 1415      01,3714  54 707 0             TS      GOLOC +2          TABLE, OR A RETURN FOR THE NEXT GROUP

 0195   REF   9  LAST 1415      01,3715  50 155 0             NDX     TEMP2G            SET UP POINTER FOR OUR LOCATION WITHIN
 0196   REF   2  LAST 1413      01,3716  3 2000 0             CA      SIZETAB           THE TABLE
 0197   REF   7  LAST 1413      01,3717  6 0154 1             AD      TEMPPHS           THIS MAY LOOK BAD BUT LET:S SEE YOU DO
 0198   REF   8  LAST 1416      01,3720  6 0154 1             AD      TEMPPHS           BETTER IN TIME OR NUMBERR OF LOCATIONS
 0199   REF   9  LAST 1416      01,3721  6 0154 1             AD      TEMPPHS
 0200   REF   6  LAST 1415      01,3722  54 156 1             TS      POINTER

 0201   REF   1                 01,3723  1 3626 1             TCF     CONTBL2           NOW PROCESS WHAT IS IN THE TABLE

 0202   REF  48  LAST 1393      01,3724  3 6214 0  PHSPART2   CA      THREE             SET THE POINTER FOR THE SECOND HALF OF
 0203   REF   7  LAST 1416      01,3725  26 156 1             ADS     POINTER           THE TABLE

 0204   REF   5  LAST 1413      01,3726  3 3526 0             CA      RTRNCADR          THIS WILL BE OUR LAST TIME THROUGH THE
 0205   REF  30  LAST 1416      01,3727  54 707 0             TS      GOLOC +2          EVEN TABLE , SO AFTER IT  GET THE NEXT
A0206                                                                                   GROUP
 0207   REF   2  LAST 1416      01,3730  1 3626 1             TCF     CONTBL2           SO LET:S GET THE SECOND ENTRY IN THE TBL

 0208   REF 662  LAST 1411         0154            TEMPPHS    EQUALS  MPAC
 0209   REF 663  LAST 1416         0155            TEMP2G     EQUALS  MPAC +1
 0210   REF 664  LAST 1416         0156            POINTER    EQUALS  MPAC +2
 0211   REF 665  LAST 1416         0157            TEMPSWCH   EQUALS  MPAC +3
 0213   REF  11  LAST 1394         7701            MINUS2     EQUALS  NEG2
 0214   REF   9  LAST 1215         6043            OCT177     EQUALS  LOW7
```

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L         IMU MODE SWITCHING ROUTINES                                                                   USER'S PAGE NO.   1      E0 S3

 0002   REF   1                   4000                       SETLOC FFTAG3
 0003                             5511                       BANK

 0004   REF   1               E3,1471                        EBANK= COMMAND

R0005               FIXED-FIXED ROUTINES.

 0006   REF   1                                              COUNT* $$/IMODE
 0007   REF 250  LAST 1413       5511  3 4772 1  ZEROICDU CAF    ZERO                ZERO ICDU COUNTERS.
 0008   REF  29  LAST 1364       5512  54 032 1           TS     CDUX
 0009   REF  18  LAST 1364       5513  54 033 0           TS     CDUY
 0010   REF  26  LAST 1364       5514  54 034 1           TS     CDUZ
 0011   REF 292  LAST 1409       5515  0 0002 0           TC     Q

 0012   REF  26  LAST 1393       4760            SPSCODE  =      BIT9
```

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P0013            IMU ZEROING ROUTINE.

  0015  REF   1             07,2000                      SETLOC  MODESW
  0016                      07,2627                      BANK

  0017  REF   1                                          COUNT*  $$/IMODE
  0018                      07,2627  0 0004 0  IMUZERO   INHINT                  ROUTINE TO ZERO ICDUS.
  0019  REF  39  LAST  393  07,2630  4 1241 0            CS      DSPTAB +11D     DONT ZERO CDUS IF IMU IN GIMBAL LOCK AND
  0020  REF   4  LAST  195  07,2631  7 5004 1            MASK    BITS4&6         COARSE ALIGN (GIMBAL RUNAWAY PROTECTION)
  0021  REF 365  LAST 1414  07,2632  10 000 0            CCS     A
  0022  REF   1             07,2633  1 2637 0            TCF     IMUZEROA

  0023  REF  35  LAST 1359  07,2634  0 5671 1            TC      ALARM           IF SO.
  0024                      07,2635   00206 0            OCT     00206

  0025  REF   1             07,2636  1 3622 0            TCF     CAGETSTJ +4     IMMEDIATE FAILURE.

  0032  REF   2  LAST 1418  07,2637  0 3616 0  IMUZEROA  TC      CAGETSTJ
 R0033                                DO ALL THE WORK.
  0034  REF  33  LAST 1063  07,2640  4 1334 0            CS      IMODES33        DISABLE DAP AUTO AND HOLD MODES
  0035  REF   8  LAST 1063  07,2641  7 4763 0            MASK    NOIMUDAP
  00352 REF  34  LAST 1418  07,2642  27'334 0            ADS     IMODES33
  00355                     07,2643  4 0000 0            COM
  00357 REF   1             07,2644  7 4764 1            MASK    IMUZROBT
  0036  REF  35  LAST 1418  07,2645  27'334 0            ADS     IMODES33

  0037  REF  47  LAST  773  07,2646  4 1333 1            CS      IMODES30        INHIBIT ICDUFAIL AND IMUFAIL (IN CASE WE
  0038  REF   2  LAST  151  07,2647  7 4765 0            MASK    IMUFINHT
  00382 REF  48  LAST 1418  07,2650  27'333 1            ADS     IMODES30
  00385                     07,2651  4 0000 0            COM
  00387 REF   2  LAST  151  07,2652  7 4766 0            MASK    ICDUINHT
  0039  REF  49  LAST 1418  07,2653  27'333 1            ADS     IMODES30

  0040  REF   5  LAST 1418  07,2654  4 5004 1            CS      BITS4&6         SEND ZERO ENCODE WITH COARSE AND ERROR
  0041                      07,2655  0 0006 1            EXTEND                  COUNTER DISABLED.
  0042  REF  45  LAST 1010  07,2656  03 012 1            WAND    CHAN12

  0043  REF   3  LAST  152  07,2657  0 3207 1            TC      NOATTOFF        TURN OFF NO ATT LAMP.

  0044  REF  32  LAST 1393  07,2660  3 4764 0            CAF     BIT5
  0045                      07,2661  0 0006 1            EXTEND
  0046  REF  46  LAST 1418  07,2662  05 012 1            WOR     CHAN12

  00461 REF   3  LAST  152  07,2663  0 5511 1            TC      ZEROICDU
  0047  REF  34  LAST 1393  07,2664  3 4763 1            CAF     BIT6            WAIT 320 MS TO GIVE AGS ADEQUATE TIME TO
  0048  REF  24  LAST 1235  07,2665  0 5223 1            TC      TWIDDLE         RECEIVE ITS PULSE TRAIN.
  0049  REF   5  LAST  199  E3,1474                      EBANK=  CDUIND
  0050  REF   1             07,2666   02677 0            ADRES   IMUZERO2
  0051  REF  50  LAST 1418  07,2667  4 1333 1            CS      IMODES30        SEE IF IMU OPERATING AND ALARM IF NOT.
  0052  REF   3  LAST  773  07,2670  7 4760 0            MASK    IMUOPBIT
```

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L        IMU MODE SWITCHING ROUTINES                                                   USER'S PAGE NO.  3      E3 S3

 0053   REF 366  LAST 1418   07,2671  10 000 0            CCS     A
 0054   REF   1              07,2672  1 2675 0            TCF     MODEEXIT

 0055   REF  36  LAST 1418   07,2673  0 5671 1            TC      ALARM
 0056                        07,2674   00210 1            OCT     210

 0057                        07,2675  0 0003 1  MODEEXIT RELINT                   GENERAL MODE-SWITCHING EXIT.
 0058   REF   5  LAST 1411   07,2676  1 4651 0            TCF     SWRETURN

 0059   REF   1              07,2677  0 3606 1  IMUZERO2 TC      CAGETEST
 0061   REF   4  LAST 1418   07,2700  0 5511 1            TC      ZEROICDU         ZERO CDUX, CDUY, CDUZ

 0062   REF  33  LAST 1418   07,2701  4 4764 1            CS      BIT5             REMOVE ZERO DISCRETE.
 0063                        07,2702  0 0006 1            EXTEND
 0064   REF  47  LAST 1418   07,2703  03 012 1            WAND    CHAN12

 0065   REF   2  LAST  151   07,2704  3 5025 0            CAF     7.9SEC           WAIT 7.9 SEC FOR CTRS TO FIND GIMBALS
 0066   REF   4  LAST  172   07,2705  0 5260 0            TC      VARDELAY

 0067   REF   2  LAST 1419   07,2706  0 3606 1  IMUZERO3 TC      CAGETEST
 0069   REF   3  LAST 1418   07,2707  3 4765 1            CA      IMUFINHT
 00692  REF   3  LAST 1418   07,2710  6 4766 1            AD      ICDUINHT
 00695                       07,2711  4 0000 0            COM
 0070   REF  51  LAST 1418   07,2712  7 1333 1            MASK    IMODES30
 0071   REF  52  LAST 1419   07,2713  55'333 1            TS      IMODES30

 0072   REF   9  LAST 1418   07,2714  3 4763 1            CA      NOIMUDAP
 00722  REF   2  LAST 1418   07,2715  6 4764 0            AD      IMUZROBT
 00725                       07,2716  4 0000 0            COM
 0073   REF  36  LAST 1418   07,2717  7 1334 0            MASK    IMODES33             BITS FOR GROUND
 0074   REF  37  LAST 1419   07,2720  55'334 0            TS      IMODES33

 0075   REF  37  LAST 1090   07,2721  0 4714 1            TC      IBNKCALL         SET ISS WARNING IF EITHER OF ABOVE ARE
 0076   REF   5  LAST  167   07,2722   14706 0            CADR    SETISSW          PRESENT.

 0077   REF   1              07,2723  1 3563 0            TCF     ENDIMU
```

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L          IMU MODE SWITCHING ROUTINES                                                          USER'S PAGE NO.  4       E3 S3

P0078                 IMU COARSE ALIGN MODE.

 0079                         07,2724  0 0004 0  IMUCOARS INHINT
 0080   REF   3  LAST 1418    07,2725  0 3616 0           TC       CAGETSTJ
 0081   REF   3  LAST  199    07,2726  0 3070 0           TC       SETCOARS

 0082   REF  35  LAST 1393    07,2727  3 6211 0           CAF      SIX
 0083   REF  28  LAST 1235    07,2730  0 5233 0           TC       WAITLIST
 0084   REF   6  LAST 1418    E3,1474                     EBANK=   CDUIND
 0085   REF   1               07,2731   02734 0           2CADR    COARS
 0085   REF   1               07,2732   16063 0

 0086   REF   2  LAST 1419    07,2733  1 2675 0           TCF      MODEEXIT

 0087   REF   3  LAST 1419    07,2734  0 3606 1  COARS    TC       CAGETEST
 0088   REF  35  LAST 1418    07,2735  3 4763 1           CAF      BIT6              ENABLE ALL THREE ISS CDU ERROR COUNTERS
 0089                         07,2736  0 0006 1           EXTEND
 0090   REF  48  LAST 1419    07,2737  05 012 1           WOR      CHAN12

 0091   REF  63  LAST 1408    07,2740  3 4767 0           CAF      TWO               SET CDU INDICATOR
 0092   REF   7  LAST 1420    07,2741  55'474 0  COARS1   TS       CDUIND

 0093   REF   8  LAST 1420    07,2742  51'474 1           INDEX    CDUIND            COMPUTE THETAD - THETAA IN 1:S
 0094   REF  24  LAST 1359    07,2743  3 1307 1           CA       THETAD              COMPLEMENT FORM
 0095                         07,2744  0 0006 1           EXTEND
 0096   REF   9  LAST 1420    07,2745  5 1474 1           INDEX    CDUIND
 0097   REF  30  LAST 1417    07,2746  20 032 1           MSU      CDUX
 0098                         07,2747  0 0006 1           EXTEND
 0099   REF  41  LAST 1393    07,2750  7 4754 1           MP       BIT13             SHIFT RIGHT 2
 0100   REF 187  LAST 1412    07,2751  56 001 0           XCH      L                 ROUND
 0101                         07,2752  6 0000 1           DOUBLE
 0102   REF  20  LAST 1408    07,2753  54 061 1           TS       ITEMP1
 0103                         07,2754  1 2756 0           TCF      +2
 0104   REF 188  LAST 1420    07,2755  26 001 1           ADS      L

 0105   REF  10  LAST 1420    07,2756  51'474 1           INDEX    CDUIND            DIFFERENCE TO BE COMPUTED
 0106   REF   2  LAST 1417    07,2757  23'471 1           LXCH     COMMAND
 0107   REF  11  LAST 1420    07,2760  11'474 0           CCS      CDUIND
 0108   REF   1               07,2761  0 2741 1           TC       COARS1

 0109   REF  64  LAST 1420    07,2762  3 4767 0           CAF      TWO               MINIMUM OF 4 MS WAIT
 0110   REF   5  LAST 1419    07,2763  0 5260 0     -1    TC       VARDELAY
 0111   REF   4  LAST 1420    07,2764  0 3606 1  COARS2   TC       CAGETEST          DONT CONTINUE IF CAGED.
 0112   REF  21  LAST 1420    07,2765  54 061 1           TS       ITEMP1            SETS TO +0.
 0113   REF  65  LAST 1420    07,2766  3 4767 0           CAF      TWO               SET CDU INDICATOR
 0114   REF  12  LAST 1420    07,2767  55'474 0     +3    TS       CDUIND

 0115   REF  13  LAST 1420    07,2770  51'474 1           INDEX    CDUIND
 0116   REF   3  LAST 1420    07,2771  11'471 0           CCS      COMMAND           NUMBER OF PULSES REQUIRED
 0117   REF   1               07,2772  0 2776 0           TC       COMPOS            GREATER THAN MAX ALLOWED
```

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L         IMU MODE SWITCHING ROUTINES                                                       USER'S PAGE NO.   5       E3 53

 0118     REF    1              07,2773  0 3005 1             TC      NEXTCDU +1
 0119     REF    1              07,2774  0 3043 0             TC      COMNEG
 0120     REF    2  LAST 1421   07,2775  0 3005 1             TC      NEXTCDU +1

 0121     REF    1              07,2776  6 3663 1  COMPOS     AD      -COMMAX             COMMAX = MAX NUMBER OF PULSES ALLOWED
 0122                           07,2777  0 0006 1             EXTEND                        MINUS ONE
 0123     REF    1              07,3000  6 3053 1             BZMF    COMZERO
 0124     REF   14  LAST 1420   07,3001  51'474 1             INDEX   CDUIND
 0125     REF    4  LAST 1420   07,3002  55'471 0             TS      COMMAND             REDUCE COMMAND BY MAX NUMBER OF PULSES
 0126     REF    1              07,3003  4 3664 1             CS      -COMMAX               ALLOWED

 0127     REF   22  LAST 1420   07,3004  24 061 0  NEXTCDU    INCR    ITEMP1
 0128     REF   18  LAST 1394   07,3005  6 4771 1    +1       AD      NEG
 0129     REF   15  LAST 1421   07,3006  51'474 1             INDEX   CDUIND
 0130     REF    4  LAST 1010   07,3007  54 050 0             TS      CDUXCMD             SET UP COMMAND REGISTER.

 0131     REF   16  LAST 1421   07,3010  11'474 0             CCS     CDUIND
 0132     REF    1              07,3011  0 2767 0             TC      COARS2 +3

 0133     REF   23  LAST 1421   07,3012  10 061 1             CCS     ITEMP1              SEE IF ANY PULSES TO GO OUT.
 0134     REF    1              07,3013  1 3057 1             TCF     SENDPULS

 0135     REF   11  LAST 1225   07,3014  0 5255 0             TC      FIXDELAY            WAIT FOR GIMBALS TO SETTLE.
 0136                           07,3015   00226 1             DEC     150


 0137     REF   66  LAST 1420   07,3016  3 4767 0             CAF     TWO                 AT END OF COMMAND, CHECK TO SEE THAT
 0138     REF   24  LAST 1421   07,3017  54 061 1  CHKCORS    TS      ITEMP1              GIMBALS ARE WITHIN 2 DEGREES OF THETAD.
 0139     REF  367  LAST 1419   07,3020  50 000 1             INDEX   A
 0140     REF   31  LAST 1420   07,3021  3 0032 0             CA      CDUX
 0141                           07,3022  0 0006 1             EXTEND
 0142     REF   25  LAST 1421   07,3023  5 0061 0             INDEX   ITEMP1
 0143     REF   25  LAST 1420   07,3024  21'307 0             MSU     THETAD
 0144     REF  368  LAST 1421   07,3025  10 000 0             CCS     A
 0145     REF    1              07,3026  1 3034 1             TCF     COARSERR
 0146     REF    1              07,3027  1 3031 1             TCF     CORSCHK2
 0147     REF    2  LAST 1421   07,3030  1 3034 1             TCF     COARSERR
 0148    REF  26  LAST 1421    07,3031  10 0061 1  CORSCHK2 CCS      ITEMP1
 0149    REF   1               07,3032  1 3017 0           TCF      CHKCORS
 0150    REF   2  LAST 1419    07,3033  1 3563 0           TCF      ENDIMU              END OF COARSE ALIGNMENT.

 0151    REF   1               07,3034  6 3042 1  COARSERR AD       COARSTOL            2 DEGREES.
 0152                          07,3035  0 0006 1           EXTEND
 0153    REF   2  LAST 1421    07,3036  6 3031 0           BZMF     CORSCHK2

 0154    REF  37  LAST 1419    07,3037  0 5671 1           TC       ALARM               COARSE ALIGN ERROR.
 0155                          07,3040   00211 0           OCT      211

 0156    REF   2  LAST  151    07,3041  1 3625 1           TCF      IMUBAD

 0157                          07,3042   77511 1  COARSTOL DEC      -.01111             2 DEGREES SCALED AT HALF-REVOLUTIONS

 0158    REF   2  LAST 1421    07,3043  6 3663 1  COMNEG   AD       -COMMAX
 0159                          07,3044  0 0006 1           EXTEND
 0160    REF   2  LAST 1421    07,3045  6 3053 1           BZMF     COMZERO
 0161                          07,3046  4 0000 0           COM
 0162    REF  17  LAST 1421    07,3047  51'474 1           INDEX    CDUIND
 0163    REF   5  LAST 1421    07,3050  55'471 0           TS       COMMAND
 0164    REF   2  LAST 1421    07,3051  3 3664 0           CA       -COMMAX-
 0165    REF   3  LAST 1421    07,3052  0 3004 0           TC       NEXTCDU

 0166    REF 251  LAST 1417    07,3053  3 4772 1  COMZERO  CAF      ZERO
 0167    REF  18  LAST 1422    07,3054  51'474 1           INDEX    CDUIND
 0168    REF   6  LAST 1422    07,3055  57'471 1           XCH      COMMAND
 0169    REF   4  LAST 1422    07,3056  0 3004 0           TC       NEXTCDU


 0170    REF   6  LAST 1066    07,3057  3 7673 1  SENDPULS CAF      13,14,15
 0171                          07,3060  0 0006 1           EXTEND
 0172    REF  11  LAST 1010    07,3061  05 0014 1          WOR      CHAN14
 0173    REF   1               07,3062  3 3665 1           CAF      600MS
 0174    REF   2  LAST 1421    07,3063  1 2763 0           TCF      COARS2 -1           THEN TO VARDELAY

 0175    REF  36  LAST 1420    07,3064  3 4763 1  CA+ECE   CAF      BIT6                ENABLE ALL THREE ISS CDU ERROR COUNTERS
 0176                          07,3065  0 0006 1           EXTEND
 0177    REF  49  LAST 1420    07,3066  05 0012 1          WOR      CHAN12
 0178    REF  58  LAST 1313    07,3067  0 5314 1           TC       TASKOVER
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0179   REF  37  LAST 1393   07,3070  3 4765 1  SETCOARS CAF     BIT4             BYPASS IF ALREADY IN COARSE ALIGN
0180                        07,3071  0 0006 1           EXTEND
0181   REF  50  LAST 1422   07,3072  02 012 0           RAND    CHAN12
0182   REF 369  LAST 1421   07,3073  10 000 0           CCS     A
0183   REF 293  LAST 1417   07,3074  0 0002 0           TC      Q

0184   REF  37  LAST 1422   07,3075  4 4763 0           CS      BIT6             CLEAR ISS ERROR COUNTERS
0185                        07,3076  0 0006 1           EXTEND
0186   REF  51  LAST 1423   07,3077  03 012 1           WAND    CHAN12

0187   REF  30  LAST 1414   07,3100  4 4757 1           CS      BIT10            KNOCK DOWN GYRO ACTIVITY
0188                        07,3101  0 0006 1           EXTEND
0189   REF  12  LAST 1422   07,3102  03 014 1           WAND    CHAN14
0190   REF 252  LAST 1422   07,3103  4 4772 0           CS      ZERO
0191   REF   2  LAST  160   07,3104  54 047 0           TS      GYROCMD

0192   REF  38  LAST 1423   07,3105  3 4765 1           CAF     BIT4             PUT ISS IN COARSE ALIGN
0193                        07,3106  0 0006 1           EXTEND
0194   REF  52  LAST 1423   07,3107  05 012 1           WOR     CHAN12

0195   REF  40  LAST 1418   07,3110  4 1241 0           CS      DSPTAB +11D      TURN ON NO ATT LAMP
0196   REF   1              07,3111  7 7664 0           MASK    OCT40010
0197   REF  41  LAST 1423   07,3112  27'241 0           ADS     DSPTAB +11D

0198   REF  38  LAST 1419   07,3113  4 1334 0           CS      IMODES33         DISABLE DAP AUTO AND HOLD MODES
0199   REF  10  LAST 1419   07,3114  7 4763 0           MASK    NOIMUDAP
0200   REF  39  LAST 1423   07,3115  27'334 0           ADS     IMODES33

0201   REF  53  LAST 1419   07,3116  4 1333 1           CS      IMODES30         DISABLE IMUFAIL
0202   REF   4  LAST 1419   07,3117  7 4765 0           MASK    IMUFINHT
0203   REF  54  LAST 1423   07,3120  27'333 1           ADS     IMODES30

0204   REF  12  LAST  760   07,3121  4 4764 1  RNDREFDR CS      TRACKBIT         KNOCK DOWN TRACK FLAG
0205   REF  40  LAST 1017   07,3122  7 0075 1           MASK    FLAGWRD1
0206   REF  41  LAST 1423   07,3123  54 075 1           TS      FLAGWRD1

0207   REF   4  LAST 1225   07,3124  4 4752 1           CS      DRFTBIT          KNOCK DOWN DRIFT FLAG
0208   REF  26  LAST 1225   07,3125  7 0076 1           MASK    FLAGWRD2
0209   REF  27  LAST 1423   07,3126  54 076 1           TS      FLAGWRD2

0210   REF   5  LAST  567   07,3127  4 4754 1           CS      REFSMBIT         KNOCK DOWN REFSMMAT FLAG
0211   REF   7  LAST  567   07,3130  7 0077 0           MASK    FLAGWRD3
0212   REF   8  LAST 1423   07,3131  54 077 0           TS      FLAGWRD3

0213   REF 294  LAST 1423   07,3132  0 0002 0           TC      Q

0214   REF   2  LAST  168      7664            OCT40010 EQUALS  OT40010
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L        IMU MODE SWITCHING ROUTINES                                                            USER'S PAGE NO.   8       E3 S3

P0215              IMU FINE ALIGN MODE SWITCH.

 0216                            07,3133  0 0004 0  IMUFINE  INHINT
 0217   REF   4  LAST 1420       07,3134  0 3616 0           TC      CAGETSTJ          SEE IF IMU BEING CAGED.

 0218   REF   1                  07,3135  4 5001 1           CS      BITS4-5           RESET ZERO AND COARSE
 0219                            07,3136  0 0006 1           EXTEND
 0220   REF  53  LAST 1423       07,3137  03 012 1           WAND    CHAN12

 0221   REF  11  LAST 1423       07,3140  4 4763 0           CS      NOIMUDAP          INSURE DAP AUTO AND HOLD MODES ENABLED
 0222   REF  40  LAST 1423       07,3141  7 1334 0           MASK    IMODES33
 0223   REF  41  LAST 1424       07,3142  55'334 0           TS      IMODES33

 0224   REF   4  LAST 1418       07,3143  0 3207 1           TC      NOATTOFF

 0225   REF  31  LAST 1423       07,3144  3 4757 0           CAF     BIT10             IMU FAIL WAS INHIBITED DURING THE
 0226   REF  25  LAST 1418       07,3145  0 5223 1           TC      TWIDDLE           PRESUMABLY PRECEDING COARSE ALIGN. LEAVE
 0228   REF   1                  07,3146   03155 0           ADRES   IFAILOK           IT ON FOR THE FIRST 5 SECS OF FIVE ALIGN
 0229   REF   6  LAST  829       07,3147  3 5017 1           CAF     2SECS
 0230   REF  26  LAST 1424       07,3150  0 5223 1           TC      TWIDDLE
 0232   REF   1                  07,3151   03153 0           ADRES   IMUFINED
 0233   REF   3  LAST 1420       07,3152  1 2675 0           TCF     MODEEXIT

 0234   REF   5  LAST 1420       07,3153  0 3606 1  IMUFINED TC      CAGETEST          SEE THAT NO ONE HAS CAGED THE IMU.
 0235   REF   3  LAST 1422       07,3154  1 3563 0           TCF     ENDIMU
```

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L          IMU MODE SWITCHING ROUTINES                                                                   USER'S PAGE NO.  9        E3 S3

  0236    REF   1                  07,3155  0 3613 0  IFAILOK  TC      CAGETSTQ         ENABLE IMU FIAL UNLESS IMU BEING CAGED.
  0237    REF  59  LAST 1422       07,3156  1 5314 0           TCF     TASKOVER         IT IS.

  0238    REF  39  LAST 1423       07,3157  3 4765 1           CAF     BIT4             DONT RESET IMU FAIL INHIBIT IF SOMEONE
  0239                             07,3160  0 0006 1           EXTEND                   HAS GONE INTO COARSE ALIGN.
  0240    REF  54  LAST 1424       07,3161  02 012 0           RAND    CHAN12
  0241    REF 370  LAST 1423       07,3162  10 000 0           CCS     A
  0242    REF  60  LAST 1425       07,3163  1 5314 0           TCF     TASKOVER

  0243    REF  55  LAST 1423       07,3164  4 1333 1           CS      IMODES30         RESET IMUFAIL.
  0244    REF   2  LAST  391       07,3165  7 4754 1           MASK    IMUFLBIT
  0245    REF  56  LAST 1425       07,3166  27'333 1           ADS     IMODES30
  0246    REF   5  LAST 1423       07,3167  4 4765 0           CS      IMUFINHT
  0247    REF  57  LAST 1425       07,3170  7 1333 1  PFAILOK2 MASK    IMODES30
  0248    REF  58  LAST 1425       07,3171  55'333 1           TS      IMODES30
  0249    REF  38  LAST 1419       07,3172  0 4714 1           TC      IBNKCALL         THE ISS WARNING LIGHT MAY COME ON NOW
  0250    REF   6  LAST 1419       07,3173   14706 0           CADR    SETISSW          THAT THE INHIBIT HAS BEEN REMOVED.
  0251    REF  61  LAST 1425       07,3174  1 5314 0           TCF     TASKOVER

  0252    REF   2  LAST 1425       07,3175  0 3613 0  PFAILOK  TC      CAGETSTQ         ENABLE PIP FAIL PROG ALARM.
  0253    REF  62  LAST 1425       07,3176  1 5314 0           TCF     TASKOVER

  0254    REF  59  LAST 1425       07,3177  4 1333 1           CS      IMODES30         RESET IMU AND PIPA FAIL BITS.
  0255    REF   4  LAST  392       07,3200  7 4757 1           MASK    PIPAFLBT
  0256    REF  60  LAST 1425       07,3201  27'333 1           ADS     IMODES30

  0257    REF  42  LAST 1424       07,3202  4 1334 0           CS      IMODES33
  0258    REF   3  LAST  391       07,3203  7 4754 1           MASK    PIP2FLBT
  0259    REF  43  LAST 1425       07,3204  27'334 0           ADS     IMODES33

  0260    REF   1                  07,3205  4 4764 1           CS      NOACCALM
  0261    REF   1                  07,3206  1 3170 0           TCF     PFAILOK2

  0262    REF   2  LAST 1423       07,3207  4 7664 0  NOATTOFF CS      OCT40010         SUBROUTINE TO TURN OFF NO ATT LAMP.
  0263    REF  42  LAST 1423       07,3210  7 1241 0           MASK    DSPTAB +11D
  0264    REF  47  LAST 1406       07,3211  6 4752 0           AD      BIT15
  0265    REF  43  LAST 1425       07,3212  55'241 0           TS      DSPTAB +11D
  0266    REF 295  LAST 1423       07,3213  0 0002 0           TC      Q
```

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P0267              ROUITNES TO INITIATE AND TERMINATE PROGRAM USE OF THE PIPAS. NO IMUSTALL REQUIRED IN EITHER CASE.

 0272   REF 253  LAST 1423   07,3214  4 4772 0  PIPUSE    CS      ZERO
 0273   REF  10  LAST  839   07,3215  54 0037 1           TS      PIPAX
 0274   REF   5  LAST  438   07,3216  54 0040 1           TS      PIPAY
 0275   REF   7  LAST  839   07,3217  54 0041 0           TS      PIPAZ

 02752  REF   3  LAST 1425   07,3220  0 3613 0  PIPUSE1   TC      CAGETSTQ         DO NOT ENABLE PIPA FAIL IF IMU IS CAGED
 02754  REF   6  LAST 1419   07,3221  1 4651 0            TCF     SWRETURN

 02756                       07,3222  0 0004 0            INHINT
 0276   REF   2  LAST  164   07,3223  4 4770 1            CS      ACCFINHT         IF PIPA FAILS FROM NOW ON (UNTIL
 0277   REF  61  LAST 1425   07,3224  7 1333 1            MASK    IMODES30         PIPFREE), LIGHT ISS WARNING.
 0278   REF  62  LAST 1426   07,3225  55'333 1            TS      IMODES30

 0279   REF  39  LAST 1425   07,3226  0 4714 1  PIPFREE2  TC      IBNKCALL         ISS WARNING MIGHT COME ON NOW.
 0280   REF   7  LAST 1425   07,3227   14706 0            CADR    SETISSW          (OR GO OFF ON PIPFREE).

 0281   REF   4  LAST 1424   07,3230  1 2675 0            TCF     MODEEXIT

 0282                        07,3231  0 0004 0  PIPFREE   INHINT                   PROGRAM DONE WITH PIPAS. DONT LIGHT
 0283   REF  63  LAST 1426   07,3232  4 1333 1            CS      IMODES30         ISS WARNING.
 0284   REF   3  LAST 1426   07,3233  7 4770 1            MASK    ACCFINHT
 0285   REF  64  LAST 1426   07,3234  27'333 1            ADS     IMODES30

 0286   REF   5  LAST 1425   07,3235  7 4757 1            MASK    PIPAFL8T         IF PIP FAIL ON, DO PROG ALARM AND RESET
 0287   REF 371  LAST 1425   07,3236  10 0000 0           CCS     A                ISS WARNING.
 0288   REF   5  LAST 1426   07,3237  1 2675 0            TCF     MODEEXIT

 0289   REF  38  LAST 1422   07,3240  0 5671 1            TC      ALARM
 0290                        07,3241   00212 0            OCT     212

 0291                        07,3242  0 0004 0            INHINT

 0292   REF   1              07,3243  1 3226 0            TCF     PIPFREE2
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L         IMU MODE SWITCHING ROUTINES                                                         USER'S PAGE NO.  11       E3 S3

P0293             THE FOLLOWING ROUTINE TORQUES THE IRIGS ACCORDING TO DOUBLE PRECISION INPUTS IN THE SIX REGISTERS
R0295     BEGINNING AT THE ECADR ARRIVING IN A. THE MINIMUM SIZE OF ANY PULSE TRAIN IS 16 PULSES (.25 CDU COUNTS). THE
R0297     UNSENT PORTION OF THE COMMAND IS LEFT INTACT IN THE INPUT COMMAND REGISTERS.

  0300    REF 666  LAST 1416   07,3244  54 161 0  IMUPULSE TS      MPAC +5          SAVE ARRIVING ECADR.
  0301    REF   5  LAST 1424   07,3245  0 3616 0           TC      CAGETSTJ         DONT PROCEED IF IMU BEING CAGED.

  0302    REF   3  LAST  446   07,3246  11'324 1           CCS     LGYRO            SEE IF GYROS BUSY.
  0303    REF   1              07,3247  0 3307 0           TC      GYROBUSY         SLEEP.

  0305    REF  38  LAST 1423   07,3250  3 4763 1           CAF     BIT6             ENABLE THE POWER SUPPLY.
  0306                         07,3251  0 0006 1           EXTEND
  0307    REF  13  LAST 1423   07,3252  05 014 1           WOR     CHAN14

  0308    REF  21  LAST 1393   07,3253  3 4766 1           CAF     FOUR
  0310    REF  29  LAST 1420   07,3254  0 5233 0  GWAKE2   TC      WAITLIST         (IF A JOB WAS PUT TO SLEEP, THE POWER
  0311    REF  19  LAST 1422   E3,1474                     EBANK=  CDUIND           SUPPLY IS LEFT ON BY THE WAKING JOB).
  0312    REF   1              07,3255   03324 1           2CADR   STRTGYRO
  0312    REF   1              07,3256   16063 0

  0313    REF 667  LAST 1427   07,3257  3 0161 1           CA      MPAC +5          SET UP EBANK, SAVING CALLER'S EBANK FOR
  0314    REF  42  LAST 1397   07,3260  56 003 1           XCH     EBANK            RESTORATION ON RETURN.
  0315    REF 668  LAST 1427   07,3261  56 161 1           XCH     MPAC +5
  0316    REF   4  LAST 1427   07,3262  55'324 1           TS      LGYRO            RESERVES GYROS.
  0317    REF  14  LAST 1394   07,3263  7 4350 1           MASK    LOW8
  0318    REF  27  LAST 1422   07,3264  54 061 1           TS      ITEMP1

  0319    REF  67  LAST 1421   07,3265  3 4767 0           CAF     TWO              FORCE SIGN AGREEMENT ON INPUTS.
  0320    REF 669  LAST 1427   07,3266  54 157 0  GYROAGRE TS      MPAC +3
  0321                         07,3267  6 0000 1           DOUBLE
  0322    REF  28  LAST 1427   07,3270  6 0061 0           AD      ITEMP1
  0323    REF 670  LAST 1427   07,3271  54 160 1           TS      MPAC +4
  0324                         07,3272  0 0006 1           EXTEND
  0325    REF 372  LAST 1426   07,3273  5 0000 1           INDEX   A
  0326                         07,3274  3 1401 0           DCA     1400
  0327    REF 671  LAST 1427   07,3275  52 155 1           DXCH    MPAC
  0328    REF   8  LAST  733   07,3276  0 7224 1           TC      DPAGREE
  0329    REF 672  LAST 1427   07,3277  52 155 1           DXCH    MPAC
  0330    REF 673  LAST 1427   07,3300  50 160 0           INDEX   MPAC +4
  0331                         07,3301  53'401 1           DXCH    1400

  0332    REF 674  LAST 1427   07,3302  10 157 0           CCS     MPAC +3
  0333    REF   1              07,3303  1 3266 1           TCF     GYROAGRE

  0334    REF 675  LAST 1427   07,3304  3 0161 1           CA      MPAC +5          RESTORE CALLER'S EBANK.
  0335    REF  43  LAST 1427   07,3305  54 003 0           TS      EBANK
  0336    REF   6  LAST 1426   07,3306  1 2675 0           TCF     MODEEXIT
```

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P0337                ROUTINES TO ALLOW TORQUING BY ONLY ONE JOB AT A TIME.

 0338                              07,3307  0 0006 1  GYROBUSY EXTEND                     SAVE RETURN 2FCADR.
 0339   REF  20  LAST 1190         07,3310  3 0134 1           DCA     BUF2
 0340   REF 676  LAST 1427         07,3311  52 155 1           DXCH    MPAC
 0341   REF   1                    07,3312  3 3323 0  REGSLEEP CAF     LGWAKE
 0342   REF   3  LAST 1324         07,3313  1 5163 1           TCF     JOBSLEEP

 0343   REF   5  LAST 1427         07,3314  11'324 1  GWAKE    CCS     LGYRO              WHEN AWAKENED, SEE IF GYROS STILL BUSY
 0344   REF   1                    07,3315  1 3312 0           TCF     REGSLEEP           IF SO, SLEEP SOME MORE.

 0346                              07,3316  0 0006 1           EXTEND
 0347   REF 677  LAST 1428         07,3317  3 0155 0           DCA     MPAC
 0348   REF  21  LAST 1428         07,3320  52 134 0           DXCH    BUF2               RESTORE SWRETURN INFO.
 0349   REF 152  LAST 1413         07,3321  3 4770 0           CAF     ONE
 0350   REF   1                    07,3322  1 3254 0           TCF     GWAKE2

 0351   REF   1                    07,3323   17314 1  LGWAKE   CADR    GWAKE
```

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P0352                   GYRO-TORQUING WAITLIST TASKS.

 0353   REF   1                07,3324  4 3560 0  STRTGYRO CS      GDESELCT          DE-SELECT LAST GYRO.
 0354                          07,3325  0 0006 1           EXTEND
 0355   REF  14  LAST 1427     07,3326  03 014 1           WAND    CHAN14

 0356   REF   1                07,3327  0 3575 0           TC      CAGETSTG

 0357   REF   6  LAST 1428     07,3330  3 1324 0  STRTGYR2 CA      LGYRO             JUMP ON PHASE COUNTER IN BITS 13-14
 0358                          07,3331  0 0006 1           EXTEND
 0359   REF  40  LAST 1425     07,3332  7 4765 0           MP      BIT4
 0360   REF 373  LAST 1427     07,3333  50 000 1           INDEX   A
 0361                          07,3334  1 3335 0           TCF     +1
 0362   REF   1                07,3335  0 3352 0           TC      GSELECT           =0. DO Y GYRO.
 0363                          07,3336   00202 1           OCT     00202

 0364   REF   2  LAST 1429     07,3337  0 3352 0           TC      GSELECT           =1. DO Z GYRO.
 0365                          07,3340   00302 0           OCT     00302

 0366   REF   3  LAST 1429     07,3341  0 3350 1           TC      GSELECT -2        =2. DO X GYRO.
 0367                          07,3342   00100 0           OCT     00100

 0368   REF 254  LAST 1426     07,3343  3 4772 1           CAF     ZERO              =3. DONE
 0369   REF   7  LAST 1429     07,3344  55'324 1           TS      LGYRO
 0370   REF   2  LAST 1428     07,3345  3 3323 0           CAF     LGWAKE            WAKE A POSSIBLE SLEEPING JOB.
 0371   REF   6  LAST 1325     07,3346  0 5167 1           TC      JOBWAKE

 0372   REF   2  LAST 1424     07,3347  1 3153 1  NORESET  TCF     IMUFINED          DO NOT RESET POWER SUPPLY
 0373    REF  22  LAST 1427    07,3350  4 4766 0   -2         CS       FOUR          SPECIAL ENTRY TO REGRESS LGYRO FOR S
 0374    REF   8  LAST 1429    07,3351  27'324 1              ADS      LGYRO

 0375    REF 296  LAST 1425    07,3352  50 002 0  GSELECT     INDEX    Q             SELECT GYRO.
 0376                          07,3353  3 0000 1              CAF      0             PACKED WORD CONTAINS GYRO SELECT BITS
 0377    REF   4  LAST 1408    07,3354  54 064 1              TS       ITEMP4        AND INCREMENT TO LGYRO.
 0378    REF  19  LAST 1401    07,3355  7 4774 0              MASK     SEVEN
 0379    REF  42  LAST 1420    07,3356  6 4754 0              AD       BIT13
 0380    REF   9  LAST 1430    07,3357  27'324 1              ADS      LGYRO
 0381    REF  44  LAST 1427    07,3360  54 003 0              TS       EBANK
 0382    REF  15  LAST 1427    07,3361  7 4350 1              MASK     LOW8
 0383    REF  29  LAST 1427    07,3362  54 061 1              TS       ITEMP1

 0384    REF  20  LAST 1430    07,3363  4 4774 0              CS       SEVEN
 0385    REF   5  LAST 1430    07,3364  7 0064 1              MASK     ITEMP4
 0386    REF   6  LAST 1430    07,3365  54 064 1              TS       ITEMP4

 0387                          07,3366  0 0006 1              EXTEND                 MOVE DP COMMAND TO RUPTREGS FOR TESTING.
 0388    REF  30  LAST 1430    07,3367  5 0061 0              INDEX    ITEMP1
 0389                          07,3370  3 1401 0              DCA      1400 +
 0390    REF  33  LAST 1408    07,3371  52 071 0              DXCH     RUPTREG1

 0391    REF  34  LAST 1430    07,3372  10 070 1              CCS      RUPTREG1
 0392    REF   1               07,3373  1 3406 1              TCF      MAJ+
 0393                          07,3374  1 3376 1              TCF      +2
 0394    REF   1               07,3375  1 3541 0              TCF      MAJ-

 0395    REF   9  LAST 1408    07,3376  10 071 0              CCS      RUPTREG2
 0396    REF   1               07,3377  1 3403 1              TCF      MIN+
 0397    REF   1               07,3400  1 3330 0              TCF      STRTGYR2
 0398    REF   1               07,3401  1 3536 0              TCF      MIN-
 0399    REF   2  LAST 1430    07,3402  1 3330 0              TCF      STRTGYR2
```

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L         IMU MODE SWITCHING ROUTINES                                                        USER'S PAGE NO.  15        E3 S3

 0400    REF   1                07,3403  6 3437 1  MIN+       AD       -GYROMIN          SMALL POSITIVE COMMAND. SEE IF AT LEAST
 0401                           07,3404  0 0006 1             EXTEND                     16 GYRO PULSES.
 0402    REF   3  LAST 1430     07,3405  6 3330 1             BZMF     STRTGYR2

 0403                           07,3406  0 0006 1  MAJ+       EXTEND                     DEFINITE POSITIVE OUTPUT.
 0404    REF   1                07,3407  3 3562 0             DCA      GYROFRAC
 0405    REF  35  LAST 1430     07,3410  20 071 0             DAS      RUPTREG1

 0406    REF   7  LAST 1430     07,3411  3 0064 0             CA       ITEMP4            SELECT POSITIVE TORQUING FOR THIS GYRO.
 0407                           07,3412  0 0006 1             EXTEND
 0408    REF  15  LAST 1429     07,3413  05 014 1             WOR      CHAN14

 0409    REF  10  LAST 1416     07,3414  3 6043 0             CAF      LOW7              LEAVE NUMBER OF POSSIBLE 8192 AUGMENTS
 0410    REF  10  LAST 1430     07,3415  7 0071 0             MASK     RUPTREG2          TO INITIAL COMMAND IN MAJOR PART OF LONG
 0411    REF  11  LAST 1431     07,3416  56 071 1             XCH      RUPTREG2          TERM STORAGE AND TRUNCATED FRACTION
 0412                           07,3417  0 0006 1  GMERGE     EXTEND                     IN MINOR PART. THE MAJOR PART WILL BE
 0413    REF  33  LAST 1407     07,3420  7 4761 1             MP       BIT8              COUNTED DOWN TO ZERO IN THE COURSE OF
 0414    REF  19  LAST 1408     07,3421  54 062 1             TS       ITEMP2            PUTTING OUT THE ENTIRE COMMAND.
 0415    REF  36  LAST 1431     07,3422  3 0070 0             CA       RUPTREG1
 0416                           07,3423  0 0006 1             EXTEND
 0417    REF  27  LAST 1417     07,3424  7 4760 0             MP       BIT9
 0418    REF  37  LAST 1431     07,3425  54 070 1             TS       RUPTREG1
 0419    REF 189  LAST 1420     07,3426  3 0001 0             CA       L
 0420                           07,3427  0 0006 1             EXTEND
 0421    REF  64  LAST 1393     07,3430  7 4753 0             MP       BIT14
 0422    REF  20  LAST 1431     07,3431  26 062 1             ADS      ITEMP2            INITIAL COMMAND.

 0423                           07,3432  0 0006 1             EXTEND                     SEE IF MORE THAN ONE PULSE TRAIN NEEDED
 0424    REF  38  LAST 1431     07,3433  3 0071 1             DCA      RUPTREG1          (MORE THAN 16383 PULSES).
 0425    REF   1                07,3434  6 7702 0             AD       MINUS1
 0426    REF 374  LAST 1429     07,3435  10 000 0             CCS      A
 0427    REF   1                07,3436  1 3503 0             TCF      LONGGYRO
 0428                           07,3437   77601 0  -GYROMIN   OCT      -176              MAY BE ADJUSTED TO SPECIFY MINIMUM CMD
 0429                           07,3440  1 3444 1             TCF      +4

 0430    REF  65  LAST 1431     07,3441  3 4753 1             CAF      BIT14
 0431    REF  21  LAST 1431     07,3442  26 062 1             ADS      ITEMP2
 0432    REF 255  LAST 1429     07,3443  3 4772 1             CAF      ZERO

 0433    REF  31  LAST 1430     07,3444  50 061 0  +4         INDEX    ITEMP1
 0434                           07,3445  53'401 1             DXCH     1400
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0435    REF  22  LAST 1431   07,3446  3 0062 0            CA      ITEMP2           ENTIRE COMMAND.
0436    REF   3  LAST 1423   07,3447  54 047 0  LASTSEG   TS      GYROCMD
04361   REF   1              07,3450  0 3570 0    +1      TC      COARSTST

04367   REF   4  LAST 1432   07,3451  3 0047 1            CA      GYROCMD
0437                         07,3452  0 0006 1            EXTEND
0438    REF  32  LAST 1424   07,3453  7 4757 1            MP      BIT10            WAITLIST DT
0439    REF  49  LAST 1416   07,3454  6 6214 0            AD      THREE            TRUNCATION AND PHASE UNCERTAINTIES.
0440    REF  27  LAST 1424   07,3455  0 5223 1            TC      TWIDDLE
0442    REF   1              07,3456   03467 1            ADRES   TWOPULSE
04475   REF   1              07,3457  0 3463 0  EXITGYRO  TC      GYROEXIT
04476   REF  63  LAST 1425   07,3460  1 5314 0            TCF     TASKOVER
04477   REF  40  LAST 1393   07,3461  3 4767 0  OUTPULSE  CA      BIT2
04478   REF   5  LAST 1432   07,3462  54 047 0            TS      GYROCMD
0448    REF  33  LAST 1432   07,3463  3 4757 0  GYROEXIT  CAF     BIT10
0449                         07,3464  0 0006 1            EXTEND
0450    REF  16  LAST 1431   07,3465  05 014 1            WOR     CHAN14
0451    REF 297  LAST 1430   07,3466  0 0002 0            TC      Q
04511   REF  28  LAST 1431   07,3467  4 4760 0  TWOPULSE  CS      BIT9
04512                        07,3470  0 0006 1            EXTEND
04513   REF  17  LAST 1432   07,3471  03 014 1            WAND    CHAN14
04514   REF   1              07,3472  0 3461 1            TC      OUTPULSE
04515   REF  64  LAST 1393   07,3473  3 4770 0            CA      BIT1
04516   REF  28  LAST 1432   07,3474  0 5223 1            TC      TWIDDLE
04517   REF   2  LAST 1427   07,3475   03324 1            ADRES   STRTGYRO
04518   REF  29  LAST 1432   07,3476  3 4760 1            CA      BIT9
04519                        07,3477  0 0006 1            EXTEND
0452    REF  18  LAST 1432   07,3500  05 014 1            WOR     CHAN14
04521   REF   2  LAST 1432   07,3501  0 3461 1            TC      OUTPULSE
04522   REF  64  LAST 1432   07,3502  1 5314 0            TCF     TASKOVER
0453    REF  32  LAST 1431   07,3503  50 061 0  LONGGYRO  INDEX   ITEMP1
04531                        07,3504  53'401 1            DXCH    1400             INITIAL COMMAND + N AUGMENTS OF
0454    REF  66  LAST 1431   07,3505  3 4753 1            CAF     BIT14            8192. INITIAL COMMAND IS AT LEAST 8192
0455    REF  23  LAST 1432   07,3506  6 0062 0            AD      ITEMP2
0456    REF   6  LAST 1432   07,3507  54 047 0            TS      GYROCMD

0457                         07,3510  0 0006 1  AUG3      EXTEND                   GET WAITLIST DT TO TIME WHEN TRAIN IS
0458    REF  34  LAST 1432   07,3511  7 4757 1            MP      BIT10            ALMOST OUT.
0459    REF   5  LAST 1394   07,3512  6 7700 1            AD      NEG3
0460    REF  29  LAST 1432   07,3513  0 5223 1            TC      TWIDDLE
0462    REF   1              07,3514   03516 0            ADRES   8192AUG
0463    REF   1              07,3515  1 3457 0            TCF     EXITGYRO

0464    REF   2  LAST 1432   07,3516  0 3570 0  8192AUG   TC      COARSTST

0465    REF  10  LAST 1430   07,3517  3 1324 0            CA      LGYRO            ADD 8192 PULSES TO GYROCMD
0466    REF  45  LAST 1430   07,3520  54 003 0            TS      EBANK
0467    REF  16  LAST 1430   07,3521  7 4350 1            MASK    LOW8
0468    REF  33  LAST 1432   07,3522  54 061 1            TS      ITEMP1
```

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 0469    REF  34  LAST 1432    07,3523  50 061 0              INDEX   ITEMP1             SEE IF THIS IS THE LAST AUG.
 0470                          07,3524  11'400 0              CCS     1400
 0471    REF   1               07,3525  1 3531 1              TCF     AUG2               MORE TO COME.

 0472    REF  67  LAST 1432    07,3526  3 4753 1              CAF     BIT14
 0473    REF   7  LAST 1432    07,3527  26 047 0              ADS     GYROCMD
 0474    REF   1               07,3530  1 3450 1              TCF     LASTSEG +1

 0475    REF  35  LAST 1433    07,3531  50 061 0    AUG2      INDEX   ITEMP1
 0476                          07,3532  55'400 0              TS      1400
 0477    REF  68  LAST 1433    07,3533  3 4753 1              CAF     BIT14
 0478    REF   8  LAST 1433    07,3534  26 047 0              ADS     GYROCMD
 0479    REF   1               07,3535  1 3510 1              TCF     AUG3               COMPUTE DT.
```

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0480  REF  2  LAST 1431  07,3536  6 3437 1  MIN-     AD      -GYROMIN        POSSIBLE NEGATIVE OUTPUT
0481                     07,3537  0 0006 1           EXTEND
0482  REF  4  LAST 1431  07,3540  6 3330 1           BZMF    STRTGYR2

0483                     07,3541  0 0006 1  MAJ-     EXTEND                  DEFINITE NEGATIVE OUTPUT
0484  REF  2  LAST 1431  07,3542  4 3562 1           DCS     GYROFRAC
0485  REF 39  LAST 1431  07,3543  20 071 0           DAS     RUPTREG1

0486  REF  8  LAST 1431  07,3544  3 0064 0           CA      ITEMP4          SELECT NEGATIVE TORQUING FOR THIS GYRO.
0487  REF 30  LAST 1432  07,3545  6 4760 1           AD      BIT9
0488                     07,3546  0 0006 1           EXTEND
0489  REF 19  LAST 1432  07,3547  05 014 1           WOR     CHAN14

0490  REF 40  LAST 1434  07,3550  4 0070 1           CS      RUPTREG1        SET UP RUPTREGS TO FALL INTO GMERGE.
0491  REF 41  LAST 1434  07,3551  54 070 1           TS      RUPTREG1        ALL NUMBERS PUT INTO GYROCMD ARE
0492  REF 12  LAST 1431  07,3552  4 0071 0           CS      RUPTREG2        POSITIVE - BIT9 OF CHAN 14 DETERMINES
0493  REF 11  LAST 1431  07,3553  7 6043 1           MASK    LOW7            THE SIGN OF THE COMMAND.
0494                     07,3554  4 0000 0           COM
0495  REF 13  LAST 1434  07,3555  56 071 1           XCH     RUPTREG2
0496                     07,3556  4 0000 0           COM
0497  REF  1             07,3557  1 3417 1           TCF     GMERGE

0498                     07,3560   01700 1  GDESELCT OCT     1700            TURN OFF SELECT AND ACTIVITY BITS.

0499                     07,3561   00000 1  GYROFRAC 2DEC    .215 B -21
0499                     07,3562   00034 0
```

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L        IMU MODE SWITCHING ROUTINES                                                            USER'S PAGE NO.  19        E3 53

P0500               IMU MODE SWITCHING ROUTINES COME HERE WHEN ACTION COMPLETE.

 0501                              07,3563  0 0006 1  ENDIMU    EXTEND                       MODE IS BAD IF CAGE HAS OCCURED OR IF
 0502    REF  27  LAST 1220        07,3564  00 011 1            READ    DSALMOUT             ISS WARNING IS ON.
 0503    REF  65  LAST 1432        07,3565  7 4770 1            MASK    BIT1
 0504    REF   6  LAST 1204        07,3566  6 7702 0            AD      NEG1
 0505    REF   1                   07,3567  1 3626 1            TCF     BADEND +1
 050603 REF  41  LAST 1429         07,3570  3 4765 1  COARSTST  CAF     BIT4
 050605                            07,3571  0 0006 1            EXTEND
 050607 REF  55  LAST 1425         07,3572  02 012 0            RAND    CHAN12
 050609 REF 375  LAST 1431         07,3573  10 000 0            CCS     A
 050613 REF   1                    07,3574  1 3601 1            TCF     DONTPULS

 050615 REF  65  LAST 1426         07,3575  4 1333 1  CAGETSTG  CS      IMODES30
 050617 REF   4  LAST  209         07,3576  7 4763 0            MASK    IMUNITBT
 050619 REF 376  LAST 1435         07,3577  10 000 0            CCS     A
 050621 REF 298  LAST 1432         07,3600  0 0002 0            TC      Q

 050623 REF 256  LAST 1431         07,3601  3 4772 1  DONTPULS  CAF     ZERO
 050625 REF  11  LAST 1432         07,3602  55'324 1            TS      LGYRO

 050627 REF   3  LAST 1429         07,3603  3 3323 0            CAF     LGWAKE
 050629 REF   7  LAST 1429         07,3604  0 5167 1            TC      JOBWAKE

 0507    REF   3  LAST 1422        07,3605  1 3625 1            TCF     IMUBAD
 0509    REF   5  LAST 1435        07,3606  3 4763 1  CAGETEST  CAF     IMUNITBT             SUBROUTINE TO TERMINATE IMU MODE
 0510    REF  66  LAST 1435        07,3607  7 1333 1            MASK    IMODES30             SWITCH IF IMU HAS BEEN CAGED.
 0511    REF 377  LAST 1435        07,3610  10 000 0            CCS     A
 0512    REF   4  LAST 1435        07,3611  1 3625 1            TCF     IMUBAD               DIRECTLY.
 0513    REF 299  LAST 1435        07,3612  0 0002 0            TC      Q                    WITH C(A) = +0.

 0514    REF  67  LAST 1435        07,3613  4 1333 1  CAGETSTQ  CS      IMODES30             SKIP IF IMU NOT BEING CAGED.
 0515    REF   6  LAST 1435        07,3614  7 4763 0            MASK    IMUNITBT
 0516    REF   5  LAST  487        07,3615  1 5651 1            TCF     INCRQCK
 0519    REF  68  LAST 1435        07,3616  4 1333 1  CAGETSTJ  CS      IMODES30             IF DURING MODE SWITCH INITIALIZATION
 0520    REF   7  LAST 1435        07,3617  7 4763 0            MASK    IMUNITBT             IT IS FOUND THAT THE IMU IS BEING CAGED,
 0521    REF 378  LAST 1435        07,3620  10 000 0            CCS     A                    SET IMUCADR TO -0 TO INDICATE OPERATION
 0522    REF 300  LAST 1435        07,3621  0 0002 0            TC      Q                    COMPLETE BUT FAILED. RETURN IMMEDIATELY

 0523    REF 257  LAST 1435        07,3622  4 4772 0     +4     CS      ZERO                 TO SWRETURN
 0524    REF   3  LAST 1225        07,3623  55'335 1            TS      IMUCADR
 0525    REF   7  LAST 1427        07,3624  1 2675 0            TCF     MODEEXIT

 05252   REF   2  LAST 1435        07,3625                IMUBAD    EQUALS  BADEND
```

```
R0526          GENERALIZED MODE SWITCHING TERMINATION. ENTER AT GOODEND FOR SUCCESSFUL COMPLETION OF AN I/O OPERATION
R0528   OR AT BADEND FOR AN UNSUCCESSFUL ONE.

 0531   REF 258  LAST 1435   07,3625  4 4772 0  BADEND   CS       ZERO            FOR FAILURE
 0535   REF   6  LAST 1408   07,3626  54 072 0    +1     TS       RUPTREG3        -0 FAILURE -1 SUCCESS
 0537   REF   7  LAST  788   07,3627  11'335 1           CCS      MODECADR
 0538                        07,3630  1 3632 1           TCF      +2              YES - WAKE IT UP.
 0539   REF   1              07,3631  1 3641 0           TCF      ENDMODE         IF 0, PROGRAM NOT IN YET.

 0540   REF 259  LAST 1436   07,3632  3 4772 1           CAF      ZERO            WAKE SLEEPING PROGRAM.
 0542   REF   8  LAST 1436   07,3633  57'335 0           XCH      MODECADR
 0543   REF   8  LAST 1435   07,3634  0 5167 1           TC       JOBWAKE

 0544   REF   7  LAST 1436   07,3635  4 0072 0           CS       RUPTREG3        ADVANCE LOC IF SUCCESSFUL.
 0545   REF  21  LAST 1325   07,3636  50 064 0           INDEX    LOCCTR
 0546   REF  40  LAST 1220   07,3637  26 164 0           ADS      LOC

 0547   REF  65  LAST 1432   07,3640  1 5314 0           TCF      TASKOVER

 0548   REF   8  LAST 1436   07,3641  3 0072 1  ENDMODE  CA       RUPTREG3        -0 INDICATES OPERATION COMPLETE BUT
 0550   REF   9  LAST 1436   07,3642  55'335 1           TS       MODECADR        SUCCESSFUL.
 0551   REF  66  LAST 1436   07,3643  1 5314 0           TCF      TASKOVER
```

```
P0552            GENERAL STALLING ROUTINE. USING PROGRAMS COME HERE TO WAIT FOR I/O COMPLETION.

R0554   PROGRAM DESCRIPTION                                  DATE- 21 FEB 1967
R0555                                             LOG SECTION IMU MODE SWITCHING
R0556   MOD BY- R.MELANSON TO ADD DOCUMENTATION       ASSEMBLY SUNDISK  REV.  82

R0557   FUNCTIONAL DESCRIPTION-
R0558     TO DELAY FURTHER EXECUTION OF THE CALLING ROUTINE UNTIL ITS SELECTED
R0559     I/O FUNCTION IS COMPLETE.THE FOLLOWING CHECKS ON THE CALLING ROUTINE:S
R0560     MODECADR ARE MADE AND ACTED UPON.
R0561       1) +0 INDICATES INCOMPLETE I/O OPERATION.CALLING ROUTINE IS PUT TO
R0562          SLEEP.
R0563       2) -1 INDICATES COMPLETED I/O OPERATION. STALL BYPASSES JOBSLEEP
R0564          CALL AND RETURNS TO CALLING ROUTINE AT L+3
R0565       3) -0 INDICATES COMPLETED I/O WITH FAILURE. STALL CLEARS MODECADR
R0566          AND RETURNS TO CALLING ROUTINE AT L+2.
R0567       4) VALUE GREATER THAN 0 INDICATES TWO ROUTINES CALLING FOR USE OF
R0568          SAME DEVICE. STALL EXITS TO ABORT WHICH EXECUTES A PROGRAM
R0569          RESTART WHICH IN TURN CLEARS ALL MODECADR REGISTERS.

R0570    CALLING SEQUENCE-
R0571     L     TC    BANKCALL
R0572    L+1      CADR    IMUSTALL
R0573

R0574    NORMAL-EXIT MODE-
R0575     TCF    JOBSLEEP OR TCF  MODEXIT

R0576   ALARM OR ABORT EXIT MODE-
R0577       POODOO 21210

R0578   OUTPUT-
R0579     MODECADR= CADR IF JOBSLEEP
R0580     MODECADR=+0       IF I/O COMPLETE
R0581     BUF2=L+3          IF I/O COMPLETE AND GOOD.
R0582     BUF2=L+2 IF I/O COMPLETE BUT FAILED.

R0583   ERASABLE INITIALIZATION-
R0584     BUF2 CONTAINS RETURN ADDRESS PLUS 1,(L+2)
R0585     BUF2+1 CONTAINS FBANK VALUE OF CALLING ROUTINE.
R0586     MODECADR CONTAINS +0, -1, OR -0 OR CADR RETURN ADDRESS.

 0598   REF  10  LAST 1436   07,3644  11'335 1  IMUSTALL CCS     MODECADR
 0599   REF   1              07,3645  1 3661 1           TCF     MODABORT         ALLOWABLE STATES ARE +0, -1, AND -
 0600   REF   1              07,3646  1 3656 0           TCF     MODESLP          OPERATION INCOMPLETE.
 0601   REF   1              07,3647  1 3652 1           TCF     MODEGOOD         COMPLETE AND GOOD IF = -1.

 0603   REF  11  LAST 1437   07,3650  55'335 1  MG2      TS      MODECADR         COMPLETE AND FAILED IF -0. RESET TO +0
 0604   REF   8  LAST 1435   07,3651  1 2675 0           TCF     MODEEXIT         RETURN TO CALLER.
```

```
0605    REF 379  LAST 1435   07,3652  10 000 0  MODEGOOD CCS     A                MAKE SURE INITIAL STATE -1.
0606    REF   2  LAST 1437   07,3653  1 3661 1           TCF     MODABORT

0607    REF  22  LAST 1428   07,3654  24 133 0           INCR    BUF2             IF SO, INCREMENT RETURN ADDRESS AND
0608    REF   1              07,3655  1 3650 0           TCF     MG2              RETURN IMMEDIATELY, SETTING CADR = +

0609    REF   4  LAST  571   07,3656  0 4665 0  MODESLP  TC      MAKECADR         CALL FROM SWITCHABLE FIXED ONLY
0611    REF  12  LAST 1437   07,3657  55'335 1           TS      MODECADR
0612    REF   4  LAST 1428   07,3660  1 5163 1           TCF     JOBSLEEP

0613    REF   9  LAST 1339   07,3661  0 5726 1  MODABORT TC      POODOO           TWO PROGRAMS USING SAME DEVICE.
0614                         07,3662   21210 1           OCT     21210
```

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L        IMU MODE SWITCHING ROUTINES                                              USER'S PAGE NO. 23       E3 S3

P0615            CONSTANTS FOR MODE SWITCHING ROUTINES

 0616   REF   4  LAST 1039       5775            BITS3&4  =       OCT14
 0617   REF  10  LAST 1394       5004            BITS4&6  =       OCT50
 0618   REF   9  LAST 1002       5001            BITS4-5  EQUALS  BITS4&5
 0619   REF  34  LAST 1431       4761            IMUSEFLG EQUALS  BIT8              INTERPRETER SWITCH 7.
 0620                         07,3663   77500 1  -COMMAX  DEC     -191
 0621                         07,3664   77477 0  -COMMAX- DEC     -192
 0622                         07,3665   00074 1  600MS    DEC     60
 0623   REF   3  LAST  428    07,3133            IMUFIN20 =       IMUFINE
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R0646    PROGRAM DESCRIPTION
R0647    IMU STATUS CHECK ROUTINE R02  (SUBROUTINE UTILITY)
R0648    MOD NO - 1
R0649    MOD BY - N.BRODEUR
R0650    FUNCTIONAL DESCRIPTION
R0651
R0652    TO CHECK WHETHER IMU IS ON AND IF ON WHETHER IT IS ALIGNED TO AN
R0653    ORIENTATION KNOWN BY THE CMC. TO REQUEST SELECTION OF THE APPROPRIATE
R0654    PROGRAM IF THE IMU IS OFF OR NOT ALIGNED TO AN ORIENTATION KNOWN BY THE
R0655    CMC. CALLED THROUGH BANKCALL
R0656    CALLING SEQUENCE-
R0657
R0658    L          TC      BANKCALL
R0659    L+1        CADR    R02BOTH
R0660    SUBROUTINES CALLED
R0661
R0662            VARALARM
R0663            FLAGUP
R0664    NORMAL EXIT MODES
R0665
R0666    AT L+2 OF CALLING SEQUENCE
R0667    ALARM OR ABORT EXIT MODES
R0668            GOTOPOOH, WITH ALARM
R0673    ERASABLE INITIALIZATION REQUIRED
R0674
R0675    NONE
R0676    DEBRIS
R0677
R0678    CENTRALS-A,Q,L
 0680    REF   1                01,2000                        SETLOC R02
 0681                           01,3731                        BANK
 0682    REF   1                                               COUNT* $$/R02
 0684    REF   6  LAST 1423     01,3731  3 4754 0   R02BOTH   CAF     REFSMBIT
 0685    REF   9  LAST 1423     01,3732  7 0077 0              MASK    FLAGWRD3
 0686    REF 380  LAST 1438     01,3733  10 000 0              CCS     A
 0687    REF   2  LAST  774     01,3734  0 3745 1              TC      R02ZERO             ZERO IMUS

 0688    REF  69  LAST 1435     01,3735  3 1333 0              CA      IMODES30
 0689    REF   4  LAST 1418     01,3736  7 4760 0              MASK    IMUOPBIT            IS ISS INITIALIZED
 0690                           01,3737  0 0006 1              EXTEND
 0691                           01,3740  1 3742 1              BZF     +2
 0692    REF  42  LAST 1435     01,3741  4 4765 0              CS      BIT4                SEND IMU ALARM CODE 210
 0693    REF   1                01,3742  6 3750 0              AD      OCT220              SEND REFSMM ALARM
 0694    REF   4  LAST  907     01,3743  0 5770 1              TC      VARALARM

 0695    REF  54  LAST  907     01,3744  0 4103 1              TC      GOTOPOOH
 0700    REF  71  LAST 1359     01,3745  0 5547 1   R02ZERO   TC      UPFLAG
 0701    REF   4  LAST  429     01,3746   00007 0              ADRES   IMUSE
 0702    REF   7  LAST 1426     01,3747  1 4651 0              TCF     SWRETURN
 07025                          01,3750   00220 1   OCT220    OCT     22
```

```
L        IMU MODE SWITCHING ROUTINES                                      USER'S PAGE NO.  25      E3 S3

P0703    PROGRAM DESCRIPTION   P06   10FEB67

R0704    TRANSFER THE ISS/CMC FROM THE OPERATE TO THE STANDBY CONDITION.

R0705    THE NORMAL CONDITION OF READINESS OF THE GNCS WHEN NOT IN USE IS STANDBY. IN THIS CONDITION THE IMU
R0707    HEATER POWER IS ON. THE IMU OPERATE POWER IS OFF. THE COMPUTER POWER IS ON. THE OPTICS POWER IS OFF. THE
R0709    CMC  STANDBY ON THE MAIN AND LEB DISKYS IS ON.

R0710    CALLING SEQUENCE:
R0711              ASTRONAUT REQUEST THROUGH DSKY     V37E 06E.

R0712    SUBROUTINES CALLED:
R0713              GOPERF1
R0716              BANKCALL
R0719              FLAGDOWN
```

```
R0810    PRESTAND PREPARES FOR STANDBY BY SNAPSHOTTING THE SCALER AND TIME1 TIME2
R0811    THE LOW 5 BITS OF THE SCALER ARE INSPECTED TO INSURE COMPATABILITY
R0812    BETWEEN THE SCALER READING AND THE TIME1 TIME2 READING.

 08125   REF   1               26,2000                          SETLOC P05P06
 08126                         26,3654                          BANK

 0813    REF   2  LAST   77      1006                           EBANK= TIME2SAV
 0814    REF   1                                                COUNT* $$/P06

 08145   REF  72  LAST 1440    26,3654   0 5547 1  P06          TC     UPFLAG           SET NODOV37 BIT
 08146   REF   5  LAST 1314    26,3655    00054 0               ADRES  NODOFLAG

 0815                          26,3656   0 0004 0  PRESTAND INHINT
 0816                          26,3657   0 0006 1               EXTEND
 0817    REF  37  LAST 1415    26,3660   3 0025 0               DCA    TIME2            SNAPSHOT TIMEITIME2
 0818    REF   3  LAST 1442    26,3661   53'007 0               DXCH   TIME2SAV
 0819    REF   1               26,3662   0 3715 1               TC     SCALPREP
 0820    REF   1               26,3663   0 3656 1               TC     PRESTAND         T1,T2,SCALER NOT COMPATIBLE
 0821    REF 678  LAST 1428    26,3664   52 155 1               DXCH   MPAC             T1,T2 AND SCALER OK
 0822    REF   1               26,3665   53'011 1               DXCH   SCALSAVE         STORE SCALER
 0823                          26,3666   0 0004 0               INHINT
 0824    REF 214  LAST 1066    26,3667   0 4636 0               TC     BANKCALL
 0825    REF   3  LAST  162    26,3670    17121 0               CADR   RNDREFDR         REFSMM, DRIFT, TRACK FLAGS DOWN

 0826    REF  64  LAST 1314    26,3671   0 5561 0               TC     DOWNFLAG
 0827    REF   5  LAST 1440    26,3672    00007 0               ADRES  IMUSE            IMUSE DOWN
 08271   REF  65  LAST 1442    26,3673   0 5561 0               TC     DOWNFLAG
 08272   REF  10  LAST  628    26,3674    00010 0               ADRES  RNDVZFLG         RNDVZFLG DOWN

 08273   REF  66  LAST 1442    26,3675   0 5561 0               TC     DOWNFLAG
 08274   REF  11  LAST  601    26,3676    00176 1               ADRES  UTFLAG
 0828    REF  32  LAST 1393    26,3677   3 4756 1               CAF    BIT11
 0829                          26,3700   0 0006 1               EXTEND
 0830    REF  16  LAST 1098    26,3701   05 013 0               WOR    CHAN13           SET STANDBY ENABLE BIT

 0831    REF 105  LAST 1406    26,3702   0 5402 1               TC     PHASCHNG         SET RESTART TO POSTAND WHEN STANDBY
 0832                          26,3703    07024 0               OCT    07024              RECOVERS
 0833                          26,3704    20000 0               OCT    20000
 08335   REF   2  LAST 1442      1010                           EBANK= SCALSAVE
 0834    REF   1               26,3705    03735 0               2CADR  POSTAND
 0834    REF   1               26,3706    54062 1
 0835    REF   2  LAST  215    26,3707   3 5011 1               CAF    OCT62
 0836    REF 215  LAST 1442    26,3710   0 4636 0               TC     BANKCALL
 0837    REF  11  LAST  786    26,3711    21067 0               CADR   GOPERF1
 0838                          26,3712   1 3707 0               TCF    -3
 0839                          26,3713   1 3707 0               TCF    -4
 0840                          26,3714   1 3707 0               TCF    -5

 08405   REF  10  LAST 1066      5011              OCT62        EQUALS .5SEC            DEC 50 = OCT 62
```

```
R0841   THE LOW 5 BITS OF THE SCALER READS 10000 FOR THE FIRST INTERVAL AFTER A
R0842   T1 INCREMENT. IF SCALPREP DETECTS THIS INTERVAL THE T1,T2 AND SCALER
R0843   DATA ARE NOT COMPATABLE AND RETURN IS TO L+1 FOR ANOTHER READING OF THE
R0844   DATA. OTHERWISE, THE RETURN IS TO L+2 TO PROCEED. ROUTINE ALSO PREPARES
R0845   THE SCALER READING FOR COMPUTATION OF THE INCREMENT TO UPDATE T1T2. (THE
R0846   10 MS BIT (BIT 6) OF THE SCALER IS INCREMENTED 5 MS OUT OF PHASE FROM
R0847   T1.) ADDITION OF 5 MS (BIT 5) TO THE SCALER READING HAS THE EFFECT OF
R0848   ADJUSTING BIT 6 IN THE SCALER TO BE IN PHASE WITH BIT 1 OF T1. THE LOW 5
R0849   BITS OF THE SCALER READING ARE THEN SET TO ZERO, TO TRUNCATE THE SCALER
R0850   DATA TO 10 MS. RESULTS ARE STORED IN MPAC, +1.

 0851                        26,3715  0 0006 1  SCALPREP EXTEND
 0852   REF 679  LAST 1442   26,3716  22 156 0           QXCH    MPAC     +2
 0853   REF   2  LAST  432   26,3717  0 4511 0           TC      FINETIME +1
 0854                        26,3720  0 0003 1           RELINT
 0855   REF 680  LAST 1443   26,3721  52 155 1           DXCH    MPAC
 0856   REF  34  LAST 1419   26,3722  3 4764 0           CA      BIT5              ADD 5 MS TO THE SCALER READING
 0857   REF 190  LAST 1431   26,3723  54 001 1           TS      L
 0858   REF 260  LAST 1436   26,3724  3 4772 1           CA      ZERO
 0859   REF 681  LAST 1443   26,3725  20 155 1           DAS     MPAC
 0860   REF   9  LAST 1201   26,3726  4 4342 1           CS      LOW5              SET LOW 5 BITS OF (SCALER+5MS) TO ZERO
 0861   REF 682  LAST 1443   26,3727  7 0155 1           MASK    MPAC     +1       AND STORE RESULTS IN MPAC,+1
 0862   REF 683  LAST 1443   26,3730  56 155 0           XCH     MPAC     +1
 0863   REF  10  LAST 1443   26,3731  7 4342 1           MASK    LOW5              TEST LOW 5 BITS OF SCALER FOR THE FIRST
A0864                                                                              INTERVAL AFTER THE T1 INCREMENT
A0865                                                                              (NOW = 00000, SINCE BIT 5 ADDED)
 0866   REF 381  LAST 1440   26,3732  10 000 0           CCS     A                 IS IT 1ST INTERVAL AFTER T1 INCREMENT
 0867   REF 684  LAST 1443   26,3733  24 156 0           INCR    MPAC +2           NO
 0868   REF 685  LAST 1443   26,3734  0 0156 0           TC      MPAC +2           YES

R0869   POSTAND RECOVERS TIME AFTER STANDBY.THE SCALER IS SNAPSHOTTED AND THE
R0870   TIME1 TIME2 COUNTER IS SET TO ZERO. THE LOW 5 BITS OF THE SCALER ARE
R0871   INSPECTED TO INSURE COMPATABILITY BETWEEN THE SCALER READING AND THE
R0872   CLEARING OF THE TIME COUNTER. IT THEN COMPUTES THE DIFFERENCE IN SCALER
R0873   VALUES (IN DP) AND ADDS THIS TO THE PREVIOUSLY SNAPSHOTTED VALUES OF
R0874   TIME1 TIME2 AND PLACES THIS NEW TIME INTO THE TIME1 TIME2 COUNTER.

 0875   REF   1                                          COUNT*  $$/P05

 0876   REF  33  LAST 1442   26,3735  4 4756 0  POSTAND  CS      BIT11             RECOVER TIME AFTER STANDBY.
 0877                        26,3736  0 0006 1           EXTEND
 0878   REF  17  LAST 1442   26,3737  03 013 0           WAND    CHAN13            CLEAR STANDBY ENABLE BIT
 0879                        26,3740  0 0004 0     +3    INHINT
 0880   REF 261  LAST 1443   26,3741  3 4772 1           CA      ZERO
 0881   REF 191  LAST 1443   26,3742  54 001 1           TS      L
 0882   REF  38  LAST 1442   26,3743  52 025 1           DXCH    TIME2             CLEAR TIME1TIME2
 0883   REF   2  LAST 1442   26,3744  0 3715 1           TC      SCALPREP          STORE SCALER IN MPAC, MPAC+1
 0884   REF   2  LAST 1442   26,3745  0 3740 1           TC      POSTAND +3        T1,T2,SCALER NOT COMPATIBLE
 0885                        26,3746  0 0006 1           EXTEND                    T1,T2 AND SCALER OK
 0886   REF   3  LAST 1442   26,3747  4 1011 1           DCS     SCALSAVE
 0887    REF 686  LAST 1443   26,3750  20 155 1             DAS     MPAC          FORM DP DIFFERENCE OF POSTSTANDBY SCALER
 0888    REF  35  LAST 1432   26,3751  3 4757 0             CAF     BIT10         MINUS PRESTANDBY SCALER AND SHIFT RIGHT
 0889    REF   9  LAST  386   26,3752  0 7256 1             TC      SHORTMP       5 TO ALIGN BITS WITH TIME1TIME2
 0892    REF   9  LAST 1427   26,3753  0 7224 1             TC      DPAGREE
 0893    REF 687  LAST 1444   26,3754  10 154 0             CCS     MPAC
 0894    REF   1              26,3755  0 3762 1             TC      POSTCOM       IF DP DIFF NET +, NO SCALER OVERFLOW
 0895    REF   2  LAST 1444   26,3756  0 3762 1             TC      POSTCOM       BETWEEN PRE AND POST STANDBY.
 0896                         26,3757  0 3760 0             TC      +1            IF DP DIFF NET -, SCALER OVERFLOWED. ADD
 0897    REF  36  LAST 1444   26,3760  3 4757 0             CAF     BIT10         BIT 10 TO HIGH DIFF TO CORRECT.
 0898    REF 688  LAST 1444   26,3761  26 154 0             ADS     MPAC
 0899                         26,3762  0 0006 1  POSTCOM    EXTEND                C(MPAC,+1) IS MAGNITUDE OF DELTA SCALER.
 0900    REF   4  LAST 1442   26,3763  3 1007 1             DCA     TIME2SAV      PRESTANDBY TIME1TIME2
 0901    REF 689  LAST 1444   26,3764  20 155 1             DAS     MPAC
 0902    REF   6  LAST 1329   26,3765  0 7226 0             TC      TPAGREE       FORCE SIGN AGREEMENT
 0903    REF 690  LAST 1444   26,3766  52 155 1             DXCH    MPAC          UPDATED VALUE FOR T1,T2.
 0904    REF  39  LAST 1443   26,3767  20 025 1             DAS     TIME2         LOAD UPDATED VALUE INTO T1,T2, WITH
 09045   REF  67  LAST 1442   26,3770  0 5561 0             TC      DOWNFLAG      CLEAR NODOFLAG
 09046   REF   6  LAST 1442   26,3771   00054 0             ADRES   NODOFLAG

 0905    REF  55  LAST 1440   26,3772  0 4103 1  TCGOPOOH   TC      GOTOPOOH
```

```
L       KEYRUPT, UPRUPT                                                                 USER'S PAGE NO.   1       E  53

 0002   REF    1                07,2000                     SETLOC  KEYRUPT
 0003                           07,3666                     BANK
 0004   REF    1                                            COUNT*  $$/KEYUP

 0005   REF   25  LAST 1232     07,3666  54 016 1  KEYRUPT1 TS      BANKRUPT
 0006   REF  301  LAST 1435     07,3667  56 002 0           XCH     Q
 0007   REF   20  LAST 1232     07,3670  54 012 0           TS      QRUPT
 0008   REF    2  LAST  365     07,3671  0 4366 0           TC      LODSAMPT          TIME IS SNATCHED IN RUPT FOR NOUN 65.
 0009   REF   11  LAST 1443     07,3672  3 4342 0           CAF     LOW5
 0010                           07,3673  0 0006 1           EXTEND
 0011   REF    2  LAST  202     07,3674  02 015 1           RAND    MNKEYIN           CHECK IF KEYS 5M-1M ON
 0012   REF    6  LAST 1408     07,3675  54 073 1  KEYCOM   TS      RUPTREG4
 0013   REF   15  LAST  952     07,3676  4 0101 0           CS      FLAGWRD5
 0014   REF    2  LAST  143     07,3677  7 4752 1           MASK    DSKYBIT
 0015   REF   16  LAST 1445     07,3700  26 101 0           ADS     FLAGWRD5

 0016   REF    5  LAST 1402     07,3701  0 5120 1  ACCEPTUP TC      NOVAC30           (NOTE: RUPTREG4 = KEYTEMP1)
 0018   REF   52  LAST  391        1202                     EBANK=  DSPCOUNT
 0019   REF    1                07,3702   02000 0           2CADR   CHARIN
 0019   REF    1                07,3703   60102 1
 0020   REF    7  LAST 1445     07,3704  3 0073 0           CA      RUPTREG4
 0021   REF   22  LAST 1436     07,3705  50 064 0           INDEX   LOCCTR
 0022   REF  691  LAST 1444     07,3706  54 154 0           TS      MPAC              LEAVE 5 BIT KEY CDE IN MPAC FOR CHARIN
 0023   REF   46  LAST 1099     07,3707  0 5323 0           TC      RESUME
```

```
P0024   UPRUPT PROGRAM

 0025   REF  26  LAST 1445    07,3710  54 016 1  UPRUPT    TS      BANKRUPT
 0026   REF 302  LAST 1445    07,3711  56 002 0            XCH     Q
 0027   REF  21  LAST 1445    07,3712  54 012 0            TS      QRUPT
 0028   REF   3  LAST 1445    07,3713  0 4366 0            TC      LODSAMPT         TIME IS SNATCHED IN RUPT FOR NOUN 65.
 0029   REF 262  LAST 1443    07,3714  3 4772 1            CAF     ZERO
 0030   REF   2  LAST  204    07,3715  56 045 0            XCH     INLINK
 0031   REF   1               07,3716  54 073 1            TS      KEYTEMP1
 00311  REF  42  LAST 1423    07,3717  3 0075 0            CA      FLAGWRD1
 00312  REF   3  LAST  443    07,3720  7 4755 0            MASK    NOP01BIT         IF = 0, MISSION IS IN
 00313  REF 382  LAST 1443    07,3721  10 000 0            CCS     A                PRELAUNCH AND UPLINK DATA SUM IS ENABLED
 00314                        07,3722  1 3726 0            TCF     +4               IF FLAGWORD1 BIT 12 =1, IT IS NOT
 00315  REF   2  LAST 1446    07,3723  3 0073 0            CA      KEYTEMP1         ALLOWED.
 00316  REF   1               07,3724  27'116 1            ADS     UPSUM
 00317  REF   2  LAST 1446    07,3725  25'117 1            INCR    UPSUM +1
 0032   REF  43  LAST 1393    07,3726  3 4766 1            CAF     BIT3             TURN ON UPACT LIGHT
 0033                         07,3727  0 0006 1            EXTEND                   (BIT 3 OF CHANNEL 11)
 0034   REF  28  LAST 1435    07,3730  05 011 1            WOR     DSALMOUT
 0035   REF  12  LAST 1445    07,3731  3 4342 0  UPRPT1    CAF     LOW5             TEST FOR TRIPLE CHAR REDUNDANCY
 0036   REF   3  LAST 1446    07,3732  7 0073 1            MASK    KEYTEMP1         LOW5 OF WORD
 0037   REF   4  LAST 1446    07,3733  56 073 0            XCH     KEYTEMP1         LOW5 INTO KEYTEMP1
 0038                         07,3734  0 0006 1            EXTEND
 0039   REF  37  LAST 1444    07,3735  7 4757 1            MP      BIT10            SHIFT RIGHT 5
 0040   REF   1               07,3736  55'137 1            TS      KEYTEMP2
 0041   REF  13  LAST 1446    07,3737  7 4342 1            MASK    LOW5             MID 5
 0042   REF   1               07,3740  6 3774 0            AD      HI10
 0043   REF   1               07,3741  0 3771 0            TC      UPTEST
 0044   REF  38  LAST 1446    07,3742  3 4757 0            CAF     BIT10
 0045                         07,3743  0 0006 1            EXTEND
 0046   REF   2  LAST 1446    07,3744  7 1137 1            MP      KEYTEMP2         SHIFT RIGHT 5
 0047   REF  14  LAST 1446    07,3745  7 4342 1            MASK    LOW5             HIGH 5
 0048                         07,3746  4 0000 0            COM
 0049   REF   2  LAST 1446    07,3747  0 3771 0            TC      UPTEST

 0050   REF   1               07,3750  4 5000 0  UPOK      CS      ELRCODE          CODE IS GOOD. IF CODE = 'ERROR RESET',
 0051   REF   5  LAST 1446    07,3751  6 0073 0            AD      KEYTEMP1         CLEAR UPLOCKFL(SET BIT4 OF FLAGWRD7 = 0)
 0052                         07,3752  0 0006 1            EXTEND                   IF CODE DOES NOT = 'ERROR RESET', ACCEPT
 0053   REF   1               07,3753  1 3761 0            BZF     CLUPLOCK         CODE ONLY IF UPLOCKFL IS CLEAR (=0).

 0054   REF   1               07,3754  3 4765 1            CAF     UPLOCBIT         TEST UPLOCKFL FOR 0 OR 1
 0055   REF  20  LAST  827    07,3755  7 0103 1            MASK    FLAGWRD7
 0056   REF 383  LAST 1446    07,3756  10 000 0            CCS     A
 0057   REF  47  LAST 1445    07,3757  0 5323 0            TC      RESUME           UPLOCKFL = 1
 0058   REF   1               07,3760  0 3701 1            TC      ACCEPTUP         UPLOCKFL = 0

 0059   REF   2  LAST 1446    07,3761  4 4765 0  CLUPLOCK  CS      UPLOCBIT         CLEAR UPLOCKFL (I.E., SET BIT 4 OF
 0060   REF  21  LAST 1446    07,3762  7 0103 1            MASK    FLAGWRD7         FLAGWRD7 = 0)
 0061   REF  22  LAST 1446    07,3763  54 103 1            TS      FLAGWRD7
 0062   REF   2  LAST 1446    07,3764  0 3701 1            TC      ACCEPTUP
```

```
A0063                                                                              CODE IS BAD
 0064   REF  23  LAST 1446   07,3765  4 0103 1  TMFAIL2  CS      FLAGWRD7          LOCK OUT FURTHER UPLINK ACTIVITY
 0065   REF   3  LAST 1446   07,3766  7 4765 0           MASK    UPLOCBIT          (BY SETTING UPLOCKFL = 1) UNTIL
 0066   REF  24  LAST 1447   07,3767  26 103 1           ADS     FLAGWRD7          'ERROR RESET' IS SENT VIA UPLINK.
 0067   REF  48  LAST 1446   07,3770  0 5323 0           TC      RESUME
 0069   REF   6  LAST 1446   07,3771  6 0073 0  UPTEST   AD      KEYTEMP1
 0070   REF 384  LAST 1446   07,3772  10 000 0           CCS     A
 0071   REF   1              07,3773  0 3765 0           TC      TMFAIL2
 0072                        07,3774   77740 1  HI10     OCT     77740
 0073   REF   2  LAST 1447   07,3775  0 3765 0           TC      TMFAIL2
 0074   REF 303  LAST 1446   07,3776  0 0002 0           TC      Q

 0075   REF   2  LAST  224      5000            ELRCODE  EQUALS OCT22
R0076   'UPLINK ACTIVITY LIGHT' IS TURNED OFF BY .....
R0077             1.     VBRELDSP
R0078             2.     ERROR RESET
R0079             3.     UPDATE PROGRAM(P27) ENTERED BY V70,V71,V72,AND V73.


R0080                            -
R0081   THE RECEPTION OF A BAD CODE(I.E  CCC FAILURE) LOCKS OUT FURTHER UPLINK ACTIVITY BY SETTING BIT4 OF FLAGWRD7 = 1.
R0083   TFIS INDICATION WILL BE TRANSFERRED TO THE GROUND BY THE DOWNLINK WHICH DOWNLINKS ALL FLAGWORDS.
R0085   WHEN UPLINK ACTIVITY IS LOCKED OUT ,IT CAN BE ALLOWED WHEN THE GROUND UPLINKS AND 'ERROR RESET' CODE.
R0087   (IT IS RECOMMENDED THAT THE 'ERROR LIGHT RESET' CODE IS PRECEEDED BY 16 BITS THE FIRST OF WHICH IS 1 FOLLOWED
R0089   BY 15 ZEROES. THIS WILL ELIMINATE EXTRANEOUS BITS FROM INLINK WHICH MAY HAVE BEEN LEFT OVER FROM THE ORIGINAL
R0091   FAILURE)
R0092   UPLINK ACTIVITY IS ALSO ALLOWED(UNLOCKED) DURING FRESH START WHEN FRESH START SETS BIT4 OF FLAGWRD7 = 0.
```

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R0001   DISPLAYS CAN BE CLASSIFIED INTO THE FOLLOWING CATEGORIES-

R0002       1. PRIORITY DISPLAYS- DISPLAYS WHICH TAKE PRIORITY OVER ALL OTHER DISPLAYS. USUALLY THESE DISPLAYS ARE SENT
R0004          OUT UNDER CRITICAL ALARM CONDITIONS.
R0005       2. EXTENDED VERB DISPLAYS- ALL EXTENDED VERBS AND MARK ROUTINES SHOULD USE EXTENDED VERB (MARK) DISPLAYS.
R0007       3. NORMAL DISPLAYS- ALL MISSION PROGRAM DISPLAYS WHICH INTERFACE WITH THE ASTRONAUT DURING THE NORMAL
R0009          SEQUENCE OF EVENTS.
R0010       4. MISC. DISPLAYS- ALL DISPLAYS NOT HANDLED BY THE DISPLAY INTERFACEROUTINES. THESE INCLUDE SUCH DISPLAYS AS
R0012          MM DISPLAYS AND SPECIAL PURPOSE DISPLAYS HANDLED BY PINBALL.


R0013       5. ASTRONAUT INITIATED DISPLAYS- ALL DISPLAYS INITIATED EXTERNALLY.
R0014   THE FOLLOWING TERMS ARE USED TO DESCRIBE THE STATUS OF DISPLAYS-

R0015       1. ACTIVE-THE DISPLAY WHICH IS (1) BEING DISPLAYED TO THE ASTRONAUT AND WAITING FOR A RESPONSE OR
R0017          (2) WAITING FIRST IN LINE FOR THE ASTRONAUT TO FINISH USING THE DSKY OR (3) BEING DISPLAYED ON THE DSKY
R0019          BUT NOT WAITING FOR A RESPONSE.
R0020       2. INACTIVE -A DISPLAY WHICH HAS (1) BEEN ACTIVE BUT WAS INTERRUPTEDBY A DISPLAY OF HIGHER PRIORITY,
R0022          (2) BEEN PUT INTO THE WAITING LIST AT TIME IT WAS REQUESTED DUE TO THE FACT A HIGHER PRIORITY DISPLAY
R0024          WAS ALREADY GOING, (3) BEEN INTERRUPTED BY THE ASTRONAUT (CALLED A PINBRANCH CONDITION, SINCE THIS TYPE
R0026          OF INACTIVE DISPLAY IS USUALLY REACTIVATED ONLY BY PINBALL) OR (4) A DISPLAY WHICH HAS FINISHED BUT STILL
R0028          HAS INFO SAVED FOR RESTART PURPOSES.


R0029   DISPLAY PRIORITIES WORK AS FOLLOWS-

R0030      INTERRUPTS-
R0031       1. THE ASTRONAUT CAN INTERRUPT ANY DISPLAY WITH AN EXTERNAL DISPLAY REQUEST.
R0033       2. INTERNAL DISPLAYS CAN NOT BE SENT OUT WHEN THE ASTRONAUT IS USING THE DSKY.
R0035       3. PRIORITY DISPLAYS INTERRUPT ALL OTHER TYPES OF INTERNAL DISPLAYS. A PRIORITY DISPLAY INTERRUPTING ANOTHER
R0037          PRIORITY DISPLAY WILL CAUSE AN ABORT UNLESS BIT14 IS SET FOR THE LINUS ROUTINE.
R0039       4. A MARK DISPLAY INTERRUPTS ANY NORMAL DISPLAY.
R0040       5. A MARK THAT INTERRUPTS A MARK COMPLETELY REPLACES IT.

R0041      ORDER OF WAITING DISPLAYS-
R0042       1. ASTRONAUT EXTERNAL USE
R0043       2. PRIORITY
R0044       3. INTERRUPTED MARK
R0045       4. INTERRUPTED NORMAL

R0046       5. MARK TO BE REQUESTED (SEE DESCRIPTION OF ENDMARK)
R0047       6. MARK WAITING
R0048       7. NORMAL WAITING
```

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L       DISPLAY INTERFACE ROUTINES                                                    USER'S PAGE NO.   2       E0 S3

R0049   THE DISPLAY ROUTINES ARE INTENDED TO SERVE AS AN INTERFACE BETWEEN THE USER AND PINBALL.  THE
R0051   FOLLOWING STATEMENTS CAN BE MADE ABOUT NORMAL DISPLAYS AND PRIORITY DISPLAYS (A DESCRIPTION OF MARK ROUTINES
R0053   WILL FOLLOW LATER):

R0054           1.  ALL ROUTINES THAT END IN R HAVE AN IMMEDIATE RETURN TO THE USER.  FOR ALL FLASHING DISPLAYS THIS RETURN
R0056               IS TO THE USERS CALL CADR +4.  FOR THE ONLY NON FLASHING IMMEDIATE RETURN DISPLAY (GODSPR) THIS RETURN
R0058               IS TO THE USERS CALLING LOC +1.
R0059           2.  ALL ROUTINES NOT ENDING IN R DO NOT DO AN IMMEDIATE RETURN TO THE USER.
R0061           3.  ALL ROUTINES THAT END IN R START A SEPARATE JOB (MAKEPLAY) WITH USERS JOB PRIORITY.
R0063           4.  ALL ROUTINES NOT ENDING IN R BRANCH DIRECTLY TO MAKEPLAY WHICH MAKES THESE DISPLAYS A PART OF THE
R0065               USERS JOB.
R0066           5.  ALL DISPLAY ROUTINES ARE CALLED VIA BANKCALL.
R0067           6.  TO RESTART A DISPLAY THE USER WILL GENERALLY USE A PHASE OF ONE WITH DESIRED RESTART GROUP (SEE
R0069               DESCRIPTION OF RESTARTS).
R0070           7.  ALL FLASHING DISPLAYS HAVE 3 RETURNS TO THE USER FROM ASTRONAUT RESPONSES.  A TERMINATE (V34) BRANCHES
R0072               TO THE USERS CALL CADR +1.  A PROCEED (V33) BRANCHES TO THE USERS CALL CADR +2.  AN ENTER OR RECYCLE
R0074               (V32) BRANCHES TO THE USERS CALL CADR +3.
R0075           8.  ALL ROUTINES MUST BE USED UNDER EXECUTIVE CONTROL.

R0076   A DESCRIPTION OF EACH ROUTINE WITH AN EXAMPLE FOLLOWS:

R0085   GODSPR IS THE SAME AS GODSP ONLY RETURN IS TO THE USER.

A0086                                                      CAF     VXXNYY
A0087                                                      TC      BANKCALL
A0088                                                      CADR    GODSPR

A0089                                                      ...     ...              IMMEDIATE RETURN OF GODSPR

R0090   GOFLASH DISPLAYS A FLASHING VERB NOUN WITH NO IMMEDIATE RETURN TO THE USER. 3 RETURNS ARE POSSIBLE FROM
R0092   THE ASTRONAUT (SEE NO. 7 ABOVE).

A0093                                                      CAF     VXXNYY           VXX NYY WILL BE A FLASHING VERB NOUN.
A0094                                                      TC      BANKCALL
A0095                                                      CADR    GOFLASH
A0096                                                      ...     ...              TERMINATE RETURN
A0097                                                      ...     ...              PROCEED RETURN
A0098                                                      ...     ...              ENTER OR RECYCLE RETURN

R0099   GOPERF1 IS ENTERED WITH DESIRED CHECKLIST VALUE IN A.  GOPERF1 WILL DISPLAY THIS VALUE IN R1 BY MEANS OF A
R0101   V01 N25,A FLASHING PLEASE PERFORM ON CHECKLIST ( V50 N25) IS THEN DISPLAYED.  NO IMMEDIATE RETURN IS MADE TO
R0103   USER (SEE NO. 7 ABOVE).

R0104   GOPERF1 BLANKS REGISTERS R2 AND R3

A0105                                                      CAF     OCTXX            CODE FOR CHECKLIST VALUE XX
A0106                                                      TC      BANKCALL
A0107                                                      CADR    GOPERF1
A0108                                                      ...     ...              TERMINATE RETURN
A0109                                                      ...     ...              PROCEED RETURN
```

```
L       DISPLAY INTERFACE ROUTINES                                                     USER'S PAGE NO.    3       E0 S3

A0110                                                       ...     ...               ENTER RETURN

R0123   GOPERF3 IS USED FOR A PLEASE PERFORM ON A PROGRAM NUMBER.  THE DESIRED PROGRAM NO. IS ENTERED IN A.  GOPERF3
R0125   DISPLAYS THE NO. BY MEANS OF A V06 N07 FOLLOWED BY A FLASHING V50 N07 FOR A PLEASE PERFORM. NO IMMEDIATE RETURN
R0127   IS MADE TO THE USER (SEE NO. 7 ABOVE).

R0128   GOPERF3 BLANKS REGISTERS R2 AND R3

A0129                                                       CAF     DECXX             REQUEST PERFORM ON PXX
A0130                                                       TC      BANKCALL
A0131                                                       CADR    GOPERF3
A0132                                                       ...     ...               TERMINATE RETURN
A0133                                                       ...     ...               PROCEED RETURN
A0134                                                       ...     ...               ENTER RETURN

R0135   GOPERF4 IS USED FOR A PLEASE PERFORM ON AN OPTION. THE DESIRED OPTION ISENTERED IN A AND STORED IN OPTION1.
R0137   GOPERF4 DISPLAYS R1 AND R2 BY MEANS OF A V04N06 FOLLOWED BY A FLASHING  V50N06 FOR A PLEASE PERFORM. NO
R0139   IMMEDIATE RETURN IS MADE TO THE USER (SEE NO. 7 ABOVE).

A0140                                                       CAF     OCTXX             REQUEST PERFORM ON OPTION XX
A0141                                                       TC      BANKCALL
A0142                                                       CADR    GOPERF4
A0143                                                       ...     ...               TERMINATE RETURN
A0144                                                       ...     ...               PROCEED RETURN
A0145                                                       ...     ...               ENTER RETURN

R0146   GOPERF4 BLANKS REGISTER R3

R0147   GODSPRET IS USED TO DISPLAY A VERB NOUN ARRIVING IN A WITH A RETURN TO THE USER AFTER THE DISPLAY HAS BEEN SENT
R0149   OUT.

A0150                                                       CAF     VXXNYY
A0151                                                       TC      BANKCALL
A0152                                                       CADR    GODSPRET

A0153                                                       ...     ...               RETURN TO USER

R0154   REGODSP IS USED TO DISPLAY A VERB NOUN ARRIVING IN A.  REGODSP IS THE SAME AS GODSP ONLY REGODSP REPLACES ANY
R0156   ACTIVE NORMAL DISPLAY IF ONE WAS ACTIVE.

A0157                                                       CAF     VXXNYY
A0158                                                       TC      BANKCALL
A0159                                                       CADR    REGODSP

R0160   REFLASH IS THE SAME AS GOFLASH ONLY REFLASH REPLACES ANY ACTIVE NORMAL DISPLAY IF ONE WAS ACTIVE.

A0162                                                       CAF     VXXNYY            VXX NYY WILL BE A FLASHING VERB NOUN
A0163                                                       TC      BANKCALL
A0164                                                       CADR    REFLASH
A0165                                                       ...     ...               TERMINATE RETURN
```

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A0166                                                      ...    ...          PROCEED RETURN
A0167                                                      ...    ...          ENTER RETURN

R0168   GOFLASHR IS SAME AS GOFLASH ONLY AN IMMEDIATE RETURN IS MADE TO THE USERS CALL CADR +4.

A0170                                                      CAF    VXXNYY
A0171                                                      TC     BANKCALL
A0172                                                      CADR   GOFLASHR
A0173                                                      ...    ...          TERMINATE RETURN
A0174                                                      ...    ...          PROCEED RETURN
A0175                                                      ...    ...          ENTER OR RECYCLE RETURN

A0176                                                      ...    ...          IMMEDIATE RETURN FROM GOFLASHR

R0177   GOPERF1R IS THE SAME AS GOPERF1 ONLY GOPERF1R HAS AN IMMEDIATE RETURN TOUSERS CALL CADR +4.

R0179   GOPERF1R BLANKS REGISTERS R2 AND R3

A0180                                                      CAF    OCTXX        CODE FOR CHECKLIST VALUE XX.
A0181                                                      TC     BANKCALL
A0182                                                      CADR   GOPERF1R
A0183                                                      ...    ...          TERMINATE RETURN
A0184                                                      ...    ...          PROCEED RETURN
A0185                                                      ...    ...          ENTER RETURN

A0186                                                      ...    ...          IMMEDIATE RETURN FROM GOPERF1R

R0197   GOPERF3R IS THE SAME AS GOPERF3 ONLY AN IMMEDIATE RETURN IS MADE TO USERS CALL CADR +4.

R0199   GOPERF3R BLANKS REGISTERS R2 AND R3

A0200                                                      CAF    PROGXX       PERFORM PROGRAM XX
A0201                                                      TC     BANKCALL
A0202                                                      CADR   GOPERF3R
A0203                                                      ...    ...          TERMINATE RETURN
A0204                                                      ...    ...          PROCEED RETURN
A0205                                                      ...    ...          ENTER RETURN

A0206                                                      ...    ...          GOPERF3R IMMEDIATELY RETURNS HERE

R0207   GOPERF4R IS THE SAME AS GOPERF4 ONLY AN IMMEDIATE RETURN IS MADE TO USERS CALL CADR +4.

A0209                                                      CAF    OCTXX        REQUEST PERFORM ON OPTIONXX
A0210                                                      TC     BANKCALL
A0211                                                      CADR   GOPERF4R
A0212                                                      ...    ...          TERMINATE RETURN
A0213                                                      ...    ...          PROCEED RETURN
A0214                                                      ...    ...          ENTER RETURN

A0215                                                      ...    ...          IMMEDIATE RETURN TO USER
```

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R0216   GOPERF4R BLANKS REGISTER R3

R0217   REFLASHR IS THE SAME AS REFLASH ONLY AN IMMEDIATE RETURN IS MADE TO THE USERS CALL CADR +4.

A0219                                CAF     VXXNYY          VXX NYY WILL BE A FLASHING VERB NOUN
A0220                                TC      BANKCALL
A0221                                CADR    REFLASHR
A0222                                ...     ...             TERMINATE RETURN
A0223                                ...     ...             PROCEED RETURN
A0224                                ...     ...             ENTER RETURN    .

A0225                                ...     ...             IMMEDIATE RETURN TO USER

R0226   REGODSPR IS THE SAME AS REGODSP ONLY A RETURN (IMMEDIATE) IS MADE TO THE USER.

A0228                                CAF     VXXNYY
A0229                                TC      BANKCALL
A0230                                CADR    REGODSPR

A0231                                ...     ...             IMMEDIATE RETURN TO USER
```

```
L       DISPLAY INTERFACE ROUTINES                                                  USER'S PAGE NO.   6      E0 S3

R0232   GOMARK IS USED TO DISPLAY A MARK VERB NOUN ARRIVING IN A. NO RETURN IS MADE TO THE USER.

R0238   GCMARKR IS THE SAME AS GOMARK ONLY RETURN IS TO THE USER.

R0244   GOMARKF DISPLAYS A FLASHING MARK VERB NOUN WITH NO IMMEDIATE RETURN TO THE USER. 3 RETURNS ARE POSSIBLE FROM
R0246   THE ASTRONAUT (SEE NO. 7 ABOVE ).

R0247   GCXDSPF = GOMARKF

A0248                                                   CAF     VXXNYY          VXXNYY WILL BE A FLASHING MARK VERB NOUN
A0249                                                   TC      BANKCALL
A0250                                                   CADR    GOMARKF         OTHER EXTENDED VERBS USE CADR GOXDSPF
A0251                                                   ...     ...             TERMINATE RETURN
A0252                                                   ...     ...             PROCEED RETURN
A0253                                                   ...     ...             ENTER OR RECYCLE RETURN

R0254   GOMARKFR IS THE SAME AS GOMARKF ONLY AN IMMEDIATE RETURN IS MADE TO THE USER CALL CADR +4.

R0264   GCMARK1 IS USED FOR A PLEASE PERFORM ON A MARK REQUEST WITH ONLY 1 ASTRONAUT RETURN TO THE USER. NO IMMEDIATE
R0266   RETURN IS MADE. THE DESIRED MARK PLEASE PERFORM VERB AND DESIRED NOUN ISENTERED IN A. GOMARK1 DISPLAYS R1, R2, R
R0268   MEANS OF A V05NYY FOLLOWED BY A FLASHING V5XNYY FOR A PLEASE PERFORM. THE ASTRONAUT WILL RESPOND WITH A MARK
R0270   OR MARK REJECT OR AN ENTER. THE ENTER IS THE ONLY ASTRONAUT RESPONSE THAT WILL COME BACK TO THE USER.

A0272                                                   CAF     V5XNYY          X=1,2,3,4    Y= NOUN
A0273                                                   TC      BANKCALL
A0274                                                   CADR    GOMARK1

A0275                                                   ...     ...             ENTER RETURN

R0276   *** IF BLANKING DESIRED ON NON R ROUTINES, NOTIFY DISPLAYER.

R0277   GOMARK1R IS THE SAME AS A GOMARK1 ONLY AN IMMEDIATE RETURN IS MADE TO THE USERS CALL CADR +2.
A0279                                                   CAF     V5XNYY          X=1,2,3,4     YY = NOUN
A0280                                                   TC      BANKCALL
A0281                                                   CADR    GOMARK1R

A0282                                                   ...     ...             ASTRONAUT ENTER RETURN
A0283                                                   ...     ...             IMMEDIATE RETURN TO USER

R0284   GCMARK2 IS THE SAME AS GOMARK1 ONLY 3 RETURNS ARE MADE TO THE USER FROM THE ASTRONAUT.
A0286                                                   CAF     V5XNYY          X=1,2,3,4    YY=NOUN
A0287                                                   TC      BANKCALL
A0288                                                   CADR    GOMARK2
A0289                                                   ...     ...             TERMINATE RETURN
A0290                                                   ...     ...             PROCEED RETURN
A0291                                                   ...     ...             ENTER RETURN
R0313   GOMARK4 IS THE SAME AS GOMARK3 ONLY R2 AND R3 ARE BLANKED AND R1 IS DISPLAYED IN OCTAL.

A0315                                                   CAF     V5XNYY          X=1,2,3,4 YY=NOUN
A0316                                                   TC      BANKCALL
```

```
A0317                                          CADR    GOMARK4
A0318                                          ...     ...               TERMINATE RETURN
A0319                                          ...     ...               PROCEED RETURN
A0320                                          ...     ...               ENTER RETURN

R0321   EXDSPRET IS USED TO DISPLAY A VERB NOUN ARRIVING IN A WITH A RETURN MADE TO THE USER AFTER THE DISPLAY HAS BEEN
R0323   SENT OUT.

A0324                                          CAF     VXXNYY
A0325                                          TC      BANKCALL
A0326                                          CADR    EXDSPRET

A0327                                          ...     ...               RETURN TO USER

R0328   KLEENEX CLEANS OUT ALL MARK DISPLAYS (ACTIVE AND INACTIVE). A RETURN IS MADE TO THE USER AFTER THE MARK DISPLAYS
R0330   HAVE BEEN CLEANED OUT.

A0331                                          TC      BANKCALL
A0332                                          CADR    KLEENEX

A0333                                          ...     ...               RETURN TO USER

R0334   MARKBRAN IS A SPECIAL PURPOSE ROUTINE USED FOR SAVING JOB VAC AREAS (SEE DESCRIPTION OF MARKBRAN BELOW).

A0336                                          TC      BANKCALL
A0337                                          CADR    MARKBRAN

A0338                                          ...     ...               BAD RETURN IF MARK DISPLAY NOT ACTIVE

A0339                                                                    (GOOD RETURN TO IMMEDIATE RETURN LOC OF
A0340                                                                    LAST FLASHING MARK R ROUTINE)

R0341   PINBRNCH REESTABLISHES THE LAST ACTIVE FLASHING DISPLAY. IF THERE IS NO ACTIVE FLASHING DISPLAY, THE DSKY IS
R0343   BLANKED AND CONTROL IS SENT TO ENDOFJOB.

A0344                                          TC      POSTJUMP
A0345                                          CADR    PINBRNCH

R0346   PRIODSP IS USED AS A PRIORITY DISPLAY.  IT WILL DISPLAY A GOFLASH TYPE DISPLAY WITH THREE POSSIBLE RETURNS FROM
R0348   THE ASTRONAUT(SEE NO.7 ABOVE).

R0349           THE MAIN PURPOSE OF PRIODSP IS TO REPLACE THE PRESENT DISPLAY WITH A DISPLAY OF HIGHER PRIORITY AND TO
R0351   PROVIDE A MEANS FOR RESTORING THE OLD DISPLAY WHEN THE PRIORITY DISPLAY
R0352   IS RESPONDED TO BY THE ASTRONAUT.

R0353           THE FORMER DISPLAY IS RESTORED BY AN AUTOMATIC BRANCH TO WAKE UP THE DISPLAY THAT WAS INTERRUPTED BY THE
R0355   PRIO DISPLAY.

A0356                                          CAF     VXXNYY            VXXNYY WILL BE A FLASHING VERB NOUN
A0357                                          TC      BANKCALL
```

```
A0358                                                          CADR     PRIODSP
A0359                                                          ...      ...                 TERMINATE RETURN
A0360                                                          ...      ...                 PROCEED RETURN
A0361                                                          ...      ...                 ENTER OR RECYCLE RETURN

R0362    PRIODSPR IS THE SAME AS PRIODSPONLY AN IMMEDIATE RETURN IS MADE TO THE  USERS CALL CADR +4.

A0364                                                          CAF      VXXNYY              VXXNYY WILL BE A FLASHING VERB NOUN
A0365                                                          TC       BANKCALL
A0366                                                          CADR     PRIODSPR
A0367                                                          ...      ...                 TERMINATE RETURN
A0368                                                          ...      ...                 PROCEED RETURN
A0369                                                          ...      ...                 ENTER OR RECYCLE RETURN

A0370                                                          ...      ...                 IMMEDIATE RETURN

R0371    PRIOLARM DOES A V05N09 PRIODSPR.
R0372    CLEANDSP CLEANS OUT ALL NORMAL DISPLAYS (ACTIVE AND INACTIVE). A RETURN IS MADE TO THE USER AFTER NORMAL
R0374    DISPLAYS ARE CLEANED OUT.

A0375                                                          TC       BANKCALL
A0376                                                          CADR     CLEANDSP

A0377                                                          ...      ...                 RETURN TO USER
```

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L       DISPLAY INTERFACE ROUTINES                                                   USER'S PAGE NO.  9      E  53

R0378   GENERAL INFORMATION
R0379   ------- -----------

R0380   ALARM OR ABORT EXIT MODES--

A0381                                           PRIOBORT TC      ABORT
A0382                                                    OCT     1502

R0383   PRIOBORT IS BRANCED TO WHEN (1)  A NORMAL DISPLAY IS REQUESTED AND  ANOTHER NORMAL DISPLAY IS ALREADY ACTIVE
R0385   (REFLASH AND REGODSP ARE EXCEPTIONS) OR (2) A PRIORITY DISPLAY IS REQUESTED WHEN ANOTHER PRIORITY DISPLAY IS
R0387   ALREADY ACTIVE (A PRIORITY WITH LINUS BIT14 IS AN EXCEPTION).

R0388   ERASABLE INITIALIZATION REQUIRED--

R0389        ACCOMPLISHED BY FRESH START- 1. FLAGWRD4 (USED EXCLUSIVELY BY DISPLAY INTERFACE ROUTINES)
R0391                                     2. NVSAVE = NORMAL VERB AND NOUN       REGISTER.
R0393                                     3. EBANKTEM = NORMAL INACTIVE FLAGWORD(ALSO CONTAINS NORMALS EBANK).

R0395                                     5. RISAVE = MARKBRAN CONTROL WORD
R0396                                     4. RESTREG = PRIORITY 30 AND SUPERBANK 3.
R0398   OUTPUT--

R0399        NVWORD = PRIO VERB AND NOUN
R0400        NVWORD +1(MARKNV) = MARK VERB AND NOUN
R0401        NVWORD +2(NVSAVE) = NORMAL VERB AND NOUN

R0402        DSPFLG(EBANKSAV) = PRIO FLAGWORD (INCLUDING EBANK)
R0403        DSPFLG +1(MARKEBAN) = MARK FLAGWORD (INCLUDING EBANK)
R0404        DSPFLG +2(EBANKTEM) = NORMAL FLAGWORD (INCLUDIG EBANK)

R0405        CADRFLSH = PRIO USERS CALL CADR +1 LOCATION
R0406        CADRFLSH +1(MARKFLSH) = MARK USERS CALL CADR +1 LOCATION
R0407        CADRFLSH +2(TEMPFLSH) = NORMAL USERS CALL CADR +1 LOCATION

R0408        PRIOTIME = TIME EACH PRIO REQUEST FIRST SENT OUT
R0409        OPTION1 = DESIRED OPTION FROM GOPERF4
R0410        FLAGWRD4 = BIT INFO FOR CONTROL OF ALL DISPLAY ROUTINES
R0411        DSPTEM1 = R1 INFO FOR ASTRONAUT FROM PERFORM DISPLAYS(NORMAL)
R0412   SUBROUTINES USED-- NVSUB, FLAGUP, FLAGDOWN, ENDOFJOB, BLANKSUB, ABORT, JOBWAKE, JOBSLEEP, FINDVAC, PRIOCHNG,
R0414   JAMTERM, NVSUBUSY, FLASHON, ENDIDLE, CHANG1, BANKJUMP, MAKECADR, NOVAC,
R0415   DEBRIS-- (STORED INTO)

R0416        TEMPORARY TEMPORARIES- A, Q, L, MPAC +2, MPAC +3, MPAC +4, MPAC +5, MPAC +6, RUPTREG2, RUPTREG3, CYL,
R0418   EBANK, RUPTREG4, LOC, BANKSET, MODE, MPAC, MPAC +1                     4, FACEREG
R0420        ERASABES(SHARED AND USED WITH OTHER PROGRAMS) CADRSTOR, DSPLIST, LOC, DSPTEM1, OPTION1

R0422        ERASABLES(USED ONLY BY DISPLAY ROUTINES)- NVWORD,+1,+2, DSPFLG,+1,+2, CADRFLSH,+1,+2, PRIOTIME, FLAGWRD4,
R0424  R1SAVE, MARK2PAC,

R0425  DEBRIS-- (USED BUT NOT STORED INTO)- NOUNREG, VERBREG, LOCCTR, MONSAVE1
R0426  FLAGWORD DESCRIPTIONS--
R0427     FLAGWRD4- SEE DESCRIPTION UNDER LOG SECTION ERASABLE ASSIGNMENTS

R0428     DSPFLG, DSPFLG+1, DSPFLG +2-
R0429     ------------------------------
R0430  BITS 1 BLANK R1
R0431       2 BLANK R2
R0432       3 BLANK R3
R0433       4 FLASHING DISPLAY REQUESTED
R0434       5 PERFORM DISPLAY REQUESTED
R0435       6 -----                EXDSPRET          GODSPRET
R0436       7 PRIO DISPLAY         -----             -----
R0437       8 -----               MARK MONITOR PERF    -----
R0438       9 EBANK
R0439      10 EBANK
R0440      11 EBANK
R0441      12 -----               -----        V99PASTE
R0442      13 2ND PART OF PERFORM
R0443      14 REFLASH OF REDO  -----           REFLASH OR REDO
R0444      15 -----           MARK REQUEST           -----
R0445  RESTARTING DISPLAYS--

R0446  RULES FOR THE DSKY OPERATOR--

R0447       1. PROCEED AND TERMINATE SERVE AS RESPONSES TO REQUESTS FOR OPERATOR RESPONSE (FLASHING V/N).  AS LONG
R0449          AS THERE IS ANY REQUEST AWAITING OPERATOR RESPONSE, ANY USE OF PROCEED OR TERMINATE WILL SERVE AS
R0451          RESPONSES TO THAT REQUEST.  CARE SHOULD BE EXERCISED IN ATTEMPTING TO KILL AN OPERATOR INITIATED MONITOR
R0453          WITH PROCEED AND TERMINATE FOR THIS REASON.
R0454       2. THE ASTRONAUT MUST RESPOND TO A PRIORITY DISPLAY NO SOONER THAN 5 SECS FROM THE TIME THE MISSION
R0456          PROGRAM SENT OUT THE REQUEST FOR OPERATOR RESPONSE (THE ASTRONAUT WOULD SEE THIS DISPLAY FOR LESS TIME
R0458          DUE TO TIME IT TAKES TO GET DISPLAY SENT OUT.) IF THE ASTRONAUT RESPONDS TOO SOON, THE PRIORITY DISPLAY
R0460          IS SENT OUT AGAIN---AND AGAIN UNTIL AN ACCUMULATED 5 SECS FROM TIME THE FIRST PRIORITY DISPLAY WAS SENT
R0462          OUT. THE SAME 5 SEC. DELAY WILL OCCUR AT 163.84 SECS OR IN ANY MULTIPLE OF THAT TIME DUE TO PROGRAM
R0464          CONSIDERATION.
R0465       3. KEY RELEASE BUTTON-
R0466          A) IF THE KEY RELEASE LIGHT IS ON, IT SIMPLY RELEASES THE KEYBOARD AND DISPLAY FOR INTERNAL USE.
R0468          B) IF THE KEY RELEASE LIGHT IS OFF, AND IF SOME REQUEST FOR OPERATOR RESPONSE (FLASHING V/N) IS STILL
R0470             AWAITING RESPONSE  THEN IT RE-ESTABLISHES THE DISPLAYS THAT ORIGINALLY REQUESTED RESPONSE.
R0472          IF AN OPERATOR WANTS THEREFORE TO RE-ESTABLISH BUT CONDITION (A) IS ENCOUNTERED, A SECOND DEPRESSION OF
R0474          KEY RELEASE BUTTON MAY BE NECESSARY.
R0475       4. IT IS IMPORTANT TO ANSWER ALL REQUESTS FOR OPERATOR RESPONSE.
R0476       5. IT IS ALWAYS GOOD PRACTICE TO TERMINATE AN EXTENDED VERB BEFORE ASKING FOR ANOTHER ONE OR THE SAME ONE
R0478          OVER AGAIN.

R0479  SPECIAL CONSIDERATIONS--
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R0480          1. MPAC +2  SAVED ONLY IN MARK DISPLAYS
R0481          2. GODSP(R),REGODSP(R),GOMARK(R) ALWAYS TURN ON THE FLASH IF ENTERED WITH A PASTE VERB REQUEST.
R0483          3. ALL NORMAL DISPLAYS ARE RESTARTABLE EXCEPT GODSP(R), REGODSP(R)
R0484          4. ALL EXTENDED VERBS WITH DISPLAYS SHOULD START WITH A TC TESTXACT AND FINISH WITH A TC ENDEXT.
R0486          5. GODSP(R) AND REGODSP(R) MUST BE IN THE SAME EBANK AND SUPERBANK AS THE LAST NORMAL DISPLAY RESTARTED
R0488             BY A .1 RESTART PHASE CHANGE.
R0489          6. IN ORDER TO SET UP A NON DISPLAY .1 RESTART POINT, THE USER MUST MAKE CERTAIN THAT RESTREG CONTAINS THE
R0491             CORRECT PRIORITY AND SUPERBANK AND THAT EBANKTEM CONTAINS THE CO
R04911         7. IF CLEANDSP IS RESTARTED VIA A .1 PHASE CHANGE, CAF ZERO SHOULD BE EXECUTED  BEFORE THE TC BANKCALL
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P0492   CALLING SEQUENCE FOR BLANKING
A0493                                                                   CAF      BITX              X=1,2,3 BLANK R1,R2,R3 RESPECTIVELY
A0494                                                                   TC       BLANKET
A0495                                                                   ...      ...               RETURN TO USER HERE

R0496   IN ORDER TO USE BLANKET CORRECTLY THE USER MUST USE A DISPLAY ROUTINE THAT ENDS IN R FIRST FOLLOWED BY THE CALL
R0498   TO BLANKET AT THE IMMEDIATE RETURN LOC.

 0500   REF    1                  4000                                  SETLOC FFTAG4
 0501                             5516                                  BANK

 0502   REF    1                                                        COUNT* $$/DSPLA
 0503   REF 692   LAST 1445       5516   54 162 0   BLANKET   TS       MPAC +6
 0504   REF    1                  5517   4 0160 1             CS       PLAYTEM4
 0505   REF 693   LAST 1459       5520   7 0162 0             MASK     MPAC +6
 0506   REF 694   LAST 1459       5521   50 161 1             INDEX    MPAC +5
 0507   REF    2  LAST 1459       5522   26 160 1             ADS      PLAYTEM4

 0508   REF 304   LAST 1447       5523   0 0002 0             TC       Q

 0510   REF    9  LAST  793       5524   0 5527 1   ENDMARK   TC       CLEARMRK
 0511   REF   57  LAST 1395       5525   0 4655 0             TC       POSTJUMP
 0512   REF    1                  5526    21643 0             CADR     MARKOVER

 05121  REF 263   LAST 1446       5527   3 4772 1   CLEARMRK CAF       ZERO
 05122  REF  17   LAST  941       5530   55'247 0             TS       EXTVBACT

 05124  REF    1                  5531   4 4770 1             CS       XDSPBIT
 05125  REF    6  LAST  590       5532   7 0100 1             MASK     FLAGWRD4
 05126  REF    7  LAST 1459       5533   54 100 1             TS       FLAGWRD4

 05128  REF 305   LAST 1459       5534   0 0002 0             TC       Q
R0513   ***ALL EXTENDED VERB ROUTINES THAT HAVE AT LEAST ONE FLASHING DISPLAY MUST TCF ENDMARK OR TCF ENDEXT WHEN
R0515   FINISHED.

 0516   REF 192   LAST 1443       5535   56 001 0   VNFLASH   XCH      L
 0517   REF    1                  5536   3 5545 0             CAF      VNCADR
 0518   REF    1                  5537   1 5542 0             TCF      VNGODSP

 0519   REF 193   LAST 1459       5540   56 001 0   VNFLASHR XCH       L
 0520   REF    1                  5541   3 5546 0             CAF      VNRCADR
 0521   REF 306   LAST 1459       5542   24 002 0   VNGODSP   INCR     Q                 BECAUSE OF RESTARTS
 0522   REF    1                  5543   22 155 0             LXCH     PLAYTEM1
 0523   REF    3  LAST 1195       5544   1 4642 1             TCF      SWCALL

 0524   REF    1                  5545    20732 0   VNCADR    CADR     VNFLSH
 0525   REF    1                  5546    20735 1   VNRCADR   CADR     VNFLSHR

 0527   REF    1               10,2000                          SETLOC DISPLAYS
 0528                          10,2575                          BANK
```

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L          DISPLAY INTERFACE ROUTINES                                                                USER'S PAGE NO.  13         E: 53

 0529      REF   1                                              COUNT* $$/DSPLA
R0530      NTERONLY IS USED TO DIFFERENTIATE THE MARK ROUTINE WITH ONLY ONE RETURN TO THE USER FROM THE MARKING ROUTINE WIT
R0532      3 RETURNS TO THE USER. THIS ROUTINE IS ONLY USED BY GOMARK1 AND GOMARK1R.

 0534      REF 264  LAST 1459    10,2575  3 4772 1  KLEENEX   CAF      ZERO                 CLEAN OUT EXTENDED VERBS
 0535      REF   2  LAST 1459    10,2576  54 155 1  GOMARKF   TS       PLAYTEM1             ENTRANCE FOR MARK GOFLASH

 0536      REF   1               10,2577  3 7664 1            CAF      MARKFMSK             MARK,FLASH
 0537      REF   1               10,2600  1 2745 1            TCF      GOFLASH2

 0538      REF   3  LAST 1460    10,2601  54 155 1  GOMARK2   TS       PLAYTEM1             MARK GOPERFS-3 AST. RETURNS
 0539      REF   1               10,2602  3 3733 0  MARKFORM  CAF      MPERFMSK             MARK, PERFORM, FLASH
 0540      REF   2  LAST 1460    10,2603  1 2745 1            TCF      GOFLASH2

 0541      REF   4  LAST 1460    10,2604  54 155 1  GOMARK4   TS       PLAYTEM1
 0542      REF   1               10,2605  3 3723 1            CAF      MARK4MSK             MARK,PERFORM,FLASH,BLANK
 0543      REF   3  LAST 1460    10,2606  1 2745 1            TCF      GOFLASH2

 0544      REF   5  LAST 1460    10,2607  54 155 1  GOMARKFR  TS       PLAYTEM1             ENTRANCE FOR MARK GOFLASHR

 0545      REF   2  LAST 1460    10,2610  3 7664 1            CAF      MARKFMSK
 0546      REF   1               10,2611  1 3103 1            TCF      GODSPRS

 05462     REF   6  LAST 1460    10,2612  54 155 1  MARKMONR  TS       PLAYTEM1             USED FOR MARK MONITOR
 05463     REF   1               10,2613  3 3754 1            CAF      MARK3MSK
 05464     REF   4  LAST 1460    10,2614  1 2745 1            TCF      GOFLASH2
 0547      REF 153  LAST 1428    10,2615  3 4770 0  MAKEMARK  CAF      ONE
 0548      REF   1               10,2616  0 3172 0            TC       COPIES

 0549      REF   8  LAST 1459    10,2617  3 0100 0            CA       FLAGWRD4             IS NORM OR PRIO BUSY OR WAITING
 0550      REF   1               10,2620  7 3734 0            MASK     OCT34300
 0551      REF 385  LAST 1447    10,2621  10 000 0            CCS      A
 0552      REF   1               10,2622  1 2670 0            TCF      CHKPRIO

 0553      REF   9  LAST 1460    10,2623  3 0100 0            CA       FLAGWRD4             IS MARK SLEEPING DUE TO ASTRO BUSY
 0554      REF   1               10,2624  7 4760 0            MASK     MRKNVBIT
 0555                            10,2625  0 0006 1            EXTEND
 0556      REF   1               10,2626  1 2630 1            BZF      MARKPLAY             NO

 0557      REF  91  LAST 1314    10,2627  1 5205 1            TCF      ENDOFJOB

 0558      REF  28  LAST 1393    10,2630  4 4773 1  MARKPLAY  CS       FIVE                 RESET MARK OVER NORM, SET MARK
 0559      REF  10  LAST 1460    10,2631  7 0100 1            MASK     FLAGWRD4
 0560      REF   2  LAST 1459    10,2632  6 4770 0            AD       XDSPBIT
 0561      REF  11  LAST 1460    10,2633  54 100 1            TS       FLAGWRD4
 0562                            10,2634  22 007 0  GOGOMARK  ZL                            PERFORM
 05621     REF   1               10,2635  4 1274 0            CS       MARKFLAG
 05622     REF   1               10,2636  7 4761 1            MASK     DCMKPERF
 05623     REF 386  LAST 1460    10,2637  10 000 0            CCS      A
 05624                           10,2640  1 2645 0            TCF      +5
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L        DISPLAY INTERFACE ROUTINES                                                                         USER'S PAGE NO.  14       E0 S3

05625  REF   1                10,2641  3 0367 0              CA       MARKNV
05626  REF   3  LAST  366     10,2642  7 4171 0              MASK     RID7
05627  REF 194  LAST 1459     10,2643  54 001 1              TS       L
05628                         10,2644  1 2651 0              TCF      +5
05629  REF   2  LAST 1460     10,2645  4 1274 0              CS       MARKFLAG
0563   REF   1                10,2646  7 4764 1              MASK     PERFRQST
0564   REF 387  LAST 1460     10,2647  10 000 0              CCS      A
0565   REF   1                10,2650  1 2653 1              TCF      MARKCOP
0566   REF   2  LAST 1461     10,2651  4 0367 1              CS       MARKNV
0567   REF   3  LAST 1461     10,2652  54 367 1              TS       MARKNV

0568   REF 154  LAST 1460     10,2653  3 4770 0   MARKCOP    CAF      ONE                MARK INDEX
0569   REF   1                10,2654  54 164 0              TS       COPINDEX
05695  REF   1                10,2655  1 3316 1              TCF      NVDSP +1
0570   REF   1                10,2656  3 0165 0   COPYTOGO   CA       MPAC2SAV
0571   REF 695  LAST 1459     10,2657  54 156 1              TS       MPAC +2

0572   REF   2  LAST 1461     10,2660  50 164 1   COPYPACS   INDEX    COPINDEX
0573   REF   1                10,2661  3 3740 1              CAF      PRIODCT
0574   REF   1                10,2662  54 162 0              TS       GENMASK

0575   REF   3  LAST 1461     10,2663  50 164 1              INDEX    COPINDEX
0576   REF   2  LAST   83     10,2664  3 1273 0              CAF      EBANKSAV
0577   REF   1                10,2665  54 160 1              TS       TEMPOR2            ACTIVE EBANK AND FLAG

0578   REF  46  LAST 1432     10,2666  54 003 0              TS       EBANK

0579   REF 307  LAST 1459     10,2667  0 0002 0              TC       Q

R0580  PINCHEK CHECKS TO SEE IF THE CURRENT MARK REQUEST IS MADE BY THE ASTRONAUT WHILE INTERRUPTING A GOPLAY DISPLAY
R0582  (A NORMAL OR A PRIO). IF THE ASTRONAUT TRIES TO MARK DURING A PRIO, THE CHECK FAIL LIGHT GOES ON AND THE MARK
R0584  REQUEST IS ENDED. IF HE TRIES TO MARK DURING A NORM, THE MARK IS ALLOWED. IN THIS CASE THE NORM IS PUT TO SLEEP
R0586  UNTIL ALL MARKING IS FINISHED.

R0587         IF THE MARK REQUEST COMES FROM THE PROGRAM DURING A TIME THE ASTRONAUT IS NOT INTERRUPTING A NORMAL OR A
R0589  PRIO, THE MARK REQUEST IS PUT TO SLEEP UNTIL THE +RESENT ACTIVE DISPLAY IS RESPONDED TO BY THE ASTRONAUT.

0591   REF  12  LAST 1460     10,2670  3 0100 0   CHKPRIO    CA       FLAGWRD4           MARK ATTEMPT DURING PRIO
0592   REF   2  LAST  250     10,2671  7 7646 0              MASK     14,12,7
0593   REF 388  LAST 1461     10,2672  10 000 0              CCS      A
0594   REF   1                10,2673  1 3676 1              TCF      MARSLEEP

0595   REF   1                10,2674  3 4766 1              CAF      MKOVBIT            SET MARK OVER NORM
0596   REF   1                10,2675  0 3755 0              TC       UPENT2

0597   REF   1                10,2676  1 3000 0              TCF      SETNORM

0598   REF   4  LAST 1461     10,2677  3 0367 0   MARKPERF   CA       MARKNV
0599   REF   1                10,2700  7 4171 0              MASK     VERBMASK
0600   REF   1                10,2701  1 3350 0              TCF      NV50DSP
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L       DISPLAY INTERFACE ROUTINES                                                                  USER'S PAGE NO.  15      E  53

 06001  REF   7  LAST 1460   10,2702  54 155 1  GODSP     TS      PLAYTEM1

 06002  REF   1              10,2703  3 4772 1  GODSP2    CAF     DSPONLY
 06003  REF   5  LAST 1460   10,2704  1 2745 1            TCF     GOFLASH2

 0601   REF   8  LAST 1462   10,2705  54 155 1  GODSPRET  TS      PLAYTEM1        ENTRANCE FOR A GODSP WITH A PASTE

 0602   REF   1              10,2706  3 4763 1            CAF     RETDSPY         SET BIT 6 TO RETURN TO USER AFTER NVSUB
 0603   REF   6  LAST 1462   10,2707  1 2745 1            TCF     GOFLASH2

 0604   REF   9  LAST 1462   10,2710  54 155 1  GODSPR    TS      PLAYTEM1

 0605   REF   2  LAST 1462   10,2711  3 4772 1  GODSPR1   CAF     DSPONLY
 0606   REF   3  LAST 1459   10,2712  54 160 1  GODSPR2   TS      PLAYTEM4

 0607   REF 265  LAST 1460   10,2713  3 4772 1            CAF     ZERO            * DONT MOVE
 0608   REF   1              10,2714  1 3105 1            TCF     GODSPRS1

R0609         CLEANDSP IS USED FOR CLEARING OUT A NORMAL DISPLAY THAT IS PRESENTLY ACTIVE OR A NORMAL DISPLAY THAT IS
R0611   SET UP TO BE STARTED OR RESTARTED.

R0612         NORMALLY THE USER WILL NOT NEED TO USE THIS ROUTINE SINCE A NEW NORMAL DISPLAY AUTOMATICALLY CLEARS OUT AN
R0614   OLD DISPLAY.

R0615         CALLING SEQUENCE FOR CLEANDSP-

A0616                                                         TC      BANKCALL
A0617                                                         CADR    CLEANDSP

 0618   REF 266  LAST 1462   10,2715  3 4772 1  CLEANDSP  CAF     ZERO
 0619   REF  10  LAST 1462   10,2716  54 155 1  REFLASH   TS      PLAYTEM1

 0620   REF   1              10,2717  3 3722 0            CAF     REDOMASK        FLASH AND PERMIT
 0621   REF   7  LAST 1462   10,2720  1 2745 1            TCF     GOFLASH2

 0622   REF  11  LAST 1462   10,2721  54 155 1  REGODSP   TS      PLAYTEM1

 0623   REF   1              10,2722  3 4753 1            CAF     REFLSH
 0624   REF   8  LAST 1462   10,2723  1 2745 1            TCF     GOFLASH2

 0625   REF  12  LAST 1462   10,2724  54 155 1  REGODSPR  TS      PLAYTEM1

 0626   REF   2  LAST 1462   10,2725  3 4753 1            CAF     REFLSH
 0627   REF   1              10,2726  1 2712 0            TCF     GODSPR2

 0628   REF  13  LAST 1462   10,2727  54 155 1  CLOCPLAY  TS      PLAYTEM1
 0629   REF   1              10,2730  3 3750 0            CAF     CLOCKCON
 0630   REF   9  LAST 1462   10,2731  1 2745 1            TCF     GOFLASH2
 0631   REF  73  LAST 1442   10,2732  0 5547 1  VNFLSH    TC      UPFLAG
 0632   REF   1              10,2733   00111 0            ADRES   VNFLAG
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L        DISPLAY INTERFACE ROUTINES                                                         USER'S PAGE NO.  16      E0 S3

 0633    REF  27  LAST  907    10,2734  1 2744 0              TCF      GOFLASH +1

 0634    REF  74  LAST 1462    10,2735  0 5547 1  VNFLSHR   TC       UPFLAG
 0635    REF   2  LAST 1462    10,2736    00111 0             ADRES    VNFLAG
 0636    REF   1               10,2737  3 4765 1              CAF      FLSHRQST
 0637    REF   4  LAST 1462    10,2740  54 160 1              TS       PLAYTEM4           IT'S A FLASHING DISPLAY
 0638    REF 267  LAST 1462    10,2741  3 4772 1              CAF      ZERO               RETURN TO CALLER'S Q +1
 0639    REF   2  LAST 1462    10,2742  1 3105 1              TCF      GODSPRS1

 0640    REF  14  LAST 1462    10,2743  54 155 1  GOFLASH   TS       PLAYTEM1

 0641    REF   2  LAST 1463    10,2744  3 4765 1    +1      CAF      FLSHRQST           LEAVE ONLY FLASH BIT SET
 0642    REF   5  LAST 1463    10,2745  54 160 1  GOFLASH2  TS       PLAYTEM4

 0643    REF   1               10,2746  0 3157 1              TC       SAVELOCS

 0644    REF   1               10,2747  1 3012 0              TCF      MAKEPLAY           BRANCH DIRECT WITH NO SEPARATE JOB CALL

 0645    REF  15  LAST 1463    10,2750  54 155 1  PRIODSPR  TS       PLAYTEM1

 0646    REF   1               10,2751  3 5013 0              CAF      BITS7+4
 0647    REF   2  LAST 1460    10,2752  1 3103 1              TCF      GODSPRS

 0648    REF  16  LAST 1463    10,2753  54 155 1  PRIODSP   TS       PLAYTEM1

 0649    REF   2  LAST 1463    10,2754  3 5013 0  SETPRIO   CAF      BITS7+4
 0650    REF  10  LAST 1462    10,2755  1 2745 1              TCF      GOFLASH2

 0651    REF 268  LAST 1463    10,2756  3 4772 1  MAKEPRIO  CAF      ZERO
 0652    REF   4  LAST 1461    10,2757  54 164 0              TS       COPINDEX

 0653    REF   1               10,2760  0 3623 0              TC       LINUSCHR
 0654    REF   1               10,2761  1 2766 0              TCF      HIPRIO             LINUS RETURN
 0655    REF  13  LAST 1461    10,2762  3 0100 0              CA       FLAGWRD4
 0656    REF   1               10,2763  7 3747 1              MASK     BIT14+7            IS PRIO IN ENDIDLE OR BUSY
 0657    REF 389  LAST 1461    10,2764  10 000 0              CCS      A
 0658    REF   1               10,2765  1 3041 0              TCF      PRIOBORT           YES, ABORT

 0659    REF  14  LAST 1463    10,2766  3 0100 0  HIPRIO    CA       FLAGWRD4           MARK ACTIVE
 0660    REF   1               10,2767  7 7716 1              MASK     BIT15+9
 0661                          10,2770  0 0006 1              EXTEND
 0662    REF   1               10,2771  1 2774 0              BZF      ASKIFNRM           NO

 0663    REF 269  LAST 1463    10,2772  3 4772 1  SETMARK   CAF      ZERO
 0664    REF   1               10,2773  1 3226 0              TCF      JOBXCHS

 0665    REF  15  LAST 1463    10,2774  3 0100 0  ASKIFNRM  CA       FLAGWRD4           NORMAL ACTIVE
 0666    REF   1               10,2775  7 3745 0              MASK     BIT13+8
 0667                          10,2776  0 0006 1              EXTEND
 0668    REF   1               10,2777  1 3002 1              BZF      OKTOCOPY           NO
 0669   REF 155  LAST 1461   10,3000  3 4770 0  SETNORM  CAF     ONE
 0670   REF   2  LAST 1463   10,3001  1 3226 0           TCF     JOBXCHS

 0671   REF   1              10,3002  0 3171 0  OKTOCOPY TC      COPYNORM
 0672   REF   1              10,3003  0 3431 1           TC      WITCHONE

 0673   REF   9  LAST 1436   10,3004  0 5167 1           TC      JOBWAKE

 0674   REF   1              10,3005  0 3445 1           TC      XCHTOEND

 0675   REF  26  LAST 1412   10,3006  3 0025 0  REDOPRIO CA      TIME1            SAVE TIME PRIODSP SENT OUT
 0676   REF   1              10,3007  55'005 1           TS      PRIOTIME

 0677   REF 270  LAST 1463   10,3010  3 4772 1  KEEPPRIO CAF     ZERO             START UP PRIO DISPLAY
 0678   REF   1              10,3011  1 3062 1           TCF     PRIOPLAY

 0679   REF  28  LAST 1218   10,3012  3 0167 1  MAKEPLAY CA      PRIORITY         SAVE USERS PRIORITY
 0680   REF   3  LAST  374   10,3013  7 7660 1           MASK    PRIO37
 0681   REF   1              10,3014  54 163 1           TS      USERPRIO

 0682   REF   1              10,3015  3 7655 0           CAF     PRIO33           RAISE PRIORITY FOR FAST JOBS AFTER WAKE
 0683   REF  16  LAST  941   10,3016  0 5176 1           TC      PRIOCHNG

 0684   REF   6  LAST 1463   10,3017  3 0160 0           CA      PLAYTEM4         IS IT MARK OR PRIO OR NORM
 0685   REF   1              10,3020  7 3735 1           MASK    BITS15+7
 0686   REF 390  LAST 1463   10,3021  10 000 0           CCS     A
 0687   REF   1              10,3022  1 2756 0           TCF     MAKEPRIO         ITS PRIO
 0688   REF   1              10,3023  1 3025 1           TCF     IFLEGAL
 0689   REF   1              10,3024  1 2615 0           TCF     MAKEMARK         ITS MARK

 0690   REF  68  LAST 1427   10,3025  3 4767 0  IFLEGAL  CAF     TWO
 0691   REF   5  LAST 1463   10,3026  54 164 0           TS      COPINDEX

 0692   REF   2  LAST 1463   10,3027  0 3623 0           TC      LINUSCHR

 0693   REF   1              10,3030  1 3043 1           TCF     OKTOPLAY         LINUS RETURN
 0694   REF   3  LAST  212   10,3031  4 1275 1           CS      EBANKTEM
 0695   REF   3  LAST 1463   10,3032  7 4765 0           MASK    FLSHRQST
 0696   REF 391  LAST 1464   10,3033  10 000 0           CCS     A
 0697   REF   2  LAST 1464   10,3034  1 3043 1           TCF     OKTOPLAY         NO

 0698   REF  16  LAST 1463   10,3035  3 0100 0           CA      FLAGWRD4         WAS NORM ASLEEP
 0699   REF   1              10,3036  7 3727 1           MASK    NBUSMASK         ARE ANY NORMS ASLEEP
 0700                        10,3037  0 0006 1           EXTEND
 0701   REF   3  LAST 1464   10,3040  1 3043 1           BZF     OKTOPLAY         NO

 0702   REF  10  LAST 1438   10,3041  0 5726 1  PRIOBORT TC      P00DOO
 0703                        10,3042   21502 0           OCT     21502            ILLEGAL FLASHING DISPLAY

 0704   REF   1              10,3043  0 3173 1  OKTOPLAY TC      COPIES2
 0705   REF    2  LAST 1464   10,3044  3 0163 0              CA       USERPRIO
 0706                         10,3045  0 0006 1              EXTEND
 0707   REF   22  LAST 1407   10,3046  04 007 1              ROR      SUPERBNK
 0708   REF    3  LAST  209   10,3047  54 365 0              TS       RESTREG

 0709   REF   17  LAST 1464   10,3050  3 0100 0              CA       FLAGWRD4        PRIO OR MARK GOING
 0710   REF    1              10,3051  7 3730 1              MASK     PMMASK
 0711   REF  392  LAST 1464   10,3052  10 000 0              CCS      A
 0712   REF    1              10,3053  1 3210 0              TCF      GOSLEEPS        YES

 0713                         10,3054  1 3056 0              TCF      +2
 0714   REF    2  LAST 1465   10,3055  1 3210 0              TCF      GOSLEEPS        MARK GOING

R0715   COULD PUT NORM BUSY CHECK HERE TO SAVE TIME
 0716   REF    2  LAST 1464   10,3056  0 3431 1              TC       WITCHONE        IS IT NVSUB BUSY, ENDIDLE OR NOONE
 0717   REF   10  LAST 1464   10,3057  0 5107 1              TC       JOBWAKE

 0718   REF    2  LAST 1464   10,3060  0 3445 1              TC       XCHTOEND

 0719   REF   69  LAST 1464   10,3061  3 4767 0  PLAYJUM1  CAF      TWO
 0720   REF    6  LAST 1464   10,3062  54 164 0  PRIOPLAY  TS       CDPINDEX

 0721   REF    1              10,3063  1 3315 1              TCF      GOPLAY

 0722   REF   17  LAST 1463   10,3064  54 155 1  EXDSPRET  TS       PLAYTEM1

 0723   REF    2  LAST  167   10,3065  3 7667 1              CAF      BIT15+6
 0724   REF   11  LAST 1463   10,3066  1 2745 1              TCF      GOFLASH2

 0725   REF    2  LAST  769   10,3067  55'250 0  GOPERF1   TS       NORMTEM1        STORE DESIRED CHECKLIST VALUE
 0726   REF    1              10,3070  3 3720 1              CAF      V01N25          USED TO DISPLAY CHECKLIST VALUE IN R1

 0727   REF   18  LAST 1465   10,3071  54 155 1  GOPERFS   TS       PLAYTEM1

 0728   REF    1              10,3072  3 3717 0              CAF      PERFMASK        LEAVE ONLY FLASH, PERFORM, BLANKING
 0729   REF   12  LAST 1465   10,3073  1 2745 1              TCF      GOFLASH2

 0730   REF    6  LAST  903   10,3074  54 775 0  GOPERF4   TS       OPTION1         DESIRED OPTION CODE

 0731   REF    2  LAST  906   10,3075  3 4537 1              CAF      V04N06
 0732   REF   19  LAST 1465   10,3076  54 155 1              TS       PLAYTEM1

 0733   REF    1              10,3077  3 5775 1              CAF      PERF4MSK        FLASH, PERFORM, AND BLANK R3
 0734   REF   13  LAST 1465   10,3100  1 2745 1              TCF      GOFLASH2

 0735   REF   20  LAST 1465   10,3101  54 155 1  GOFLASHR  TS       PLAYTEM1

 0736   REF    4  LAST 1464   10,3102  3 4765 1              CAF      FLSHRQST        LEAVE ONLY FLASH BIT SET
 0737   REF    7  LAST 1464   10,3103  54 160 1  GODSPRS   TS       PLAYTEM4
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0738   REF  50  LAST 1432   10,3104  3 6214 0             CAF     THREE

0739                        10,3105  0 0004 0  GODSPRS1   INHINT                  IMMEDIATE RETURN IS CALL CADR +4
0740   REF   9  LAST 1436   10,3106  54 072 0             TS      RUPTREG3

0741   REF  29  LAST 1464   10,3107  3 0167 1             CA      PRIORITY        MAKE DISPLAY ONE HIGHER THAN USER
0742   REF   4  LAST 1464   10,3110  7 7660 1             MASK    PRIO37
0743   REF  11  LAST 1217   10,3111  54 063 0             TS      NEWPRIO

0744   REF   8  LAST 1465   10,3112  3 0160 0             CA      PLAYTEM4        IS THIS A FLASHING R DISPLAY
0745   REF   5  LAST 1465   10,3113  7 4765 0             MASK    FLSHRQST
0746   REF 393  LAST 1465   10,3114  10 000 0             CCS     A
0747   REF   1              10,3115  1 3123 0             TCF     VACDSP          YES, MAKE DSPLAY JOB A VAC
0748   REF  12  LAST 1466   10,3116  3 0063 1             CA      NEWPRIO         NO, MAKE DSPLAY JOB A NOVAC
0749   REF  22  LAST 1225   10,3117  0 5121 0             TC      NOVAC
0750   REF  10  LAST  790   E7,1777                       EBANK=  WHOCARES
0751   REF   2  LAST 1463   10,3120   03012 1             2CADR   MAKEPLAY
0751                        10,3121   20067 1
0752   REF   1              10,3122  1 3131 0             TCF     BOTHJOBS

0753   REF  32  LAST 1408   10,3123  3 0006 1  VACDSP     CA      BBANK
0754                        10,3124  0 0006 1             EXTEND
0755   REF  23  LAST 1465   10,3125  04 007 1             ROR     SUPERBNK
0756   REF 195  LAST 1461   10,3126  54 001 1             TS      L
0757   REF   1              10,3127  3 3744 0             CAF     MAKEGEN
0758   REF   2  LAST  221   10,3130  0 5146 1             TC      SPVAC

0759   REF   2  LAST 1463   10,3131  0 3157 1  BOTHJOBS   TC      SAVELOCS        COPY TEMPS INTO PERMANENT REGISTERS

0760                        10,3132  0 0006 1             EXTEND                  SAVE NVWORD AND USERS MPAC +2
0761   REF 696  LAST 1461   10,3133  3 0156 0             DCA     MPAC +1
0762   REF  23  LAST 1445   10,3134  50 064 0             INDEX   LOCCTR
0763   REF 697  LAST 1466   10,3135  52 156 1             DXCH    MPAC +1

0764                        10,3136  0 0006 1             EXTEND                  SAVE USERS CADR, FLAGS AND EBANK
0765   REF 698  LAST 1466   10,3137  3 0160 0             DCA     MPAC +3
0766   REF  24  LAST 1466   10,3140  50 064 0             INDEX   LOCCTR
0767   REF 699  LAST 1466   10,3141  52 160 1             DXCH    MPAC +3

0768   REF  25  LAST 1466   10,3142  3 0064 0             CA      LOCCTR
0769   REF 700  LAST 1466   10,3143  54 161 0             TS      MPAC +5

0770   REF   1              10,3144  0 3164 1             TC      SAVELOCR
0771                        10,3145  0 0003 1             RELINT

0772   REF   9  LAST 1402   10,3146  1 4660 1             TCF     BANKJUMP        CALL CADR +4

0773   REF   3  LAST 1465   10,3147  55'250 0  GOPERF1R   TS      NORMTEM1        DESIRED CHECKLIST VALUE

0774   REF   2  LAST 1465   10,3150  3 3720 1             CAF     V01N25          DISPLAYS CHECKLIST VALUE IN R1
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 0775   REF  21  LAST 1465   10,3151  54 155 1  GOPERFRS TS       PLAYTEM1

 0776   REF   2  LAST 1465   10,3152  3 3717 0           CAF      PERFMASK          LEAVE ONLY FLASH, PERFORM, BLANKING
 0777   REF   3  LAST 1463   10,3153  1 3103 1           TCF      GODSPRS

 0778   REF  22  LAST 1467   10,3154  54 155 1  GOPERF2R TS       PLAYTEM1          DESIRED VERB-NOUN TO DISPLAY R1,R2,R3

 0779   REF   1              10,3155  3 5001 0           CAF      PERF2MSK
 0780   REF   4  LAST 1467   10,3156  1 3103 1           TCF      GODSPRS

 0781                        10,3157  0 0004 0  SAVELOCS INHINT

 0782   REF   4  LAST  713   10,3160  4 5046 1           CS       EBANK7            GETS ALL EBANK BITS OFF
 0783   REF   9  LAST 1466   10,3161  7 0160 1           MASK     PLAYTEM4
 0784   REF  47  LAST 1461   10,3162  6 0003 1           AD       EBANK
 0785   REF  10  LAST 1467   10,3163  54 160 1           TS       PLAYTEM4

 0786   REF 308  LAST 1461   10,3164  22 002 0  SAVELOCR LXCH     Q

 0787   REF   5  LAST 1438   10,3165  0 4665 0           TC       MAKECADR
 0788   REF   1              10,3166  54 157 0           TS       PLAYTEM3

 0789   REF  10  LAST 1466   10,3167  6 0072 1           AD       RUPTREG3          NOT USED FOR NON R ROUTINES
 0790   REF 196  LAST 1466   10,3170  0 0001 0           TC       L

 0791   REF 271  LAST 1464   10,3171  3 4772 1  COPYNORM CAF      ZERO
 0792   REF   7  LAST 1465   10,3172  54 164 0  COPIES   TS       COPINDEX
 0793   REF  11  LAST 1467   10,3173  3 0160 0  COPIES2  CA       PLAYTEM4          FLAGWORD
 0794   REF   8  LAST 1467   10,3174  50 164 1           INDEX    COPINDEX
 0795   REF   3  LAST 1461   10,3175  55'273 1           TS       EBANKSAV          EQUIV TO DSPFLG

 0796   REF   1              10,3176  7 5004 1           MASK     CADRMASK          FLASH AND GODSPRET
 0797                        10,3177  0 0006 1           EXTEND
 0798   REF   1              10,3200  1 3204 0           BZF      SKIPADD

 0799   REF   2  LAST 1467   10,3201  3 0157 1           CA       PLAYTEM3
 0800   REF   9  LAST 1467   10,3202  50 164 1           INDEX    COPINDEX
 0801   REF   2  LAST  136   10,3203  54 371 0           TS       CADRFLSH

 0802   REF  23  LAST 1467   10,3204  3 0155 0  SKIPADD  CA       PLAYTEM1          VERB NOUN
 0803   REF  10  LAST 1467   10,3205  50 164 1           INDEX    COPINDEX
 0804   REF   1              10,3206  54 366 0           TS       NVWORD

 0805   REF   1              10,3207  1 3454 0           TCF      RELINTQ

 0806   REF  11  LAST 1467   10,3210  50 164 1  GOSLEEPS INDEX    COPINDEX
 0807   REF   2  LAST 1461   10,3211  3 3740 1           CA       PRIODCT
 0808   REF   1              10,3212  7 5045 1           MASK     WAITMASK
 0809   REF   2  LAST 1461   10,3213  0 3755 0           TC       UPENT2
 0810   REF 156  LAST 1464   10,3214  4 4770 1           CS       ONE
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L       DISPLAY INTERFACE ROUTINES                                                      USER'S PAGE NO.  21      E6 53

 0811   REF  12  LAST 1467   10,3215  6 0164 1            AD     COPINDEX
 0812   REF   1              10,3216  54 154 0            TS     FACEREG

 0813   REF   2  LAST 1468   10,3217  50 154 1  XCHSLEEP INDEX   FACEREG
 0814   REF   1              10,3220  3 3725 1            CAF    WAKECADR
 0815   REF  11  LAST 1465   10,3221  0 5167 1            TC     JOBWAKE         FIND CADR IN JOB AREA

 0816   REF   3  LAST 1465   10,3222  0 3445 1            TC     XCHTOEND        CAUSES AWAKENED JOB TO GO TO ENDOFJOB

 0817   REF   3  LAST 1468   10,3223  50 154 1            INDEX  FACEREG         REPLACE SAME CADR BUT NEW JOB AREA
 0818   REF   2  LAST 1468   10,3224  3 3725 1            CAF    WAKECADR
 0819   REF   5  LAST 1438   10,3225  1 5163 1            TCF    JOBSLEEP

 0820   REF   4  LAST 1468   10,3226  54 154 0  JOBXCHS   TS     FACEREG         CONTROLS TYPE OF DISPLAY PUT TO SLEEP
 0821   REF   3  LAST 1465   10,3227  0 3431 1            TC     WITCHONE
 0822   REF  12  LAST 1468   10,3230  0 5167 1            TC     JOBWAKE
 0823   REF   5  LAST 1468   10,3231  3 0154 1            CA     FACEREG
 0824   REF  26  LAST 1466   10,3232  50 064 0            INDEX  LOCCTR
 0825   REF   6  LAST 1468   10,3233  54 154 0            TS     FACEREG

 0826   REF   1              10,3234  3 3752 1            CAF    XCHQADD
 0827   REF   1              10,3235  0 3446 1            TC     XCHNYLOC

 0828   REF   7  LAST 1468   10,3236  50 154 1            INDEX  FACEREG
 0829   REF   1              10,3237  3 3741 0            CA     MARKOCT
 0830   REF   1              10,3240  7 3743 0            MASK   IDLESLEP
 0831   REF   1              10,3241  0 3762 1            TC     DOWNENT2
 0832   REF   8  LAST 1468   10,3242  50 154 1            INDEX  FACEREG         BIT SHOWS PRIO INTERRUPTED NORM OR MARK
 0833   REF   1              10,3243  3 4764 0            CA     MRUPTBIT        BIT5 FOR MARK, BIT4 FOR NORMAL
 0834   REF   3  LAST 1467   10,3244  0 3755 0            TC     UPENT2
 0835   REF  18  LAST 1465   10,3245  3 0100 0            CA     FLAGWRD4
 0836   REF   2  LAST 1461   10,3246  7 4766 0            MASK   MKOVBIT         IF BIT 5 THEN MARK OVER NORM
 0837   REF 394  LAST 1466   10,3247  10 000 0            CCS    A
 0838   REF   2  LAST 1460   10,3250  0 2630 0  GENMARK   TC     MARKPLAY        USED AS GENADR FOR JOBWAKE
 0839   REF   2  LAST 1463   10,3251  1 3002 1            TCF    CKTOCOPY

 0840   REF 272  LAST 1467   10,3252  3 4772 1  MARKWAKE CAF     ZERO
 0841   REF   2  LAST 1461   10,3253  54 160 1  WAKEPLAY TS      TEMPOR2

 0842   REF   3  LAST 1468   10,3254  50 160 0            INDEX  TEMPOR2
 0843   REF   1              10,3255  3 3736 0            CA     BITS5+11
 0844   REF   2  LAST 1468   10,3256  0 3762 1            TC     DOWNENT2
 0845   REF   4  LAST 1468   10,3257  50 160 0            INDEX  TEMPOR2
 0846   REF   3  LAST 1468   10,3260  3 3725 1            CAF    WAKECADR
 0847   REF  13  LAST 1468   10,3261  0 5167 1            TC     JOBWAKE

 0848   REF   1              10,3262  1 3555 0            TCF    ENDRET

R0849        ALL .1 RESTARTS BRANCH DIRECTLY TO INITDSP. NORMAL DISPLAYS ARE THEONLY DISPLAYS ALLOWED TO USE .1 RESTARTS
R0851   INITDSP FIRST RESTORES THE EBANK AND THE SUPERBANK TO THE MOST RECENT NORMAL EBANK AND SUPERBANK.
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R0853         IF THE MOST RECENT NORMAL DISPLAY REQUEST WAS NOT FINISHED, CONTROL IS SENT BACK TO THE LAST NORMAL USER.
R0855   OTHERWISE THE NORMAL DISPLAY SET UP IN THE NORMAL DISPLAY REGS IS STARTED UP IMMEDIATELY.

 0857   REF   4  LAST 1464    10,3263  3 1275 0  INITDSP  CA      EBANKTEM           RESTORE MOST RECECT NORMAL EBANK
 0858   REF  48  LAST 1467    10,3264  54 0003 0          TS      EBANK

 0859   REF   4  LAST 1465    10,3265  3 0365 1           CA      RESTREG            SUPERBANK AND JOB PRIORITY
 0860                         10,3266  0 0006 1           EXTEND                     RESTORE SUPERBANK
 08605  REF  24  LAST 1466    10,3267  01 007 1           WRITE   SUPERBNK           CHAN 07
 0861   REF   5  LAST 1466    10,3270  7 7660 1           MASK    PRIO37
 0862   REF  17  LAST 1464    10,3271  0 5176 1           TC      PRIOCHNG

 0863   REF  51  LAST 1466    10,3272  4 6214 1           CS      THREE
 0864   REF   5  LAST  632    10,3273  6 0373 0           AD      TEMPFLSH
 0865   REF  10  LAST 1466    10,3274  1 4660 1           TCF     BANKJUMP

 0866                         10,3275  0 0003 1  PINBRNCH RELINT                     FOR GOPIN USERS
 0867   REF   1               10,3276  3 1276 0           CA      MARK2PAC           NEEDED TO SAVE MPAC +2 FOR MARK USERS
 0868   REF 701  LAST 1466    10,3277  54 156 1           TS      MPAC +2            ONLY

 0869   REF  19  LAST 1468    10,3300  3 0100 0           CA      FLAGWRD4           PINBRANCH CONDITION
 0870   REF   1               10,3301  7 7673 0           MASK    PINMASK
 0871   REF 395  LAST 1468    10,3302  10 000 0           CCS     A
 0872                         10,3303  1 3306 0           TCF     +3
 0873   REF   1               10,3304  1 3713 0           TCF     ERASER             *  NOTHING IN ENDIDLE
 0874   REF   3  LAST 1468    10,3305  1 2630 1           TCF     MARKPLAY

 0875   REF  75  LAST 1463    10,3306  0 5547 1  NORMBNCH TC      UPFLAG             SET PINBRANCH BIT
 0876   REF   1               10,3307   00105 0           ADRES   PINBRFLG

 0877   REF   1               10,3310  3 4753 1           CAF     PRIOOBIT           PRIO INTERRUPTED
 0878   REF  20  LAST 1469    10,3311  7 0100 1           MASK    FLAGWRD4
 0879   REF 396  LAST 1469    10,3312  10 000 0           CCS     A
 0880   REF   1               10,3313  1 3010 1           TCF     KEEPPRIO

 0881   REF   1               10,3314  1 3061 1           TCF     PLAYJUM1

 0882                         10,3315  22 007 0  NVDSP    ZL
 08825  REF   1               10,3316  0 2660 0           TC      COPYPACS
 0883   REF   5  LAST 1468    10,3317  3 0160 0           CA      TEMPOR2            SET UP BLANK BITS FOR NVMONOPT IN CASE
 0884   REF  21  LAST 1430    10,3320  7 4774 0           MASK    SEVEN              USER REQUESTS BLANKING MONITOR
 0885   REF 197  LAST 1467    10,3321  26 001 1           ADS     L
 0886   REF   1               10,3322  4 4754 1           CS      2NDPERF
 0887   REF  13  LAST 1468    10,3323  50 164 1           INDEX   COPINDEX
 0888   REF   1               10,3324  7 1273 1           MASK    DSPFLG
 0889   REF  14  LAST 1469    10,3325  50 164 1           INDEX   COPINDEX
 0890   REF   2  LAST 1469    10,3326  55 273 1           TS      DSPFLG

 0891   REF   2  LAST 1460    10,3327  7 4761 1           MASK    DCMKPERF
 08912  REF 397  LAST 1469    10,3330  10 000 0           CCS     A
 08914  REF   1                10,3331   3 5044 1                CA      OCT2600
 0892   REF   5  LAST 1175     10,3332  54 141 1                 TS      TEM1

 0893   REF 702  LAST 1469     10,3333   3 0156 0                CA      MPAC +2
 0894   REF   2  LAST 1461     10,3334  54 165 1                 TS      MPAC2SAV

 0895   REF   2  LAST 1469     10,3335  55'276 1                 TS      MARK2PAC        * FOR DISK ONLY *
 0896   REF  15  LAST 1469     10,3336  50 164 1                 INDEX   COPINDEX
 0897   REF   2  LAST 1467     10,3337  10 366 0                 CCS     NVWORD
 0898   REF   1                10,3340   1 3347 0                TCF     NVDSP1
 0899   REF   1                10,3341   1 3455 1                TCF     CLEANEND
 0900   REF   5  LAST 1461     10,3342   4 0367 1                CS      MARKNV
 0901   REF   6  LAST 1470     10,3343  54 367 1                 TS      MARKNV          IN CASE MARKPLAY AWAKENED AFTER SLEEPING
 0902   REF  12  LAST 1434     10,3344   7 6043 1                MASK    LOW7
 0903   REF   1                10,3345   6 3731 1                AD      V50N00M1
 0904   REF   6  LAST 1470     10,3346   6 0141 0                AD      TEM1
 0905   REF 157  LAST 1467     10,3347   6 4770 0   NVDSP1       AD      ONE
 0906   REF   1                10,3350   0 4203 1   NV50DSP      TC      NVMONOPT
 0907   REF   1                10,3351   1 3467 0                TCF     REST            IF BUSY
 0908   REF   6  LAST  391     10,3352   0 4417 1                TC      FLASHOFF        IN CASE OF EXTENDED VERB NON FLASH

 0909   REF   1                10,3353   0 2656 0                TC      COPYTOGO        MPACS DESTROYED BY NVSUB
 0910   REF   1                10,3354   3 3732 1                CAF     OCT700
 0911   REF   3  LAST 1468     10,3355   0 3762 1                TC      DOWNENT2

 0912   REF   6  LAST 1469     10,3356   3 0160 0   BLANKCHK     CA      TEMPOR2         BLANK BITS 1,2,3 IF SET
 0913   REF   2  LAST  366     10,3357   0 4264 0                TC      BLANKSUB
 0914   REF   2  LAST 1461     10,3360   1 3315 1                TCF     NVDSP
 0915   REF   2  LAST 1461     10,3361   3 4764 0   PERFCHEK     CAF     PERFRQST        BITS FOR PERFORM
 0916   REF   7  LAST 1470     10,3362   7 0160 1                MASK    TEMPOR2
 0917   REF 398  LAST 1469     10,3363  10 000 0                 CCS     A               IS THIS A GOPERF DISPLAY
 0918   REF   1                10,3364   1 3407 0                TCF     ISTORZND        YES

 0919   REF   6  LAST 1466     10,3365   3 4765 1   GOANIDLE     CAF     FLSHRQST
 0920   REF   8  LAST 1470     10,3366   7 0160 1                MASK    TEMPOR2
 0921   REF 399  LAST 1470     10,3367  10 000 0                 CCS     A
 0922   REF   1                10,3370   1 3504 1                TCF     FLASHSUB        IT IS

 0923   REF   9  LAST 1470     10,3371   4 0160 1                CS      TEMPOR2         IS THIS A GODSPRET
 0924   REF   2  LAST 1462     10,3372   7 4763 0                MASK    RETDSPY
 0925   REF 400  LAST 1470     10,3373  10 000 0                 CCS     A
 0926   REF   1                10,3374   1 3401 0                TCF     ISITNOO

 0927   REF  16  LAST 1470     10,3375  50 164 1                 INDEX   COPINDEX
 0928   REF   3  LAST 1467     10,3376   3 0371 1                CA      CADRFLSH
 0929   REF 703  LAST 1470     10,3377  54 157 0                 TS      MPAC +3
 0930   REF   1                10,3400   1 3602 1                TCF     ENDIT

 0931   REF  17  LAST 1470     10,3401  50 164 1    ISITNOO      INDEX   COPINDEX        IS THIS A PASTE
 0932   REF   3  LAST 1470     10,3402   3 0366 1                CA      NVWORD
 0933   REF  13  LAST 1470   10,3403  7 6043 1             MASK     LOW7         CHECK MADE FOR PINBRNCH AND PRIO ON MARK
 0934                        10,3404  0 0006 1             EXTEND
 0935   REF   2  LAST 1470   10,3405  1 3504 1             BZF      FLASHSUB     YES, ASSUME PASTE ALWAYS ON FLASH

 0936   REF  92  LAST 1460   10,3406  1 5205 1             TCF      ENDOFJOB     NOT FLASH, NOT GOPERF, THERFORE EXIT

 0937   REF  10  LAST 1470   10,3407  3 0160 0  1STOR2ND CA       TEMPOR2
 0938   REF   2  LAST 1469   10,3410  7 4754 1             MASK     2NDPERF
 0939   REF 401  LAST 1470   10,3411  10 000 0             CCS      A
 0940   REF   1              10,3412  1 3365 0             TCF      GOANIDLE     SECOND

 0941   REF   3  LAST 1471   10,3413  3 4754 0             CA       2NDPERF
 0942   REF  18  LAST 1470   10,3414  50 164 1             INDEX    COPINDEX
 0943   REF   3  LAST 1469   10,3415  27'273 1             ADS      DSPFLG

 0944                        10,3416  22 007 0             ZL
 0945                        10,3417  0 0006 1             EXTEND                IS IT MARK
 0946   REF   1              10,3420  6 2677 0             BZMF     MARKPERF     YES

 0947   REF   1              10,3421  7 4755 0             MASK     V99PSTE
 0948                        10,3422  0 0006 1             EXTEND
 0949   REF   1              10,3423  1 3427 1             BZF      V50PASTE
 0950   REF  23  LAST  738   10,3424  4 0777 1             CS       NVWORD1      NVWORD1= -0  IS V97  NVWORD1= -400 IS V99
 0951   REF   1              10,3425  6 3746 1             AD       V97N00
 0952   REF   2  LAST 1461   10,3426  1 3350 0             TCF      NV50DSP
 0953   REF   1              10,3427  3 3721 0  V50PASTE CAF      V50N00
 0954   REF   3  LAST 1471   10,3430  1 3350 0             TCF      NV50DSP      DISPLAY SECOND PART OF GOPERF

 0955   REF  35  LAST 1443   10,3431  4 4764 1  WITCHONE CS       BIT5         TURN OFF KEY RELEASE LIGHT
 0956                        10,3432  0 0006 1             EXTEND
 0957   REF  29  LAST 1446   10,3433  03 011 1             WAND     DSALMOUT

 0958   REF  21  LAST 1469   10,3434  3 0100 0             CA       FLAGWRD4
 0959   REF   1              10,3435  7 3732 0             MASK     NVBUSMSK     IS IT NVSUB ASLEEP
 0960   REF 402  LAST 1471   10,3436  10 000 0             CCS      A
 0961   REF 158  LAST 1470   10,3437  3 4770 0             CAF      ONE
 0962   REF 198  LAST 1469   10,3440  54 001 1             TS       L
 0963   REF 273  LAST 1468   10,3441  3 4772 1             CAF      ZERO
 0964   REF 199  LAST 1471   10,3442  50 001 0             INDEX    L
 0965   REF  10  LAST  383   10,3443  57'245 0             XCH      CADRSTOR

 0966   REF 309  LAST 1467   10,3444  0 0002 0             TC       Q

 0967   REF   6  LAST  374   10,3445  3 4170 0  XCHTOEND CAF      ENDINST      TC ENDOFJOB REPLACES GENADR IN LOC FOR
 0968   REF  27  LAST 1468   10,3446  56 064 0  XCHNYLOC XCH      LOCCTR       WAS THIS ADDRESS SLEEPING
 0969                        10,3447  0 0006 1             EXTEND
 0970   REF   2  LAST 1467   10,3450  6 3454 1             BZMF     RELINTQ      NO
 0971   REF  28  LAST 1471   10,3451  56 064 0             XCH      LOCCTR       YES
 0972   REF  29  LAST 1471   10,3452  50 064 0             INDEX    LOCCTR
 0973   REF  41  LAST 1436   10,3453  54 164 0             TS       LOC
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0974   REF   3  LAST  333   10,3454  1 5642 0  RELINTQ  TCF     REQ                BACK TO USER
0976   REF   2  LAST  827   10,3455  3 7654 1  CLEANEND CAF     PRIO32             ONE LOWER THAN DISPLAYS SLEEPING
0977   REF  38  LAST 1411   10,3456  0 5135 0           TC      FINDVAC
0978   REF   2  LAST  195      0370                     EBANK=  NVSAVE
0979   REF   1              10,3457   04247 1           2CADR   JAMTERM
0979   REF   1              10,3460   04060 0

0980   REF   3  LAST 1471   10,3461  1 3505 0           TCF     FLASHSUB +1

0981   REF  22  LAST 1471   10,3462  3 0100 0  ISITPRIO CA      FLAGWRD4
0982   REF   1              10,3463  7 7667 0           MASK    ITISMASK           IS PINBRFLG, MARKIDFLG SET
0983                        10,3464  0 0006 1           EXTEND
0984   REF   2  LAST 1463   10,3465  1 3041 0           BZF     PRIOBORT
0985   REF  93  LAST 1471   10,3466  1 5205 1           TCF     ENDOFJOB

0986   REF  11  LAST 1471   10,3467  11'245 1  REST     CCS     CADRSTOR           IS SOMEONE IN ENDIDLE
0987   REF  94  LAST 1472   10,3470  1 5205 1           TCF     ENDOFJOB           YES
0988   REF   1              10,3471  1 3473 0           TCF     RESTSLEP

0989   REF  95  LAST 1472   10,3472  1 5205 1           TCF     ENDOFJOB

0990   REF   2  LAST 1461   10,3473  3 0162 1  RESTSLEP CA      GENMASK            SET NVSLEEP BITS
0991   REF   2  LAST 1471   10,3474  7 3732 0           MASK    NVBUSMSK
0992   REF   4  LAST 1468   10,3475  0 3755 0           TC      UPENT2
0993   REF   1              10,3476  0 4240 0  NVSUBUSY TC      ISCADR+0
0994   REF   3  LAST  366   10,3477  0 4356 0           TC      RELDSPON
0995   REF  19  LAST 1471   10,3500  50 164 1           INDEX   COPINDEX
0996   REF   1              10,3501  3 3724 0           CAF     NVCADR
0997   REF   6  LAST  388   10,3502  55'246 1           TS      DSPLIST
0998   REF   6  LAST 1468   10,3503  0 5163 0           TC      JOBSLEEP
0999   REF   4  LAST  373   10,3504  0 4360 0  FLASHSUB TC      FLASHON

1000   REF  20  LAST 1472   10,3505  3 0164 1    +1     CA      COPINDEX           COPINDEX DESTROYED BY ENDIDLE
1001   REF   1              10,3506  54 157 0           TS      COPMPAC

1002   REF   3  LAST 1472   10,3507  3 0162 1           CA      GENMASK
1003   REF   1              10,3510  7 7675 0           MASK    IDLEMASK
1004   REF   5  LAST 1472   10,3511  0 3755 0           TC      UPENT2
1010   REF  12  LAST 1472   10,3512  11'245 1           CCS     CADRSTOR           SEE IF SOMEONE ALREADY IN ENDIDLE
1011   REF   1              10,3513  1 3462 0           TCF     ISITPRIO
1012                        10,3514  1 3516 1           TCF     +2
1013   REF   2  LAST 1472   10,3515  1 3462 0           TCF     ISITPRIO

1014   REF   2  LAST 1472   10,3516  0 4240 0  ENDIDLE  TC      ISCADR+0
1015   REF   1              10,3517  3 3557 0           CA      ENDIDRET
1016   REF  13  LAST 1472   10,3520  55'245 1           TS      CADRSTOR
1017   REF   7  LAST 1472   10,3521  0 5163 0           TC      JOBSLEEP
1018   REF   1              10,3522  4 4354 0  IDLERET1 CS      LOWLOAD
1019   REF 704  LAST 1470   10,3523  6 0154 1           AD      MPAC               VERBREG
1020                        10,3524  0 0006 1           EXTEND
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 1021   REF 403  LAST 1471   10,3525  26 000 0            DIM     A
 1022                        10,3526  0 0006 1            EXTEND
 1023   REF   1              10,3527  1 3703 1            BZF     LOADITIS    V21 OR V22 OR V23 ON DSKY
 1024   REF  23  LAST 1472   10,3530  3 0100 0  CKTOENT   CA      FLAGWRD4    CHECK NATURE OF ENDIDLE RETURN
 1025   REF   3  LAST  366   10,3531  7 4076 0            MASK    BIT15/14
 1026   REF 404  LAST 1473   10,3532  10 000 0            CCS     A
 1027   REF   1              10,3533  1 3536 0            TCF     TIMECHEK    PRIO ENDIDLE RETURN
 1028   REF   1              10,3534  1 3651 1            TCF     NORMRET     NORMAL ENDIDLE RETURN
 1029   REF   1              10,3535  1 3640 1            TCF     MARKRET     MARK ENDIDLE RETURN

 10295  REF   4  LAST 1470   10,3536  3 0366 1  TIMECHEK  CA      NVWORD
 10296                       10,3537  0 0006 1            EXTEND
 10297  REF   2  LAST 1473   10,3540  1 3651 1            BZF     NORMRET

 1030   REF  27  LAST 1464   10,3541  4 0025 1            CS      TIME1
 1031   REF   2  LAST 1464   10,3542  6 1005 0            AD      PRIOTIME
 1032   REF 405  LAST 1473   10,3543  10 000 0            CCS     A
 1033                        10,3544  4 0000 0            COM
 1034   REF   7  LAST 1412   10,3545  6 7663 0            AD      OCT37776
 1035   REF 159  LAST 1471   10,3546  6 4770 0            AD      ONE
 1036   REF   1              10,3547  6 3774 0            AD      -2SEC
 1037                        10,3550  0 0006 1            EXTEND
 1038   REF   2  LAST 1469   10,3551  6 3010 0            BZMF    KEEPPRIO

 1039   REF   3  LAST 1473   10,3552  1 3651 1            TCF     NORMRET

 1040   REF 160  LAST 1473   10,3553  3 4770 0  NORMWAKE  CAF     ONE
 1041   REF   1              10,3554  1 3253 1            TCF     WAKEPLAY

 1042   REF   4  LAST  380   10,3555  11'217 0  ENDRET    CCS     LOADSTAT    -0=V32 OR E, -1=V33 OR PRO, -2=V34
 1043   REF  96  LAST 1472   10,3556  1 5205 1            TCF     ENDOFJOB    +1=ENDMARK
 1044   REF   1              10,3557   21522 1  ENDIDRET  CADR    IDLERET1    CANNOT GET HERE
 1045                        10,3560  1 3561 1            TCF     +1
 1046   REF  24  LAST 1473   10,3561  3 0100 0            CA      FLAGWRD4    IS IT A VNFLASH
 1047   REF   1              10,3562  7 4767 1            MASK    VNBIT         (BIT2)
 1048   REF   2  LAST 1472   10,3563  6 0157 1            AD      CDPMPAC        AND A NORMAL DISPLAY
 1049   REF   4  LAST 1394   10,3564  6 6061 0            AD      NEG4
 1050                        10,3565  0 0006 1            EXTEND
 1051   REF   1              10,3566  1 3607 1            BZF     VNRET
 1052   REF   5  LAST 1473   10,3567  3 1217 1            CA      LOADSTAT
 1053   REF  70  LAST 1465   10,3570  6 4767 0            AD      TWO
 1054   REF   3  LAST 1473   10,3571  50 157 1  ENDRET1   INDEX   CDPMPAC
 1055   REF   4  LAST 1470   10,3572  6 0371 1            AD      CADRFLSH
 1056   REF 705  LAST 1472   10,3573  54 157 0  ENDRET2   TS      MPAC +3

 1057   REF   4  LAST 1472   10,3574  3 0162 1            CA      GENMASK     REMOVE ENDIDLE AND PINBRANCH BITS
 1058   REF   1              10,3575  7 3751 0            MASK    PINIDMSK
 1059   REF   4  LAST 1470   10,3576  0 3762 1            TC      DOWNENT2
 1060   REF  52  LAST 1469   10,3577  4 6214 1            CS      THREE       BLANK EVERYTHING EXCEPT MM
 1061   REF   2  LAST  250   10,3600  0 4202 0            TC      NVSUB
 1062                          10,3601  1 3602 1           TCF     +1

 1063  REF   3  LAST 1465     10,3602  3 0163 0  ENDIT    CA      USERPRIO          RETURN TO USERS PRIORITY
 1064  REF   6  LAST 1469     10,3603  7 7660 1           MASK    PRIO37
 1065  REF  18  LAST 1469     10,3604  0 5176 1           TC      PRIOCHNG
 1066  REF 706  LAST 1473     10,3605  3 0157 1           CA      MPAC +3
 1067  REF  11  LAST 1469     10,3606  1 4660 1           TCF     BANKJUMP

 1068  REF  68  LAST 1444     10,3607  0 5561 0  VNRET    TC      DOWNFLAG
 1069  REF   3  LAST 1463     10,3610    00111 0           ADRES   VNFLAG
 1070  REF   6  LAST 1473     10,3611  3 1217 1           CA      LOADSTAT
 1071  REF 161  LAST 1473     10,3612  6 4770 0           AD      ONE
 1072  REF 406  LAST 1473     10,3613  10 000 0           CCS     A
 1073  REF   6  LAST 1432     10,3614  3 7700 1           CAF     NEG3              LOADOSTAT.-0
 1074  REF   1                10,3615  1 3571 0           TCF     ENDRET1           CANNOT GET HERE VIA CCS
 1075  REF   1                10,3616  1 3621 0           TCF     TERMFLSH          LOADSTAT=-2
 1076  REF 162  LAST 1474     10,3617  4 4770 1           CS      ONE               COMPENSATE FOR INCREMENTED Q IN LEAD-IN
 1077  REF   2  LAST 1474     10,3620  1 3571 0           TCF     ENDRET1           LOADSTAT=-1
 1078  REF   1                10,3621  3 3753 0  TERMFLSH CAF     GOP00CAD
 1079  REF   1                10,3622  1 3573 1           TCF     ENDRET2
R1080

 1090  REF  12  LAST 1467     10,3623  4 0160 1  LINUSCHR CS      PLAYTEM4          IS THIS A LINUS
 1091  REF   3  LAST 1462     10,3624  7 4753 0           MASK    REFLSH
 1092  REF 407  LAST 1474     10,3625  10 000 0           CCS     A
 1093  REF   5  LAST 1402     10,3626  1 6706 1           TCF     Q+1               NO
 1094  REF   3  LAST 1467     10,3627  4 0157 0           CS      PLAYTEM3          YES, IS IT ALREADY IN ENDIDLE
 1095  REF  21  LAST 1472     10,3630  50 164 1           INDEX   CDPINDEX
 1096  REF   5  LAST 1473     10,3631  6 0371 1           AD      CADRFLSH
 1097                          10,3632  0 0006 1           EXTEND
 1098                          10,3633  1 3635 0           BZF     +2                YES

 1099  REF 310  LAST 1471     10,3634  0 0002 0           TC      Q                 NO
 1100  REF   9  LAST  392     10,3635  11'215 1           CCS     DSPLOCK           IS THE ASTRONAUT BUSY
 1101  REF  97  LAST 1473     10,3636  0 5205 0           TC      ENDOFJOB          END THE NEW DISPLAY, ITS ALREADY ACTIVE
 1102  REF 311  LAST 1474     10,3637  0 0002 0           TC      Q

R1103  MORE LOGIC COULD BE INCORPORATED HERE TO MAKE SURE A RECYCLE IS A RECYCLAND CONVERSLY THAT A LOAD IS A LOAD.
R1105       LASTPLAY CHECKS TO SEE IF (1) THE LAST NORMAL DISPLAY WAS EITHER INTERRUPTED BY A PRIO OR A MARK (MARK
R1107  COULD ONLY HAPPEN DURING PINBRANCH) OR IF (2) THE LAST NORMAL DISPLAY WAS REQUESTED WHILE A HIGHER PRIORITY
R1109  DISPLAY WAS GOING RESULTING IN THE NORMAL BEING PUT TO SLEEP.

R1110       IF EITHER OF THE ABOVE 2 CONDITIONS EXISTS , THE NORMAL DISPLAY IS AWAKENED TO GO TO PLAYJUM1 WHICH STARTS
R1112  UP THE MOST RECENT VALID NORMAL DISPLAY. IF THESE 2 CONDITIONS DO NOT EXIST, CONTROL GOES TO PLAYJUM1 WHICH IS
R1114  STARTED IMMEDIATELY WITH THE ASSUMPTION THAT THE MOST RECENT NORMAL DISPLAY IS ALREADY IN-ENDIDLE(DURING A
R1116  PINBRANCH) OR THAT A RESTART HAS OCCURRED AND THE DISPLAY CAN BE STARTED AS A .1 RESTART.

 1118  REF   3  LAST 1468     10,3640  3 4766 1  MARKRET  CAF     MKOVBIT
 1119  REF   5  LAST 1473     10,3641  0 3762 1           TC      DOWNENT2
 1120    REF   2  LAST 1468   10,3642  1 3555 0             TCF     ENDRET

 1121    REF 163  LAST 1474   10,3643  3 4770 0  MARKOVER  CAF     ONE
 1122    REF   7  LAST 1474   10,3644  55 217 0            TS      LOADSTAT
 1123    REF  25  LAST 1473   10,3645  3 0100 0            CA      FLAGWRD4         IS ENDIOFLG SET
 1124    REF   1              10,3646  7 4346 0            MASK    BIT13-14         IS NORMAL OR PRIO IN ENDIDLE
 1125    REF 408  LAST 1474   10,3647  10 000 0            CCS     A
 1126    REF   1              10,3650  1 3306 0            TCF     NORMBNCH

 1127    REF  26  LAST 1475   10,3651  3 0100 0  NORMRET   CA      FLAGWRD4         IS MARK SLEEPING
 1128    REF   2  LAST 1468   10,3652  7 3736 1            MASK    BITS5+11         OR WAITING
 1129    REF 409  LAST 1475   10,3653  10 000 0            CCS     A
 1130    REF   1              10,3654  1 3252 0            TCF     MARKWAKE

 1131    REF  27  LAST 1475   10,3655  3 0100 0            CA      FLAGWRD4         NO
 1132    REF   1              10,3656  7 3737 0            MASK    BITS4+10         IS NORMAL INTERRUPTED OR WAITING
 1133    REF 410  LAST 1475   10,3657  10 000 0            CCS     A
 1134    REF   1              10,3660  1 3553 0            TCF     NORMWAKE         YES

 1135    REF   7  LAST 1470   10,3661  3 4765 1            CAF     FLSHRQST         NO, WAS IT FLASH REQUEST
 11355   REF   3  LAST 1470   10,3662  6 4763 1            AD      RETDSPY          OR GODSPRET
 1136    REF   5  LAST 1469   10,3663  7 1275 1            MASK    EBANKTEM
 1137    REF 411  LAST 1475   10,3664  10 000 0            CCS     A
 1138    REF   3  LAST 1475   10,3665  1 3555 0            TCF     ENDRET           YES
 1139    REF   3  LAST 1472   10,3666  3 0370 0            CA      NVSAVE
 1140                         10,3667  0 0006 1            EXTEND
 1141    REF   4  LAST 1475   10,3670  1 3555 0            BZF     ENDRET

 1142    REF   3  LAST  741   10,3671  3 5054 0            CAF     PRIO15
 1143    REF  23  LAST 1466   10,3672  0 5121 0            TC      NOVAC
 1144    REF   5  LAST 1473       0366                     EBANK=  NVWORD
 1145    REF   2  LAST 1469   10,3673    03061 0           2CADR   PLAYJUM1
 1145                         10,3674    20060 0

 1146    REF   5  LAST 1475   10,3675  1 3555 0            TCF     ENDRET

 1147    REF  28  LAST 1475   10,3676  3 0100 0  MARSLEEP  CA      FLAGWRD4         IS MARK ALREADY IN
 1148    REF   3  LAST 1475   10,3677  7 3736 1            MASK    BITS5+11
 1149    REF 412  LAST 1475   10,3700  10 000 0            CCS     A
 1150    REF  98  LAST 1474   10,3701  1 5205 1            TCF     ENDOFJOB         YES
 1151    REF   3  LAST 1465   10,3702  1 3210 0            TCF     GOSLEEPS

 1152    REF   4  LAST 1473   10,3703  50 157 1  LOADITIS  INDEX   COPMPAC
 1153    REF   6  LAST 1475   10,3704  3 0366 1            CA      NVWORD
 1154    REF  14  LAST 1471   10,3705  7 6043 1            MASK    LOW7
 1155                         10,3706  4 0000 0            COM
 1156    REF 707  LAST 1474   10,3707  6 0155 0            AD      MPAC +1          NOUNREG
 1157                         10,3710  0 0006 1            EXTEND
 1158    REF   1              10,3711  1 3530 0            BZF     OKTOENT          NO, THEN LOAD IS VALID
 1159    REF   6  LAST  453   10,3712  1 3275 0            TCF     PINBRNCH         YES, ACCEPT LOAD BUT ASK FOR LAST AGAIN
 1160    REF  53  LAST 1473   10,3713  4 6214 1  ERASER    CS       THREE          BLANK EVERYTHINGEXCEPT MM
 1161    REF   3  LAST 1473   10,3714  0 4202 0            TC       NVSUB
 1162    REF  99  LAST 1475   10,3715  1 5205 1            TCF      ENDOFJOB
 1163    REF 100  LAST 1476   10,3716  1 5205 1            TCF      ENDOFJOB

 1164                         10,3717   00036 1  PERFMASK  OCT      0036           FLASH,PERFORM,BLANK R2 AND R3
 1165                         10,3720   00231 1  V01N25    VN       00125
 1166                         10,3721   14400 0  V50N00    VN       5000
 1167    REF  10  LAST 1439      5001            PERF2MSK  EQUALS   BITS4&5        (OCTAL 30)   FLASH, PERFORM
 1168    REF   5  LAST 1439      5775            PERF4MSK  EQUALS   OCT14          FLASH, BLANK R3
 1169                         10,3722   20010 1  REDOMASK  OCT      20010          BITS 4 AND 14
 1170                         10,3723   40036 0  MARK4MSK  OCT      40036          MARK,PERFORM,FLASH,BLANK 2 AND 3
 1171    REF   1              10,3724   21006 1  NVCADR    CADR     REDOPRIO
 1172    REF   4  LAST 1469   10,3725   20630 0  WAKECADR  CADR     MARKPLAY
 1173    REF   3  LAST 1475   10,3726   21061 0            CADR     PLAYJUM1

 1174                         10,3727   11210 1  NBUSMASK  OCT      11210
 1175                         10,3730   66521 1  PMMASK    OCT      66521
 1176    REF   4  LAST 1461      4171            VERBMASK  =        M107           (OCT 37600)
 1177                         10,3731   01177 1  V05N00M1  OCT      1177           V05 MINUS ONE
 1178    REF   5  LAST  569   10,2576            GOXDSPF   EQUALS   GOMARKF
 1179    REF   2  LAST  570      5524            ENDEXT    EQUALS   ENDMARK
 1180    REF  14  LAST 1216      0165            MPAC2SAV  EQUALS   BANKSET
 1181                         10,3732   00700 0  NVBUSMSK  OCT      700
 1182                         10,3733   40030 0  MPERFMSK  OCT      40030          BIT 15,5,4 FOR MARK,PERFORM,FLASH
 1183                         10,3734   34300 0  OCT34300  OCT      34300
 1184                         10,3735   40100 1  BITS15+7  OCT      40100
 1189                         10,3736   02020 1  BITS5+11  OCT      2020           * DONT MOVE
 1190                         10,3737   01010 1  BITS4+10  OCT       1010          * DONT MOVE
 1191    REF   4  LAST  375      4354            LOWLOAD   EQUALS   V8SP2LD
 1192    REF  11  LAST 1439      5004            CADRMASK  EQUALS   OCT50
 1193    REF   7  LAST 1422      7673            PINMASK   EQUALS   13,14,15
 1194    REF   3  LAST 1470   10,3315            GOPLAY    EQUALS   NVDSP
A1195                                            PRIOSAVE  EQUALS   RISAVE
 1196    REF 708  LAST 1475      0157            COPMPAC   EQUALS   MPAC +3
 1197    REF 709  LAST 1476      0160            TEMPOR2   EQUALS   MPAC +4
 1199    REF  42  LAST 1471      0164            COPINDEX  EQUALS   LOC
 1200    REF  26  LAST 1182      0163            USERPRIO  EQUALS   MODE
 1201    REF 710  LAST 1476      0162            GENMASK   EQUALS   MPAC +6
 1202                         10,3740   20144 1  PRIOOCT   OCT      20144          PRIO
 1203                         10,3741   42424 0  MARKOCT   OCT      42424          MARK
 1204                         10,3742   11254 1            OCT      11254          NORM

 1205                         10,3743   74700 0  IDLESLEP  OCT      74700
 1206    REF  13  LAST  941      5516            LINUS     EQUALS   BLANKET
 1207    REF 711  LAST 1476      0154            FACEREG   EQUALS   MPAC
 1208    REF 712  LAST 1476      0155            PLAYTEM1  EQUALS   MPAC +1
 1209    REF 713  LAST 1476      0157            PLAYTEM3  EQUALS   MPAC +3
 1210    REF 714  LAST 1476      0160            PLAYTEM4  EQUALS   MPAC +4
 1211    REF   3  LAST 1466   10,3744   03012 1  MAKEGEN   GENADR   MAKEPLAY
 1212                           10,3745   10200 1  BIT13+8  OCT      10200
 1213                           10,3746   30200 0  V97N00   VN       09700           PASTE FOR V97 OR V99
 1214                           10,3747   20100 1  BIT14+7  OCT      20100
 1215                           10,3750   24030 1  CLOCKCON OCT      24030           FLASH, PERFORM, V99 OR V97 PASTE,REFLASH
 1216                           10,3751   74040 0  PINIDMSK OCT      74040
 1217   REF   3  LAST 1129         7675            IDLEMASK EQUALS HIGH4
 1219   REF   3  LAST 1465         7667            ITISMASK EQUALS BIT15+6         *** ENDIDLE ALLOW ***
 1220   REF   3  LAST 1423         7664            MARKFMSK EQUALS OT40010
 1221   REF   1                 10,3752   03217 0  XCHQADD  GENADR XCHSLEEP
 1222   REF   3  LAST 1204         3045            WAITMASK EQUALS PRIO3           (OCTAL 3000)
 1223   REF   3  LAST 1472      10,3732            OCT700   EQUALS NVBUSMSK
 1224   REF   1                 10,3753   55772 0  GOPOOCAD CADR   TCGOPOOH
 1225                           10,3754   40210 0  MARK3MSK OCT    40210
 1226   REF  48  LAST 1425         4752            MKRQST    =     BIT15
 1227   REF  69  LAST 1433         4753            REFLSH    =     BIT14
 1228   REF  43  LAST 1430         4754            2NDPERF   =     BIT13
 1229   REF  31  LAST 1410         4755            V99PSTE   =     BIT12
 1230   REF  35  LAST 1439         4761            DCMKPERF  =     BIT8
 1231   REF  40  LAST 1407         4762            PRIODSPY  =     BIT7
 1232   REF  39  LAST 1427         4763            RETDSPY   =     BIT6
 1233   REF  36  LAST 1471         4764            PERFRQST  =     BIT5
 1234   REF  43  LAST 1440         4765            FLSHRQST  =     BIT4
 1235   REF  44  LAST 1446         4766            BLNKR3    =     BIT3
 1236   REF  41  LAST 1432         4767            BLNKR2    =     BIT2
 1237   REF  66  LAST 1435         4770            BLNKR1    =     BIT1
 1238   REF 274  LAST 1471         4772            DSPONLY   =     ZERO
```

```
L          SERVICE ROUTINES                                                                            USER'S PAGE NO.   1       E0 S3

  0038    REF   2  LAST 1459   10,2000                                 SETLOC DISPLAYS
  0039                         10,3755                                 BANK
  0040   *REF   2 LAST 1460 TO 1478:   624   624*                      COUNT* $$/DSPLA
  0049    REF 200  LAST 1471   10,3755  54 0001 1  UPENT2     TS       L
  0050    REF  29  LAST 1475   10,3756  4 0100 1              CS       FLAGWRD4
  0051    REF 201  LAST 1478   10,3757  7 0001 1              MASK     L
  0053    REF  30  LAST 1478   10,3760  26 100 1              ADS      FLAGWRD4
  0056    REF 312  LAST 1474   10,3761  0 0002 0              TC       Q                   RETURN

  0063                         10,3762  4 0000 0  DOWNENT2   COM                          START TO PROCESS INFORMATION
  0066    REF  31  LAST 1478   10,3763  7 0100 1              MASK     FLAGWRD4
  0068    REF  32  LAST 1478   10,3764  54 100 1              TS       FLAGWRD4
  0071    REF 313  LAST 1478   10,3765  0 0002 0              TC       Q                   RETURN

  0072    REF  22  LAST 1469      4774            CCT7       EQUALS SEVEN
```

```
R0074
R0075         UPFLAG AND DOWNFLAG ARE ENTIRELY GENERAL FLAG SETTING AND CLEARING SUBROUTINES.   USING THEM, WHETHER OR
R0077    NOT IN INTERRUPT, ONE MAY SET OR CLEAR ANY SINGLE, NAMED BIT IN ANY ERASABLE REGISTER, SUBJECT OF COURSE TO
R0079    EBANK SETTING.   A "NAMED" BIT, AS THE WORD IS USED HERE, IS ANY BIT WITH A NAME FORMALLY ASSIGNED BY THE YUL
R0081    ASSEMBLER.

R0082         AT PRESENT THE ONLY NAMED BITS ARE THOSE IN THE FLAGWORDS.   ASSEMBLER CHANGES WILL MAKE IT POSSIBLE TO
R0084    NAME ANY BIT IN ERASABLE MEMORY.

R0085         CALLING SEQUENCES ARE AS FOLLOWS:-

R0086                        TC      UPFLAG                          TC      DOWNFLAG
R0087                        ADRES   NAME OF FLAG                    ADRES   NAME OF FLAG

R0088         RETURN IS TO THE LOCATION FOLLOWING THE "ADRES" ABOUT .58 MS AFTER THE "TC".

R0090         UPON RETURN A CONTAINS THE CURRENT FLAGWRD SETTING.

 0092    REF   9  LAST 1410       4000                           SETLOC FFTAG1
 0093                             5547                           BANK
 0094    REF   1                                                 COUNT* $$/FLAG

 0095    REF 314  LAST 1478       5547  3 0002 0  UPFLAG         CA      Q
 0096    REF   3  LAST  278       5550  0 5565 1                 TC      DEBIT
 0097                             5551  4 0000 0                 COM                              +(15 - BIT)
 0098                             5552  0 0006 1                 EXTEND
 0099    REF  16  LAST 1132       5553  04 001 1                 ROR     LCHAN                    SET BIT
 0100    REF  36  LAST 1433       5554  50 061 0  COMFLAG        INDEX   ITEMP1
 0101    REF  21  LAST 1021       5555  54 074 0                 TS      FLAGWRD0
 0102    REF   4  LAST 1408       5556  22 063 1                 LXCH    ITEMP3
 0103                             5557  0 0003 1                 RELINT
 0104    REF 202  LAST 1478       5560  0 0001 0                 TC      L

 0105    REF 315  LAST 1479       5561  3 0002 0  DOWNFLAG       CA      Q
 0106    REF   4  LAST 1479       5562  0 5565 1                 TC      DEBIT
 0107    REF 203  LAST 1479       5563  7 0001 1                 MASK    L                        RESET BIT
 0108    REF   1                  5564  1 5554 1                 TCF     COMFLAG

 0109    REF 164  LAST 1475       5565  6 4770 0  DEBIT          AD      ONE                      GET DE BITS
 0110                             5566  0 0004 0                 INHINT
 0111    REF   5  LAST 1479       5567  54 063 0                 TS      ITEMP3
 0112    REF   6  LAST 1197       5570  3 4777 1                 CA      LOW4                     DEC15
 0113    REF  37  LAST 1479       5571  54 061 1                 TS      ITEMP1
 0114    REF   6  LAST 1479       5572  50 063 1                 INDEX   ITEMP3
 0115                             5573  2'7777 0                 CA      0 -1                     ADRES
 0116    REF 204  LAST 1479       5574  54 001 1                 TS      L
 0117    REF 275  LAST 1477       5575  3 4772 1                 CA      ZERO
 0118                             5576  0 0006 1                 EXTEND
```

```
0119    REF  38  LAST 1479        5577  10 061 1          DV      ITEMP1           A = FLAGWRD, L = (15 - BIT)
0120    REF  39  LAST 1480        5600  52 062 1          DXCH    ITEMP1
0121    REF  40  LAST 1480        5601  50 061 0          INDEX   ITEMP1
0122    REF  22  LAST 1479        5602  3 0074 1          CA      FLAGWRD0
0123    REF 205  LAST 1479        5603  54 001 1          TS      L                CURRENT STATE
0124    REF  24  LAST 1432        5604  50 062 0          INDEX   ITEMP2
0125    REF  49  LAST 1477        5605  4 4752 1          CS      BIT15            -(15 - BIT)
0126    REF 316  LAST 1479        5606  0 0002 0          TC      Q
```

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L        SERVICE ROUTINES                                                              USER'S PAGE NO.   4       E0 53

P0127    DELAYJOB- A GENERAL ROUTINE TO DELAY A JOB A SPECIFIC AMOUNT OF TIME BEFORE PICKING UP AGAIN.

R0129    ENTRANCE REQUIREMENTS...
A0130                                                           CAF      DT                DELAY JOB FOR DT CENTISECS
A0131                                                           TC       BANKCALL
A0132                                                           CADR     DELAYJOB

 0134    REF   1                 00,2000                        SETLOC DLAYJOB
 0135                            00,3730                        BANK

R0136    THIS MUST REMAIN IN BANK 0 ****************************************
 0137    REF   1                                                COUNT* $$/DELAY
 01371   REF  13  LAST  788      00,3730  3 5016 0  1SECDELY CAF      1SEC
 0138                            00,3731  0 0004 0  DELAYJOB INHINT
 0139    REF 317  LAST 1480      00,3732  54 002 1           TS       Q                 STORE DELAY DT IN Q FOR DLY -1 IN

 0140    REF   1                 00,3733  3 6214 0           CAF      DELAYNUM          WAITLIST
 0141    REF  42  LAST 1434      00,3734  54 070 1  DELLOOP  TS       RUPTREG1
 0142    REF 413  LAST 1475      00,3735  50 000 1           INDEX    A
 0143    REF   5  LAST  204      00,3736  3 1000 0           CA       DELAYLOC          IS THIS DELAYLOC AVAILABLE
 0144                            00,3737  0 0006 1           EXTEND
 0145    REF   1                 00,3740  1 3745 0           BZF      OK2DELAY          YES

 0146    REF  43  LAST 1481      00,3741  10 070 1           CCS      RUPTREG1          NO, TRY NEXT DELAYLOC
 0147    REF   1                 00,3742  1 3734 0           TCF      DELLOOP

 0148    REF   5  LAST 1229      00,3743  0 7706 1           TC       BAILOUT           NO AVAILABLE LOCS AVAILABLE.
 0149                            00,3744   31104 0           OCT      31104

 0150    REF   1                 00,3745  3 3765 0  OK2DELAY CA       TCSLEEP           SET WAITLIST IMMEDIATE RETURN
 0151    REF   5  LAST 1224      00,3746  54 061 1           TS       WAITEXIT

 0152    REF  30  LAST 1210      00,3747  3 0004 0           CA       FBANK
 0153    REF  44  LAST 1481      00,3750  6 0070 0           AD       RUPTREG1          STORE BBANK FOR TASK CALL
 0154    REF 206  LAST 1480      00,3751  54 001 1           TS       L

 0155    REF   1                 00,3752  3 3766 0           CAF      WAKECAD           STORE CADR FOR TASK CALL
 0156    REF   2  LAST 1224      00,3753  1 5243 0           TCF      DLYZ -1           DLY IS IN WAITLIST ROUTINE

 0157    REF   6  LAST 1467      00,3754  0 4665 0  TCGETCAD TC       MAKECADR          GET CALLERS FCADR

 0158    REF  45  LAST 1481      00,3755  50 070 0           INDEX    RUPTREG1
 0159    REF   6  LAST 1481      00,3756  55'000 1           TS       DELAYLOC          SAVE DELAY CADRS

 0160    REF   8  LAST 1472      00,3757  0 5163 0           TC       JOBSLEEP

 0161    REF 276  LAST 1479      00,3760  3 4772 1  WAKER    CAF      ZERO
 0162    REF  33  LAST 1466      00,3761  50 006 1           INDEX    BBANK
 0163    REF   7  LAST 1481      00,3762  57'000 0           XCH      DELAYLOC          MAKE DELAYLOC AVAILABLE
 0164    REF  14  LAST 1468      00,3763  0 5167 1           TC       JOBWAKE
 0165   REF  67  LAST 1436   00,3764  0 5314 1            TC       TASKOVER

 0166   REF   1              00,3765   03752 1  TCSLEEP   GENADR TCGETCAD -2
 0167   REF   1              00,3766   03760 0  WAKECAD   GENADR WAKER
```

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L        SERVICE ROUTINES                                                                      USER'S PAGE NO.   6       E0 53

P0169    GENTRAN, A BLOCK TRANSFER ROUTINE.

R0170    WRITTEN BY D. EYLES
R0171    MOD 1 BY KERNAN                                                                   UTILITYM REV 17 11/18/67

R01722   MOD 2 BY SCHULENBERG  (REMOVE RELINT)   SKIPPER REV 4 2/28/68

R0173               THIS ROUTINE IS USEFULL FOR TRANSFERING N CONSECUTIVE ERASABLE OR FIXED QUANTITIES TO SOME OTHER N
R0175    CONSECUTIVE ERASABLE LOCATIONS.  IF BOTH BLOCKS OF DATA ARE IN SWITCHABLE EBANKS, THEY MUST BE IN THE SAME ONE.

R0177               GENTRAN IS CALLABLE IN A JOB AS WELL AS A RUPT.  THE CALLING SEQUENCE IS:

A0179                                                    I         CA     N-1             # OF QUANTITIES MINUS ONE.
A0180                                                    I +1      TC     GENTRAN         IN FIXED-FIXED.
A0181                                                    I +2      ADRES  L               STARTING ADRES OF DATA TO BE MOVED.
A0182                                                    I +3      ADRES  M               STARTING ADRES OF DUPLICATION BLOCK.
A0183                                                    I +4                             RETURNS HERE.

R0184               GENTRAN TAKES 25 MCT'S (300 MICROSECONDS) PER ITEM + 5 MCT'S (60 MICS) FOR ENTERING AND EXITING.

R0186               A, L AND ITEMP1 ARE NOT PRESERVED.

 0188    REF   2  LAST 1459       4000                              SETLOC FFTAG4
 0189                             5607                              BANK

 0190    REF  41  LAST 1480       0061                              EBANK= ITEMP1

 0191    REF   1                                                    COUNT* $$/TRAN

 0192                             5607  0 0004 0   GENTRAN          INHINT
 0193    REF  42  LAST 1483       5610  54 0061 1    +1             TS      ITEMP1            SAVE N-1
 0194    REF 318  LAST 1481       5611  50 0002 0                   INDEX   Q                 C(Q) = ADRES L.
 0195                             5612  6 0000 1                    AD      0                 ADRES (L + N - 1).
 0196    REF 414  LAST 1481       5613  50 0000 1                   INDEX   A
 0197                             5614  3 0000 1                    CA      0                 C(ABOVE).
 0198    REF 207  LAST 1481       5615  54 0001 1                   TS      L                 SAVE DATA.
 0199    REF  43  LAST 1483       5616  3 0061 0                    CA      ITEMP1
 0200    REF 319  LAST 1483       5617  50 0002 0                   INDEX   Q
 0201                             5620  6 0001 0                    AD      1                 ADRES (M + N - 1).
 0202    REF 415  LAST 1483       5621  50 0000 1                   INDEX   A
 0203                             5622  22 0000 1                   LXCH    0                 STUFF IT.
 0204    REF  44  LAST 1483       5623  10 0061 1                   CCS     ITEMP1            LOOP UNTIL N-1 = 0.
 0205    REF  11  LAST  836       5624  1 5610 1                    TCF     GENTRAN +1
 0207    REF   8  LAST 1402       5625  1 6710 0                    TCF     Q+Z               RETURN TO CALLER.
```

```
L       SERVICE ROUTINES                                                            USER'S PAGE NO.   7     LD S3

P0208   B5OFF   ZERO BIT 5 OF EXTVBACT, WHICH IS SET BY TESTXACT.

R0209           MAY BE USED AS NEEDED BY ANY EXTENDED VERB WHICH HAS DONE TESTXACT

 0211   REF   1                                               COUNT* $$/EXTVB

 0212   REF  37  LAST 1477       5626  4 4764 1  B5OFF        CS      BIT5
 0213   REF  18  LAST 1459       5627  7 1247 0               MASK    EXTVBACT
 0214   REF  19  LAST 1484       5630  55'247 0               TS      EXTVBACT
 0215   REF 101  LAST 1476       5631  0 5205 0               TC      ENDOFJOB
```

```
L       SERVICE ROUTINES                                                                        USER'S PAGE NO.  8     E  53

P0216   SUBROUTINES TO TURN OFF AND TURN ON TRACKER FAIL LIGHT.

  02165  REF    2 LAST 1459 TO 1460:     25      25*                COUNT* $$/DSPLA
  0217                                 5632  0 0004 0  TRFAILOF INHINT
  0218   REF    1                      5633  4 7670 0           CS       CCT40200          TURN OFF TRACKER LIGHT
  0219   REF   44  LAST 1425           5634  7 1241 0           MASK     DSPTAB +11D
  0220   REF   50  LAST 1480           5635  6 4752 0           AD       BIT15
  0221   REF   45  LAST 1485           5636  55'241 0           TS       DSPTAB +11D
  02215  REF   32  LAST  392           5637  4 1337 0           CS       OPTMODES          TO INSURE THAT OCDU FAIL WILL GO ON
  02216  REF    5  LAST  392           5640  7 4762 1           MASK     OCDUFBIT          AGAIN IF IT WAS ON IN ADDITION TO
  02217  REF   33  LAST 1485           5641  27'337 0           ADS      OPTMODES          TRACKER FAIL.

  0222                                 5642  0 0003 1  REQ      RELINT
  0223   REF 320  LAST 1483            5643  0 0002 0           TC       Q

  0224                                 5644  0 0004 0  TRFAILON INHINT
  0225   REF   46  LAST 1485           5645  4 1241 0           CS       DSPTAB +11D       TURN ON
  0226   REF    2  LAST 1485           5646  7 7670 0           MASK     CCT40200
  0227   REF   47  LAST 1485           5647  27'241 0           ADS      DSPTAB +11D
  0228   REF    4  LAST 1472           5650  1 5642 0           TCF      REQ

  0229   REF 416  LAST 1483            5651  10 000 0  INCRQCK  CCS      A
  0230   REF 321  LAST 1485            5652  24 0002 0          INCR     Q
  0231   REF 322  LAST 1485            5653  0 0002 0           TC       Q
  02315  REF    1                                               COUNT*   $$/CFAIL
  0232   REF 208  LAST 1483            5654  54 0001 1 C31BTCHK TS       L                 SAVE MASK
  0233   REF    5  LAST  187           5655  3 0374 1           CA       C31FLWRD
  0234   REF    1                      5656  7 4346 0           MASK     FAILBIT
  0235   REF 417  LAST 1485            5657  10 000 0           CCS      A
  0236   REF    1                      5660  1 5667 1           TCF      USEFLBTS
  0237                                 5661  0 0006 1           EXTEND
  0238   REF    6  LAST 1038           5662  00 031 0           READ     CHAN31
  0239   REF 209  LAST 1485            5663  7 0001 1  C31CMCHK MASK     L
  0240                                 5664  0 0006 1           EXTEND
  0241   REF    9  LAST  363           5665  1 6711 1           BZF      TCQ               BITS SET
  0242   REF    6  LAST 1474           5666  1 6706 1           TCF      Q+1               BITS NOT SET

  0243   REF    6  LAST 1485           5667  3 0374 1  USEFLBTS CA       C31FLWRD
  0244   REF    1                      5670  1 5663 0           TCF      C31CMCHK

  0245   REF   14  LAST 1325           4346            FAILBIT  =        PRIO30
```

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L         ALARM AND ABORT                                                                            USER'S PAGE NO.   1      LC S3

R0001             THE FOLLOWING SUBROUTINE MAY BE CALLED TO DISPLAY A NON-ABORTIVE ALARM CONDITION. IT MAY BE CALLED
R0003     EITHER IN INTERRUPT OR UNDER EXECUTIVE CONTROL.

R0004             CALLING SEQUENCE IS AS FOLLOWS:

R0005             TC      ALARM
R0006             OCT     NNNNN
R0007                                   (RETURNS HERE)
 0009     REF   1               4000                       SETLOC FFTAG7
 0010                           5671                       BANK

 0011     REF   9  LAST  393    0375                       EBANK= FAILREG

 0012     REF   1                                          COUNT* $$/ALARM
R0013     ALARM TURNS ON THE PROGRAM ALARM LIGHT, BUT DOES NOT DISPLAY.

 0014                           5671  0 0004 0  ALARM      INHINT

 0015     REF 323  LAST 1485    5672  3 0002 0             CA       Q
 0016     REF   5  LAST 1394    5673  55'363 1  ALARM2     TS       ALMCADR
 0017     REF 324  LAST 1486    5674  50 002 0             INDEX    Q
 0018                           5675  3 0000 1             CA       0
 0019     REF 210  LAST 1485    5676  54 001 1  BORTENT    TS       L

 0020     REF  34  LAST 1481    5677  3 0006 1  PRIOENT    CA       BBANK
 00202                          5700  0 0006 1   +1        EXTEND
 00204    REF  25  LAST 1469    5701  04 007 1             ROR      SUPERBNK          ADD SUPER BITS.
 0021     REF   6  LAST 1486    5702  55'364 0             TS       ALMCADR +1

 0022     REF 325  LAST 1486    5703  3 0002 0  LARMENT    CA       Q                 STORE RETURN FOR ALARM
 0023     REF  45  LAST 1483    5704  54 061 1             TS       ITEMP1

 0024     REF  10  LAST 1486    5705  10 375 1  CHKFAIL1 CCS       FAILREG           IS ANYTHING IN FAILREG
 0025     REF   1               5706  1 5712 1             TCF      CHKFAIL2          YES TRY NEXT REG
 0026     REF 211  LAST 1486    5707  3 0001 0             CA       L
 00265    REF  11  LAST 1486    5710  54 375 1             TS       FAILREG
 0027     REF   1               5711  1 5716 0             TCF      PROGLARM          TURN ALARM LIGHT ON FOR FIRST ALARM

 0028     REF  12  LAST 1486    5712  10 376 1  CHKFAIL2 CCS       FAILREG +1
 0029     REF   2  LAST 1486    5713  1 5716 0             TCF      PROGLARM
 0030     REF 212  LAST 1486    5714  3 0001 0             CA       L
 0031     REF  13  LAST 1486    5715  54 376 1             TS       FAILREG +1

 0037     REF  14  LAST 1486    5716  22 377 1  PROGLARM LXCH      FAILREG +2        STORE AS "MOST RECENT" ALARM CODE

 0038     REF  48  LAST 1485    5717  4 1241 0             CS       DSPTAB +11D       TURN ON PROGRAM ALARM IF OFF
 0039     REF   2  LAST 1463    5720  7 7716 1             MASK     BIT15+9
 0040     REF  49  LAST 1486    5721  27'241 0             ADS      DSPTAB +11D

 0041     REF  46  LAST 1486    5722  56 061 0  MULTEXIT XCH       ITEMP1            OBTAIN RETURN ADDRESS IN A
```

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  0042                               5723  0 0003 1              RELINT
  0043   REF 418  LAST 1485          5724  50 000 1              INDEX  A
  0044                               5725  0 0001 0              TC     1

R0049    PRIOLARM DISPLAYS V05N09 VIA PRIODSPR WITH 3 RETURNS TO THE USER FROM THE ASTRONAUT AT CALL LOC +1,+2,+3 AND
R0051    AN IMMEDIATE RETURN TO THE USER AT CALL LOC +4. EXAMPLE FOLLOWS,
A0052                                                            CAF    OCTXX                ALARM CODE
A0053                                                            TC     BANKCALL
A0054                                                            CADR   PRIOLARM

A0055                                                            ...    ...
A0056                                                            ...    ...
A0057                                                            ...    ...                  ASTRONAUT RETURN
A0058                                                            TC     PHASCHNG             IMMEDIATE RETURN TO USER. RESTART
A0059                                                            OCT    X.1                  PHASE CHANGE FOR PRIO DISPLAY

  0061   REF   3  LAST 1478   10,2000                            SETLOC DISPLAYS
  0062                        10,3766                            BANK

  0063   REF   3 LAST 1478 TO 1479:     9    633*                COUNT* $$/DSPLA
  0064                        10,3766  0 0004 0  PRIOLARM INHINT                      * * * KEEP IN DISPLAY ROUTINES BANK
  0065   REF 213  LAST 1486   10,3767  54 001 1                  TS     L                    SAVE ALARM CODE

  0066   REF  23  LAST 1438   10,3770  3 0133 0                  CA     BUF2                 2 CADR OF PRIOLARM USER
  0067   REF   7  LAST 1486   10,3771  55'363 1                  TS     ALMCADR
  0068   REF  24  LAST 1487   10,3772  3 0134 1                  CA     BUF2 +1
  0069   REF   1              10,3773  0 5700 0                  TC     PRIOENT +1           * LEAVE L ALONE
  0071                        10,3774   77467 1  -2SEC           DEC    -200                 *** DONT MOVE
  0072   REF   7  LAST  907   10,3775  3 5023 0                  CAF    V05N09
  0073   REF   1              10,3776  1 2750 0                  TCF    PRIODSPR

  0075   REF   1                 6000                            SETLOC FFTAG13
  0076                           7706                            BANK

  0077   REF   1                                                 COUNT* $$/ALARM
  0078                           7706  0 0004 0  BAILOUT         INHINT
  0079   REF 326  LAST 1486      7707  3 0002 0                  CA     Q
  0080   REF   8  LAST 1487      7710  55'363 1                  TS     ALMCADR

 00801   REF 216  LAST 1442      7711  0 4636 0                  TC     BANKCALL
 00802   REF   2  LAST  198      7712   40000 0                  CADR   VAC5STOR

  0081   REF   9  LAST 1487      7713  51'363 0                  INDEX  ALMCADR
  0082                           7714  3 0000 1                  CAF    0
  0083   REF   1                 7715  0 5676 0                  TC     BORTENT
  0084                           7716   40400 1  BIT15+9         OCT    40400

 00845                           7717  0 0004 0    -1            INHINT
  0085   REF  71  LAST 1473      7720  3 4767 0  WHIMPER         CA     TWO
 00851   REF  15  LAST 1402      7721  6 0005 1                  AD     Z
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L        ALARM AND ABORT                                                                            USER'S PAGE NO.   3       E0 S3

 00852  REF   1                   7722  54 017 0            TS     BRUPT
 00853                            7723  5 0017 1            RESUME
 00854  REF  58  LAST 1459        7724  0 4655 0            TC     POSTJUMP         RESUME SENDS CONTROL HERE
 008541 REF   2  LAST  270        7725   12712 0            CADR   ENEMA

 008543 REF   2  LAST 1486        4000                      SETLOC FFTAG7
 008544 REF   2 LAST 1486 TO 1487:     29     29*           COUNT* $$/ALARM
 008545                           5726                      BANK

 008546                           5726  0 0004 0  POODOO    INHINT
 008547 REF 327  LAST 1487        5727  3 0002 0            CA     Q
 008548 REF  10  LAST 1487        5730  55'363 1            TS     ALMCADR

 008549 REF 217  LAST 1487        5731  0 4636 0            TC     BANKCALL
 00855  REF   3  LAST 1487        5732   40000 0            CADR   VAC5STOR         STORE ERASABLES FOR DEBUGGING PURPOSES.

 008555 REF  11  LAST 1488        5733  51'363 0            INDEX  ALMCADR
 008556                           5734  3 0000 1            CAF    0
 008557 REF   2  LAST 1487        5735  0 5676 0  ABORT2    TC     BORTENT

 008558                           5736   77770 1  OCT77770  OCT    77770            DONT MOVE
 00856  REF   3  LAST  827        5737  3 4763 1            CA     V37FLBIT         IS AVERAGE G ON
 008561 REF  25  LAST 1447        5740  7 0103 1            MASK   FLAGWRD7
 008562 REF 419  LAST 1487        5741  10 000 0            CCS    A
 008563 REF   1                   5742  0 7717 1            TC     WHIMPER -1       YES.  DONT DO POODOO.  DO BAILOUT.

 008564 REF  70  LAST 1477        5743  4 4753 0            CS     BIT14            DISREGARD ENTRY SETTING
 008565 REF  20  LAST 1484        5744  7 1247 0            MASK   EXTVBACT         EXTENDED VBS ACTIVE?
 008566 REF 420  LAST 1488        5745  10 000 0            CCS    A
 008567 REF   2  LAST 1488        5746  1 7717 0            TCF    WHIMPER -1       YES  DONT DO POODOO  DO BAILOUT

 0086   REF  69  LAST 1474        5747  0 5561 0            TC     DOWNFLAG
 0087   REF   8  LAST 1349        5750   00067 0            ADRES  STATEFLG

 00875  REF  70  LAST 1488        5751  0 5561 0            TC     DOWNFLAG
 00877  REF  18  LAST  748        5752   00236 0            ADRES  AUTOSEQ

 0088   REF  71  LAST 1488        5753  0 5561 0            TC     DOWNFLAG
 0089   REF   5  LAST 1348        5754   00230 0            ADRES  REINTFLG

 00891  REF  72  LAST 1488        5755  0 5561 0            TC     DOWNFLAG
 00892  REF  12  LAST 1442        5756   00176 1            ADRES  UTFLAG
 00893  REF  73  LAST 1488        5757  0 5561 0            TC     DOWNFLAG
 00894  REF  11  LAST 1442        5760   00010 0            ADRES  RNDVZFLG
 00895  REF  74  LAST 1488        5761  0 5561 0            TC     DOWNFLAG
 00896  REF  14  LAST  744        5762   00031 0            ADRES  TRACKFLG         FORCE STOPRATE
 0090   REF  75  LAST 1488        5763  0 5561 0            TC     DOWNFLAG
 0091   REF   7  LAST 1444        5764   00054 0            ADRES  NODOFLAG

 0092   REF 218  LAST 1488        5765  0 4636 0            TC     BANKCALL
```

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L        ALARM AND ABORT                                                            USER'S PAGE NO.  4       E0 S3

 0093    REF   2  LAST  195       5766   12536 1             CADR    MR.KLEAN
 0094    REF   3  LAST 1488       5767  0 7720 0             TC      WHIMPER

 0108    REF 102  LAST 1484       5205              COALARM  EQUALS  ENDOFJOB
R0109    CALLING SEQUENCE FOR VARALARM

A0110                                                        CAF     (ALARM)
A0111                                                        TC      VARALARM

R0112    VARALARM TURNS ON PROGRAM ALARM LIGHT BUT DOES NOT DISPLAY
 0113                             5770  0 0004 0  VARALARM INHINT

 0114    REF 214  LAST 1487       5771  54 001 1             TS      L                  SAVE USERS ALARM CODE

 0115    REF 328  LAST 1488       5772  3 0002 0             CA      Q                  SAVE USERS Q
 0116    REF  12  LAST 1488       5773  55 363 1             TS      ALMCADR

 0117    REF   2  LAST 1487       5774  0 5677 1             TC      PRIOENT
 0118                             5775   00014 1   OCT14     OCT     14                 DONT MOVE

 0119    REF  13  LAST 1489       5776  0 1363 0             TC      ALMCADR            RETURN TO USER

 0120    REF   6  LAST 1481       7706              ABORT    EQUALS  BAILOUT            *** TEMPORARY UNTIL ABORT CALLS OUT
```

```
L       UPDATE PROGRAM                                                          USER'S PAGE NO.  1      E0 S3

R0001   PROGRAM NAME:   P27
R0002   WRITTEN BY:     KILROY/ DE WOLF

R0003   MOD NO:         6
R0004   MOD BY:         KILROY
R0005   DATE:           01DEC67

R0006   LOG SECTION:    UPDATE PROGRAM.

R0007   FUNCT. DESCR:   P27 (THE UPDATE PROGRAM) PROCESSES COMMANDS AND DATA
R0008                        INSERTIONS REQUESTED BY THE GROUND VIA UPLINK.
R0009                        THE P27 PROGRAM WILL ACCEPT UPDATES
R0010                        ONLY DURING P00 FOR THE LM, AND ONLY DURING P00,
R0011                   P02, AND FRESH START FOR THE CSM

R0012   CALLING SEQ:    PROGRAM IS INITIATED BY UPLINK ENTRY OF VERBS 70, 71, 72 AND 73.

R0014   SUBROUTINES:    TESTXACT, NEWMODEX, NEWMODEX +3, GOXDSPF, BANKCALL, FINDVAC, INTPRET, INTSTALL, TPAGREE,
R0016                   INTWAKEU, ENDEXT, POSTJUMP, FALTON, NEWPHASE, PHASCHNG

R0017   NORMAL EXIT:    TC ENDEXT

R0018   ALARM/ABORT:    TC FALTON FOLLOWED BY TC ENDEXT

R0019   RESTARTS:       P27 IS RESTART PROTECTED IN TWO WAYS...
R0020                   1. PRIOR TO VERIFLAG INVERSION(WHICH IS CAUSED BY THE GROUND/ASTRONAUT'S VERIFICATION OF UPDATE
R0022                      DATA BY SENDING A V33E WHEN V21N02 IS FLASHING)---
R0023                      NO PROTECTION EXCEPT PRE-P27 MODE IS RESTORED, COAST + ALIGN DOWNLIST IS SELECTED AND UPLINK
R0025                      ACTIVITY LIGHT IS TURNED OFF.(JUST AS IF A V34E WAS SENT DURING P27 DATA LOADS).
R0027                      V70,V71,V72 OR V73 WILL HAVE TO BE COMPLETELY RESENT BY USER.
R0029                   2. AFTER VERIFLAG INVERSION(WHEN UPDATE OF THE SPECIFIED ERASABLES IS BEING PERFORMED)---
R0031                      PROTECTED AGAINST RESTARTS.

R0032   DEBRIS:         UPBUFF    (20D)  TEMP STORAGE FOR ADDRESSES AND CONTENTS.
R0033                   UPVERB    (1)    VERB NUMBER MINUS 70D (E.G. FOR V72, UPVERB = 72D - 70D = 2)
R0035                   UPOLDMOD (1)     FOR MAJOR MODE INTERRUPTED BY P27.
R0036                   COMPNUMB (1)     TOTAL NUMBER OF COMPONENTS TO BE TRANSMITTED.
R0038                   UPCOUNT   (1)    ACTUAL NUMBER OF COMPONENTS RECEIVED.
R0039                   UPTEMP    (1)    SCRATCH, BUT USUALLY CONTAINS COMPONENT NUMBER TO BE CHANGED DURING VERIFY CYCLE


R0041   INPUT:

R0042    ENTRY:              DESCRIPTION

R0043    V70EXXXXXEXXXXXE (LIFTOFF TIME INCREMENT) DOUBLE PRECISION OCTAL TIME INCREMENT, XXXXX XXXXX,
R0045                    IS ADDED TO TEPHEM, SUBTRACTED FROM AGC CLOCK(TIME2,TIME1), SUBTRACTED FROM CSM STATE
R0047                    VECTOR TIME(TETCSM) AND SUBTRACTED FROM LEM STATE VECTOR TIME(TETLEM).
R0049                    THE DP OCTAL TIME INCREMENT IS SCALED AT 2(28).
```

```
R0050    V71EIIEAAAAE       (CONTIGUOUS BLOCK UPDATE) II-2 OCTAL COMPONENTS,XXXXX,
R0051     XXXXXE             ARE LOADED INTO ERASABLE STARTING AT ECADR, AAAA.
R0052    XXXXXE              IT IS .GE. 3 .AND. .LE. 20D.,
R0053                        AND (AAAA + II - 3) DOES NOT PRODUCE AN ADDRESS IN THE
R0054    9 NEXT BANK
R0055      .                 SCALING IS SAME AS INTERNAL REGISTERS.

R0056     V72EIIE            (SCATTER UPDATE) (II-1)/2 OCTAL COMPONENTS,XXXXX, ARE
R0057     AAAAEXXXXXE        LOADED INTO ERASABLE LOCATIONS, AAAA.
R0058     AAAAEXXXXXE        II IS .GE. 3 .AND. .LE. 19D, AND MUST BE ODD.
R0060      .                 SCALING IS SAME AS INTERNAL REGISTERS.

R0061     V73EXXXXXEXXXXXE (OCTAL CLOCK INCREMENT) DOUBLE PRECISION OCTAL TIME
R0062                        INCREMENT XXXXX XXXXX, IS ADDED TO THE AGC CLOCK, IN
R0063                        CENTISECONDS SCALED AT (2)28.
R0064                        THIS LOAD IS THE OCTAL EQUIVALENT OF V55.


R0065    OUTPUT:            IN ADDITION TO THE ABOVE REGISTER LOADS, ALL UPDATES
R0066                       COMPLEMENT BIT3 OF FLAGWORD7.

R0067    ADDITIONAL NOTES: VERB 71, JUST DEFINED ABOVE WILL BE USED TO PERFORM BUT NOT LIMITED TO THE FOLLOWING UPDATES--

R0069                       1. CSM/LM STATE VECTOR UPDATE
R0072                       2. REFSMMAT UPDATE

R0073              THE FOLLOWING COMMENTS DELINEATE EACH SPECIAL UPDATE----

R0074    1. CSM/LM STATE VECTOR UPDATE(ALL DATA ENTRIES IN OCTAL)

R0075    ENTRIES:           DATA DEFINITION:                                   SCALE FACTORS:
R0077    V71E               CONTIGUOUS BLOCK UPDATE VERB
R0078      21E              NUMBER OF COMPONENTS FOR STATE VECTOR UPDATE
R0080     AAAAE             ECADR OF 'UPSVFLAG'
R0082    XXXXXE             STATE VECTOR IDENTIFIER: 00001 FOR CSM, 77776 FOR LEM - EARTH SPHERE OF INFLUENCE SCALING
R0083                                                00002 FOR CSM, 77775 FOR LEM - LUNAR SPHERE OF INFLUENCE SCALING
R0084    XXXXXEXXXXXE       X POSITION
R0086    XXXXXEXXXXXE       Y POSITION
R0088    XXXXXEXXXXXE       Z POSITION
R0090    XXXXXEXXXXXE       X VELOCITY
R0092    XXXXXEXXXXXE       Y VELOCITY
R0094    XXXXXEXXXXXE       Z VELOCITY
R0096    XXXXXEXXXXXE       TIME FROM AGC CLOCK ZERO
R0098    V33E               VERB 33 TO SIGNAL THAT THE STATE VECTOR IS READY TO BE STORED.


R0144    2. REFSMMAT(ALL DATA ENTRIES IN OCTAL)
R0145    ENTRIES:           DATA DEFINITIONS:                                  SCALE FACTORS:
```

```
R0147    V71E              CONTIGUOUS BLOCK UPDATE VERB
R0148      24E             NUMBER OF COMPONENTS FOR REFSMMAT UPDATE
R0150     AAAAE            ECADR OF 'REFSMMAT'
R0152    XXXXXEXXXXXE      ROW 1 COLUMN 1                                          2(-1)
R0154    XXXXXEXXXXXE      ROW 1 COLUMN 2                                          2(-1)
R0156    XXXXXEXXXXXE      ROW 1 COLUMN 3                                          2(-1)
R0158    XXXXXEXXXXXE      ROW 2 COLUMN 1                                          2(-1)
R0160    XXXXXEXXXXXE      ROW 2 COLUMN 2                                          2(-1)
R0162    XXXXXEXXXXXE      ROW 2 COLUMN 3                                          2(-1)
R0164    XXXXXEXXXXXE      ROW 3 COLUMN 1                                          2(-1)
R0166    XXXXXEXXXXXE      ROW 3 COLUMN 2                                          2(-1)
R0168    XXXXXEXXXXXE      ROW 3 COLUMN 3                                          2(-1)
R0170    V33E              VERB 33 TO SIGNAL THAT REFSMMAT IS READY TO BE STORED.


 0172    REF   6  LAST  452   43,2000                        SETLOC EXTVERBS
 0173                         43,3656                        BANK

 0174    REF  13  LAST 1331   E3,1706                        EBANK= TEPHEM

 0175    REF   1                                             COUNT* $$/P27
 0176    REF   1              43,3656  3 4772 1  V70UPDAT CAF     UP70              COMES HERE ON V70E
 0177    REF   2  LAST  249   43,3657  1 3665 0           TCF     V73UPDAT +1


 0178    REF   1              43,3660  3 4770 0  V71UPDAT CAF     UP71              COMES HERE ON V71E
 0179    REF   3  LAST 1492   43,3661  1 3665 0           TCF     V73UPDAT +1


 0180    REF   1              43,3662  3 4767 0  V72UPDAT CAF     UP72              COMES HERE ON V72E
 0181    REF   4  LAST 1492   43,3663  1 3665 0           TCF     V73UPDAT +1


 0182    REF   1              43,3664  3 6214 0  V73UPDAT CAF     UP73              COMES HERE ON V73E

 0183    REF   1              43,3665  54 331 1    +1     TS      UPVERBSV          SAVE UPVERB UNTIL IT'S OK TO ENTER P27

 0184    REF  18  LAST  279   43,3666  0 2076 1           TC      TESTXACT          GRAB DISPLAY IF AVAILABLE, OTHERWISE
A0185                                                                               TURN*OPERATOR ERROR* ON AND TERMINATEJOB

 0186    REF  19  LAST 1402   43,3667  3 1214 1           CA      MODREG            CHECK IF UPDATE ALLOWED
 0187                         43,3670  0 0006 1           EXTEND                    FIRST CHECK FOR MODREG = +0, -0
 0188    REF   1              43,3671  1 3707 0           BZF     UPDATEOK          FRESH START OR P00
 0189    REF  22  LAST  834   43,3672  4 0104 0           CS      FLAGWRD8
 0190    REF  12  LAST  834   43,3673  7 4760 0           MASK    UTBIT
 0191    REF 421  LAST 1483   43,3674  10 000 0           CCS     A
 0192                         43,3675  1 3702 0           TCF     +5

 0193    REF  20  LAST 1492   43,3676  4 1214 0           CS      MODREG
 0194    REF   8  LAST  710   43,3677  6 4124 1           AD      OCT24
 0195                        43,3700   0 0006 1              EXTEND
 0196   REF   2  LAST 1492   43,3701   1 3707 0              BZF      UPDATEOK

 0197   REF  72  LAST 1487   43,3702   4 4767 1              CS       TWO
 0198   REF  21  LAST 1492   43,3703   7 1214 0              MASK     MODREG
 0199                        43,3704   0 0006 1              EXTEND
 0200                        43,3705   1 3707 0              BZF      +2                P02
 0201   REF   1              43,3706   1 3717 1              TCF      UPERROR
 0202   REF  22  LAST 1493   43,3707   31'214 1   UPDATEOK   CAE      MODREG            UPDATE ALLOWED.
 0203   REF   4  LAST  188   43,3710   54 301 1              TS       UPOLDMOD          SAVE CURRENT MAJOR MODE

 0204   REF   2  LAST 1492   43,3711   30 331 0              CAE      UPVERBSV          SET UPVERB TO INDICATE TO P27
 0205   REF   4  LAST  188   43,3712   54 302 1              TS       UPVERB            WHICH EXTENDED VERB CALLED IT.

 0206   REF 165  LAST 1479   43,3713   3 4770 0              CAF      ONE
 0207   REF   3  LAST  188   43,3714   54 303 0              TS       UPCOUNT           INITIALIZE UPCOUNT TO 1

 0208   REF  59  LAST 1488   43,3715   0 4655 0              TC       POSTJUMP          LEAVE EXTENDED VERB BANK AND
 0209   REF   1              43,3716    65626 0              CADR     UPPART2           GO TO UPDATE PROGRAM(P27) BANK.


 0210   REF  14  LAST  781   43,3717   0 4362 1   UPERROR    TC       FALTON            TURN ON OP. ERROR
 0211   REF   3  LAST  596   43,3720   0 4415 0              TC       UPACTOFF          TURN OFF UPLINK ACT LITE
 0212   REF  34  LAST  941   43,3721   1 5524 0              TCF      ENDEXT            (RESTART GROUP NOT ESTABLISHED YET)

 0213   REF 277  LAST 1481      4772              UP70       EQUALS   ZERO
 0214   REF 166  LAST 1493      4770              UP71       EQUALS   ONE
 0215   REF  73  LAST 1493      4767              UP72       EQUALS   TWO
 0216   REF  54  LAST 1476      6214              UP73       EQUALS   THREE


 0218   REF   1              42,2000                         SETLOC   UPDATE3
 0219                        42,3626                         BANK

 0220   REF   1                                              COUNT*   $$/P27

 0221                        42,3626              UPPART2    EQUALS                     UPDATE PROGRAM - PART 2

 0222   REF 106  LAST 1442   42,3626   0 5402 1              TC       PHASCHNG          SET RESTART GROUP 6 TO RESTORE OLD MODE
 0223                        42,3627    07026 1              OCT      07026             AND DOWNLIST AND EXIT IF RESTART OCCURS
 0224                        42,3630    30000 1              OCT      30000             PRIORITY SAME AS CHRPRIO
 0225   REF  12  LAST  187      0304                         EBANK=   UPBUFF
 0226   REF   2  LAST 1332   42,3631    03706 0              2CADR    UPOUT +1
 0226                        42,3632    56100 0

 0227   REF 167  LAST 1493   42,3633   3 4770 0              CAF      ONE
 0228   REF  10  LAST 1097   42,3634   54 332 1              TS       DNLSTCOD          DOWNLIST

 0229   REF  11  LAST  804   42,3635   0 5344 1              TC       NEWMODEX          SET MAJOR MODE = 27
 0230                        42,3636    00033 1              DEC      27
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L         UPDATE PROGRAM                                                                        USER'S PAGE NO.   5       E3 54

  0231   REF   5  LAST 1493   42,3637  50 302 0            INDEX   UPVERB          BRANCH DEPENDING ON WHETHER THE UPDATE
  0232                        42,3640  1 3641 0            TCF     +1              VERB REQUIRES A FIXED OR VARIABLE NUMBER
  0233                        42,3641  1 3644 0            TCF     +3              V70 FIXED.                (OF COMPONENTS.
  0234   REF   1              42,3642  1 3647 0            TCF     OHWELL1         V71 VARIABLE - GO GET NO. OF COMPONENTS
  0235   REF   2  LAST 1494   42,3643  1 3647 0            TCF     OHWELL1         V72 VARIABLE - GO GET NO. OF COMPONENTS
  0236   REF  74  LAST 1493   42,3644  3 4767 0            CA      TWO             V73 (AND V70) FIXED
  0237   REF   5  LAST  187   42,3645  54 300 0            TS      COMPNUMB        SET NUMBER OF COMPONENTS TO 2
  0238   REF   1              42,3646  1 3672 0            TCF     OHWELL2         GO GET THE TWO UPDATE COMPONENTS

  0239   REF   1              42,3647  3 3744 0  OHWELL1   CAF     ADUPBUFF        * REQUEST USER TO SEND NUMBER   *
  0240   REF 715  LAST 1476   42,3650  54 156 1            TS      MPAC +2         * OF COMPONENTS PARAMETER(II). *
  0241   REF   1              42,3651  3 3746 1    +2      CAF     UPLOADNV        (CK4V32 RETURNS HERE IF V32 ENCOUNTERED)
  0242   REF 219  LAST 1488   42,3652  0 4636 0            TC      BANKCALL        DISPLAY A FLASHING V21N01
  0243   REF  15  LAST  640   42,3653   20576 1            CADR    GOXDSPF         TO REQUEST II.
  0244   REF   1              42,3654  1 3733 1            TCF     UPOUT4          V34 TERMINATE UPDATE(P27) RETURN
  0245   REF   3  LAST 1494   42,3655  1 3651 1            TCF     OHWELL1 +2
  0246   REF   1              42,3656  0 3735 0            TC      CK4V32          DATA OR V32 RETURN
  0247   REF  42  LAST 1477   42,3657  4 4767 1            CS      BIT2
  0248   REF  13  LAST 1493   42,3660  6 0304 0            AD      UPBUFF          IS II(NUMBER OF COMPONENTS PARAMETER)
  0249                        42,3661  0 0006 1            EXTEND                  .GE. 3 AND .LE. 20D.
  0250   REF   4  LAST 1494   42,3662  6 3651 0            BZMF    OHWELL1 +2
  0251   REF  14  LAST 1494   42,3663  4 0304 1            CS      UPBUFF
  0252   REF   1              42,3664  6 4353 0            AD      UP21
  0253                        42,3665  0 0006 1            EXTEND
  0254   REF   5  LAST 1494   42,3666  6 3651 0            BZMF    OHWELL1 +2
  0255   REF  15  LAST 1494   42,3667  30 304 0            CAE     UPBUFF
  0256   REF   6  LAST 1494   42,3670  54 300 0            TS      COMPNUMB        SAVE II IN COMPNUMB


R 0257              UPBUFF LOADING SEQUENCE

  0258   REF   4  LAST 1493   42,3671  24 303 1    -1      INCR    UPCOUNT         INCREMENT COUNT OF COMPONENTS RECEIVED
  0259   REF   1              42,3672  3 3745 1  OHWELL2   CAF     ADUPBFM1        CALCULATE LOCATION(ECADR) IN UPBUFF
  0260   REF   5  LAST 1494   42,3673  6 0303 1            AD      UPCOUNT         WHERE NEXT COMPONENT SHOULD BE STORED.
  0261   REF 716  LAST 1494   42,3674  54 156 1    +2      TS      MPAC +2         PLACE ECADR INTO R3.
  0262   REF   2  LAST 1494   42,3675  3 3746 1    +3      CAF     UPLOADNV        (CK4V32 RETURNS HERE IF V32 ENCOUNTERED)
  0263   REF 220  LAST 1494   42,3676  0 4636 0            TC      BANKCALL        DISPLAY A FLASHING V21N01
  0264   REF  16  LAST 1494   42,3677   20576 1            CADR    GOXDSPF         TO REQUEST DATA.
  0265   REF   2  LAST 1494   42,3700  1 3733 1            TCF     UPOUT4          V34 TERMINATE UPDATE(P27) RETURN.
  0266   REF   2  LAST 1494   42,3701  1 3675 1            TCF     OHWELL2 +3      V33 PROCEED RETURN
  0267   REF   2  LAST 1494   42,3702  0 3735 0            TC      CK4V32          DATA OR V32 RETURN
  0268   REF   6  LAST 1494   42,3703  4 0303 0            CS      UPCOUNT         HAVE WE FINISHED RECEIVING ALL
  0269   REF   7  LAST 1494   42,3704  6 0300 1            AD      COMPNUMB        THE DATA WE EXPECTED.
  0270                        42,3705  0 0006 1            EXTEND
  0271   REF   1              42,3706  6 3710 1            BZMF    UPVERIFY        YES- GO TO VERIFICATION SEQUENCE
  0272   REF   3  LAST 1494   42,3707  1 3671 0            TCF     OHWELL2 -1      NO- REQUEST ADDITIONAL DATA.


R 0273              VERIFY SEQUENCE
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 0274    REF   1                 42,3710  3 3743 1  UPVERIFY CAF      ADUPTEMP            PLACE ECADR WHERE COMPONENT NO. INDEX
 0275    REF 717  LAST 1494      42,3711  54 156 1           TS       MPAC +2             IS TO BE STORED INTO R3.
 0276    REF   1                 42,3712  3 3747 0           CAF      UPVRFYNV            (CK4V32 RETURNS HERE IF V32 ENCOUNTERED)
 0277    REF 221  LAST 1494      42,3713  0 4636 0           TC       BANKCALL            DISPLAY A FLASHING V21N02 TO REQUEST
 0278    REF  17  LAST 1494      42,3714   20576 1           CADR     GOXDSPF             DATA CORRECTION OR VERIFICATION
 0279    REF   3  LAST 1494      42,3715  1 3733 1           TCF      UPOUT4              V34 TERMINATE UPDATE(P27) RETURN
 0280    REF   1                 42,3716  1 3750 1           TCF      UPSTORE             V33 DATA SENT IS GOOD. GO STORE IT
 0281    REF   3  LAST 1494      42,3717  0 3735 0           TC       CK4V32              COMPONENT NO. INDEX OR V32 RETURN
 0282    REF   1                 42,3720  3 0330 1           CA       UPTEMP              DOES THE COMPONENT NO. INDEX JUST SENT
 0283                            42,3721  0 0006 1           EXTEND                       SPECIFY A LEGAL COMPONENT NUMBER?
 0284    REF   2  LAST 1494      42,3722  6 3710 1           BZMF     UPVERIFY            NO, IT IS NOT POSITIVE NONZERO
 0285    REF   2  LAST 1495      42,3723  4 0330 0           CS       UPTEMP
 0286    REF   8  LAST 1494      42,3724  6 0300 1           AD       COMPNUMB
 0287    REF  67  LAST 1477      42,3725  6 4770 0           AD       BIT1
 0288                            42,3726  0 0006 1           EXTEND
 0289    REF   3  LAST 1495      42,3727  6 3710 1           BZMF     UPVERIFY            NO
 0290    REF   2  LAST 1494      42,3730  3 3745 1           CAF      ADUPBFM1            YES- BASED ON THE COMPONENT NO. INDEX
 0291    REF   3  LAST 1495      42,3731  6 0330 1           AD       UPTEMP              CALCULATE THE ECADR OF LOCATION IN
 0292    REF   4  LAST 1494      42,3732  1 3674 0           TCF      DHWELL2 +2          UPBUFF WHICH USER WANTS TO CHANGE

 0293    REF  60  LAST 1493      42,3733  0 4655 0  UPOUT4   TC       POSTJUMP            COMES HERE ON V34 TO TERMINATE UPDATE
 02935   REF   3  LAST 1493      42,3734   57706 1           CADR     UPOUT +1

R0294                   CHECK FOR VERB 32 SEQUENCE

 0295    REF 718  LAST 1495      42,3735  4 0154 0  CK4V32   CS       MPAC                ON DATA RETURN FROM 'GOXDSPF'
 0296    REF  40  LAST 1477      42,3736  7 4763 0           MASK     BIT6                ON DATA RETURN FROM "GOXDSP"& THE CON-
 0297    REF 422  LAST 1492      42,3737  10 000 0           CCS      A                   TENTS OF MPAC = VERB.  SO TEST FOR V32
 0298    REF 329  LAST 1489      42,3740  0 0002 0           TC       Q                   IT'S NOT A V32, IT'S DATA.  PROCEED.
 0299    REF 330  LAST 1495      42,3741  50 002 0           INDEX    Q
 0300                            42,3742  7'7771 0           TC       0 -6                V32 ENCOUNTERED - GO BACK AND GET DATA

 0301    REF   4  LAST 1495      42,3743   00330 1  ADUPTEMP ADRES    UPTEMP              ADDRESS OF TEMP STORAGE FOR CORRECTIONS
 0302    REF  16  LAST 1494      42,3744   00304 0  ADUPBUFF ADRES    UPBUFF              ADDRESS OF UPDATE DATA STORAGE BUFFER
 03025   REF  17  LAST 1495      42,3745   00303 1  ADUPBFM1 ADRES    UPBUFF -1           SAME AS ADUPBUFF BUT LESS ONE
 0303                            42,3746   05201 1  UPLOADNV VN       2101                VERB 21 NOUN 01
 0304                            42,3747   05202 1  UPVRFYNV VN       2102                VERB 21 NOUN 02
 0305    REF   4  LAST 1204         4353            UP21     =        MD1                 DEC 21 = MAX NO OF COMPONENTS +1
 0306    REF  29  LAST 1460         4773            UPDTPHAS EQUALS   FIVE

R0307                   PRE-STORE AND FAN TO APPROPRIATE BRANCH SEQUENCE

 0308                            42,3750            UPSTORE  EQUALS                       GROUND HAS VERIFIED UPDATE. STORE DATA.

 0309                            42,3750  0 0004 0           INHINT

 0310    REF  26  LAST 1488      42,3751  30 103 0           CAE      FLAGWRD7            INVERT VERIFLAG(BIT3 OF FLAGWRD7) TO
 0311    REF 215  LAST 1489      42,3752  56 001 0           XCH      L                   INDICATE TO THE GROUND(VIA DOWNLINK)
 0312    REF   1                 42,3753  3 4766 1           CAF      VERIFBIT            THAT THE V33(WHICH THE GROUND SENT TO
 0313                            42,3754  0 0006 1           EXTEND                       VERIFY THE UPDATE) HAS BEEN SUCCESSFULLY
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0314   REF  17  LAST 1479   42,3755  06 001 0             RXOR    LCHAN        RECEIVED BY THE UPDATE PROGRAM
0315   REF  27  LAST 1495   42,3756  54 103 1             TS      FLAGWRD7

0316   REF 107  LAST 1493   42,3757  0 5402 1             TC      PHASCHNG     SET RESTART GROUP 6 TO REDO THE UPDATE
0317                        42,3760   04026 1             OCT     04026        DATA STORE IF A RESTART OCCURS.
0318                        42,3761  0 0004 0             INHINT               (BECAUSE PHASCHNG DID A RELINT)

0319   REF  75  LAST 1494   42,3762  4 4767 1             CS      TWO          GO TO UPFNDVAC IF INSTALL IS REQUIRED,
0320   REF   6  LAST 1494   42,3763  6 0302 0             AD      UPVERB       THAT IS, IF IT'S A V70 - V72
0321                        42,3764  0 0006 1             EXTEND               GO TO UPEND73 IF IT'S A V73.
0322   REF   1              42,3765  6 3770 1             BZMF    UPFNDVAC

0323   REF  61  LAST 1495   42,3766  0 4655 0             TC      POSTJUMP
0324   REF   1              42,3767   57757 0             CADR    UPEND73

0330   REF   3  LAST 1204   42,3770  3 4346 1  UPFNDVAC   CAF     CHRPRIO      (USE EXTENDED VERB PRIORITY)
0331   REF  39  LAST 1472   42,3771  0 5135 0             TC      FINDVAC      GET VAC AREA FOR 'CALL INTSTALL'
0332   REF  14  LAST 1492   E3,1706                       EBANK=  TEPHEM
0333   REF   1              42,3772   03545 0             2CADR   UPJOB        (NOTE: THIS WILL ALSO SET EBANK FOR
0333   REF   1              42,3773   56103 0
0334   REF 103  LAST 1489   42,3774  0 5205 0             TC      ENDOFJOB     'TEPHEM' UPDATE BY V70)

03345  REF   2  LAST 1331   27,2000                       SETLOC  UPDATE2
03346                       27,3545                       BANK

03347  REF   1                                            COUNT*  $$/P27
0335   REF 245  LAST 1367   27,3545  0 6006 1  UPJOB      TC      INTPRET      THIS COULD BE A STATE VECTOR UPDATE--SO
0336                        27,3546   77624 1             CALL                 WAIT(PUT JOB TO SLEEP) IF ORBIT INT(OI)
0337   REF  31  LAST 1328   27,3547   27516 0                     INTSTALL     IS IN PROGRESS--OR--GRAB OI AND RETURN
A0338                                                                          TO UPWAKE IF OI IS NOT IN PROGRESS.

0339                        27,3550   77776 1  UPWAKE     EXIT

0340   REF 108  LAST 1496   27,3551  0 5402 1             TC      PHASCHNG     RESTART PROTECT(GROUP 6)
0341                        27,3552   04026 1             OCT     04026

0342   REF  76  LAST 1469   27,3553  0 5547 1             TC      UPFLAG       SET INTEGRATION RESTART BIT
0343   REF   6  LAST 1488   27,3554   00230 0             ADRES   REINTFLG
0344                        27,3555  0 0004 0             INHINT
0345                        27,3556            UPPART3    EQUALS

0346   REF   7  LAST 1496   27,3556  50 302 0             INDEX   UPVERB       BRANCH TO THE APPROPRIATE UPDATE VERB
0347                        27,3557  1 3560 0             TCF     +1           ROUTINE TO ACTUALLY PERFORM THE UPDATE
0348   REF   1              27,3560  1 3722 1             TCF     UPEND70      V70
0349   REF   1              27,3561  1 3626 1             TCF     UPEND71      V71
0350   REF   1              27,3562  1 3660 0             TCF     UPEND72      V72

R0351           ROUTINE TO INCREMENT CLOCK(TIME2,TIME1) WITH CONTENTS OF DP WORD AT UPBUFF
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0353                           27,3563  0 0006 1  TIMEDIDL EXTEND
0354    REF   5  LAST 1495     27,3564  22 330 1           QXCH    UPTEMP          SAVE Q FOR RETURN
0355    REF 278  LAST 1493     27,3565  3 4772 1           CAF     ZERO            ZERO AND SAVE TIME2,TIME1
0356                           27,3566  22 007 0           ZL
0357    REF  40  LAST 1444     27,3567  52 025 1           DXCH    TIME2
0358    REF  18  LAST 1495     27,3570  52 327 0           DXCH    UPBUFF +180     STORE IN CASE OF OVERFLOW

0359    REF   1                27,3571  3 4773 0           CAF     UPDTPHAS        OO
0360    REF 216  LAST 1495     27,3572  54 001 1           TS      L               A
0361                           27,3573  4 0000 0           COM                     QUICK
0362    REF   3  LAST  703     27,3574  53'170 1           DXCH    -PHASE6         PHASCHNG

03625   REF   1                01,2330            6P5SPT1  =       6.5SPOT
0363                           27,3575  0 0004 0  TIMEDIDR INHINT

0364    REF 279  LAST 1497     27,3576  3 4772 1           CAF     ZERO
0365                           27,3577  22 007 0           ZL                      PICK UP INCREMENTER(AND ZERO
0366    REF 719  LAST 1495     27,3600  54 156 1           TS      MPAC +2         IT IN CASE OF RESTARTS) AND
0367    REF  19  LAST 1497     27,3601  52 315 1           DXCH    UPBUFF +80      STORE IT
0368    REF 720  LAST 1497     27,3602  52 155 1           DXCH    MPAC            INTO MPAC FOR TPAGREE.

0369                           27,3603  0 0006 1           EXTEND
0370    REF  20  LAST 1497     27,3604  3 0327 1           DCA     UPBUFF +180
0371    REF 721  LAST 1497     27,3605  20 155 1           DAS     MPAC            FORM SUM IN MPAC
0372                           27,3606  0 0006 1           EXTEND
0373    REF   1                27,3607  1 3616 1           BZF     DELTATOK        TEST FOR OVERFLOW
0374    REF 280  LAST 1497     27,3610  3 4772 1           CAF     ZERO
0375    REF  21  LAST 1497     27,3611  52 327 0           DXCH    UPBUFF +180     OVERFLOW, RESTORE OLD VALUE OF CLOCK
0376    REF  41  LAST 1497     27,3612  20 025 1           DAS     TIME2           AND TURN ON OPERATOR ERROR

0377    REF 109  LAST 1496     27,3613  0 5402 1           TC      PHASCHNG        RESTART PROTECT(GROUP 6)
0378                           27,3614   04026 1           OCT     04026

0379    REF   6  LAST 1497     27,3615  0 0330 1           TC      UPTEMP          GO TO ERROR EXIT

0380    REF   7  LAST 1444     27,3616  0 7226 0  DELTATOK TC      TPAGREE         FORCE SIGN AGREEMENT
0381    REF 722  LAST 1497     27,3617  52 155 1           DXCH    MPAC
0382    REF  42  LAST 1497     27,3620  20 025 1           DAS     TIME2           INCREMENT TIME2,TIME1

0383    REF 110  LAST 1497     27,3621  0 5402 1           TC      PHASCHNG        RESTART PROTECT(GROUP 6)
0384                           27,3622   04026 1           OCT     04026

0385                           27,3623  0 0004 0           INHINT
0386    REF   7  LAST 1497     27,3624  50 330 1           INDEX   UPTEMP          (CODED THIS WAY FOR RESTART PROTECTION)
0387                           27,3625  0 0001 0           TC      1               NORMAL RETURN
R0388                 VERB 71 BRANCH

0389    REF  22  LAST 1497     27,3626  30 305 1  UPEND71  CAE     UPBUFF +1       SET EBANK
0390    REF  49  LAST 1469     27,3627  54 003 0           TS      EBANK              AND
0391    REF  17  LAST 1432     27,3630  7 4350 1           MASK    LOW8            CALCULATE
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 0392   REF   8  LAST 1497   27,3631  54 330 0              TS      UPTEMP            S-REG VALUE OF RECEIVING AREA

 0393   REF   7  LAST 1474   27,3632  6 7700 1              AD      NEG3              IN THE PROCESS OF
 0394   REF   9  LAST 1495   27,3633  6 0300 1              AD      COMPNUMB          PERFORMING
 0395                        27,3634  0 0006 1              EXTEND                    THIS UPDATE
 0396   REF   1              27,3635  1 3643 1              BZF     STORLP71          WILL WE
 0397   REF  31  LAST 1434   27,3636  7 4760 0              MASK    BIT9              OVERFLOW
 0398   REF 423  LAST 1495   27,3637  10 000 0              CCS     A                 INTO THE NEXT EBANK....
 0399   REF   1              27,3640  1 3656 0              TCF     UPERROUT          YES

 0400   REF   8  LAST 1498   27,3641  3 7700 1              CA      NEG3              NO- CALCULATE NUMBER OF
 0401   REF  10  LAST 1498   27,3642  6 0300 1              AD      COMPNUMB          WORDS TO BE STORED MINUS ONE
 0402   REF 723  LAST 1497   27,3643  54 154 0   STORLP71   TS      MPAC              SAVE NO. OF WORDS REMAINING MINUS ONE
 0403   REF 424  LAST 1498   27,3644  50 000 1              INDEX   A                 TAKE NEXT UPDATE WORD FROM
 0404   REF  23  LAST 1497   27,3645  3 0306 1              CA      UPBUFF +2         UPBUFF AND
 0405   REF 217  LAST 1497   27,3646  54 001 1              TS      L                 SAVE IT IN L
 0406   REF 724  LAST 1498   27,3647  3 0154 1              CA      MPAC              CALCULATE NEXT
 0407   REF   9  LAST 1498   27,3650  6 0330 1              AD      UPTEMP            RECEIVING ADDRESS
 0408   REF 425  LAST 1498   27,3651  50 000 1              INDEX   A
 0409                        E3,1400                        EBANK=  1400
 0410                        27,3652  23'400 1              LXCH    1400              UPDATE THE REGISTER  BY CONTENTS OF L
 0411   REF  15  LAST 1496   E3,1706                        EBANK=  TEPHEM
 0412   REF 725  LAST 1498   27,3653  10 154 0              CCS     MPAC              ARE THERE ANY WORDS LEFT TO BE STORED
 0413   REF   2  LAST 1498   27,3654  1 3643 1              TCF     STORLP71          YES
 0414   REF   4  LAST 1495   27,3655  1 3705 1              TCF     UPOUT             NO- THEN EXIT UPDATE PROGRAM
 0415   REF  15  LAST 1493   27,3656  0 4362 1   UPERROUT   TC      FALTON            TURN ON OP ERROR, CCS CANT GET HERE
 0416   REF   5  LAST 1498   27,3657  1 3705 1              TCF     UPOUT             NO- EXIT UPDATE(HERE WHEN COMPNUMB = 3)


R0417              VERB 72 BRANCH

 0418   REF  68  LAST 1495   27,3660  3 4770 0   UPEND72    CAF     BIT1              HAVE AN ODD NO. OF COMPONENTS
 0419   REF  11  LAST 1498   27,3661  7 0300 0              MASK    COMPNUMB          BEEN SENT FOR A V72 UPDATE..
 0420   REF 426  LAST 1498   27,3662  10 000 0              CCS     A
 0421                        27,3663  1 3665 0              TCF     +2                YES
 0422   REF   2  LAST 1498   27,3664  1 3656 0              TCF     UPERROUT          ERROR- SHOULD BE ODD NO. OF COMPONENTS
 0423   REF  43  LAST 1494   27,3665  4 4767 1              CS      BIT2
 0424   REF  12  LAST 1498   27,3666  6 0300 1              AD      COMPNUMB
 0425   REF 726  LAST 1498   27,3667  54 154 0   LDLOOP72   TS      MPAC              NOW PERFORM THE UPDATE
 0426   REF 427  LAST 1498   27,3670  50 000 1              INDEX   A
 0427   REF  24  LAST 1498   27,3671  30 305 1              CAE     UPBUFF +1         PICK UP NEXT UPDATE WORD
 0428   REF 428  LAST 1498   27,3672  22 000 1              LXCH    A
 0429   REF 727  LAST 1498   27,3673  10 154 0              CCS     MPAC              SET POINTER TO ECADR(MUST BE CCS)
 0430   REF 728  LAST 1498   27,3674  54 154 0              TS      MPAC
 0431   REF 429  LAST 1498   27,3675  50 000 1              INDEX   A
 0432   REF  25  LAST 1498   27,3676  30 305 1              CAE     UPBUFF +1         PICK UP NEXT ECADR OF REG TO BE UPDATED
 0433   REF  50  LAST 1497   27,3677  54 003 0              TS      EBANK             SET EBANK
 0434   REF  18  LAST 1497   27,3700  7 4350 1              MASK    LOW8              ISOLATE RELATIVE ADDRESS
 0435   REF 430  LAST 1498   27,3701  50 000 1              INDEX   A
 0436                        E3,1400                        EBANK=  1400
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L          UPDATE PROGRAM                                                                  USER'S PAGE NO.  10        E? 54

 0437                               27,3702  23'400 1                LXCH    1400           UPDATE THE REGISTER BY CONTENTS OF L
 0438   REF  16  LAST 1498          E3,1706                          EBANK=  TEPHEM
 0439   REF 729  LAST 1498          27,3703  10 154 0                CCS     MPAC           ARE WE THROUGH THE V72 UPDATE..
 0440   REF   1                     27,3704  1 3667 1                TCF     LOLOOP72       NO


R0441               NORMAL FINISH OF P27

 0442                               27,3705            UPOUT         EQUALS
 0443   REF   1                     27,3705  0 3072 1                TC      INTWAKEU       RELEASE  GRAB  OF ORBITAL INTEGRATION
 0444   REF   5  LAST 1493          27,3706  30 301 0     +1         CAE     UPOLDMOD       RESTORE PRIOR P27 MODE
 0445   REF   4  LAST  429          27,3707  0 5347 1                TC      NEWMODEA
 04453  REF  69  LAST 1498          27,3710  4 4770 1                CS      BIT1
 04455  REF  23  LAST 1493          27,3711  6 1214 1                AD      MODREG
 04457  REF 431  LAST 1498          27,3712  10 000 0                CCS     A
 0446   REF 432  LAST 1499          27,3713  10 000 0                CCS     A
 04463  REF  76  LAST 1496          27,3714  3 4767 0                CAF     TWO
 0447   REF  11  LAST 1493          27,3715  54 332 1                TS      DNLSTCOD
 0448   REF   4  LAST 1493          27,3716  0 4415 0                TC      UPACTOFF       TURN OFF 'UPLINK ACTIVITY' LIGHT

 0449   REF 222  LAST 1495          27,3717  0 4636 0                TC      BANKCALL       KILL GROUP 6
 0450   REF   1                     27,3720    12556 1               CADR    UPKLEAN

 0452   REF  35  LAST 1493          27,3721  0 5524 1                TC      ENDEXT         EXTENDED VERB EXIT


R0453               VERB 70 BRANCH

 0454                               27,3722  0 0006 1  UPEND70       EXTEND                 V70 DOES THE FOLLOWING WITH DP DELTA
 0455   REF  26  LAST 1498          27,3723  4 0305 0                DCS     UPBUFF         TIME IN UPBUFF
 0456   REF  27  LAST 1499          27,3724  52 315 1                DXCH    UPBUFF +8D
 0457   REF   1                     27,3725  0 3563 1                TC      TIMEDIDL       DECREMENT AGC CLOCK

 0458   REF   3  LAST 1498          27,3726  0 3656 1                TC      UPERROUT       ERROR WHILE DECREMENTING CLOCK -- EXIT

 0459   REF  17  LAST 1499          E3,1706                          EBANK=  TEPHEM
 0460                               27,3727  0 0006 1                EXTEND
 0461   REF  28  LAST 1499          27,3730  4 0305 0                DCS     UPBUFF         COPY DECREMENTERS FOR
 0462   REF  29  LAST 1499          27,3731  52 317 0                DXCH    UPBUFF +10D    RESTART PROTECTION
 0463                               27,3732  0 0006 1                EXTEND
 0464   REF  30  LAST 1499          27,3733  4 0305 0                DCS     UPBUFF
 0465   REF  31  LAST 1499          27,3734  52 321 0                DXCH    UPBUFF +12D

 0466   REF 111  LAST 1497          27,3735  0 5402 1                TC      PHASCHNG       RESTART PROTECT(GROUP 6)
 0467                               27,3736   04026 1                OCT     04026

 0468   REF 281  LAST 1497          27,3737  3 4772 1                CAF     ZERO
 0469                               27,3740  22 007 0                ZL
 0470   REF  32  LAST 1499          27,3741  52 317 0                DXCH    UPBUFF +10D    DECREMENT CSM STATE VECTOR TIME
 0471   REF   3  LAST  228          27,3742  21'571 1                DAS     TETCSM
```

```
L          UPDATE PROGRAM                                                             USER'S PAGE NO.  11      E3 54

 0472   REF 282  LAST 1499   27,3743  3 4772 1            CAF     ZERO
 0473                        27,3744  22 0007 0           ZL
 0474   REF  33  LAST 1499   27,3745  52 321 0            DXCH    UPBUFF +120       DECREMENT LEM STATE VECTOR TIME
 0475   REF   3  LAST   90   27,3746  21'643 0            DAS     TETLEM

 0476   REF 283  LAST 1500   27,3747  3 4772 1            CAF     ZERO
 0477                        27,3750  22 007 0            ZL
 0478   REF  34  LAST 1500   27,3751  52 305 0            DXCH    UPBUFF
 0479   REF  18  LAST 1499   27,3752  21'710 1            DAS     TEPHEM +1         INCREMENT TP TEPHEM
 0480   REF  19  LAST 1500   27,3753  27'706 0            ADS     TEPHEM

 0481   REF 112  LAST 1499   27,3754  0 5402 1            TC      PHASCHNG          RESTART PROTECT(GROUP 6)
 0482                        27,3755   04026 1            OCT     04026

 0483   REF  35  LAST 1500      0304                      EBANK=  UPBUFF

 0484   REF   6  LAST 1498   27,3756  0 3705 0            TC      UPOUT             GO TO STANDARD UPDATE PROGRAM EXIT


R04841              VERB 73 BRANCH

 04842                       27,3757  0 0006 1  UPEND73   EXTEND
 04843  REF  36  LAST 1500   27,3760  3 0305 1            DCA     UPBUFF
 04844  REF  37  LAST 1500   27,3761  52 315 1            DXCH    UPBUFF +80
 04845  REF   2  LAST 1499   27,3762  0 3563 1            TC      TIMEDIDL
 04846  REF  16  LAST 1498   27,3763  0 4362 1            TC      FALTON
 04847  REF   7  LAST 1500   27,3764  0 3706 0            TC      UPOUT +1

R0485               ERROR SEQUENCE

 0500   REF  14  LAST 1401   30,2000                      SBANK=  LOWSUPER
```

```
L       RTB OP CODES                                                                            USER'S PAGE NO.  1      E0 S?

 0002   REF    1                 24,2000                          SETLOC RTBCODE1
 0003                            24,3751                          BANK

 0004   REF   14  LAST 1358      E5,1713                          EBANK= XNB
 0005   REF    1                                                  COUNT* $$/RTB

R0006             LOAD TIME2, TIME1 INTO MPAC:

 0007                            24,3751   0 0006 1   LOADTIME EXTEND
 0008   REF   43  LAST 1497      24,3752   3 0025 0            DCA     TIME2
 0009   REF    2  LAST 1125      24,3753   1 6024 0            TCF     SLOAD2

R0010             CONVERT THE SINGLE PRECISION 2'S COMPLEMENT NUMBER ARRIVING IN MPAC (SCALED IN HALF-REVOLUTIONS) TO A
R0012   DP 1'S COMPLEMENT NUMBER SCALED IN REVOLUTIONS.

 0016   REF  730  LAST 1499      24,3754  10 154 0    CDULOGIC CCS     MPAC
 0017   REF  284  LAST 1500      24,3755   3 4772 1            CAF     ZERO
 0018                            24,3756   1 3761 0            TCF     +3
 0019                            24,3757  13 760 1             NOOP
 0020   REF   27  LAST 1207      24,3760   4 4753 0            CS      HALF

 0021   REF  731  LAST 1501      24,3761  54 155 1             TS      MPAC +1
 0022   REF  285  LAST 1501      24,3762   3 4772 1            CAF     ZERO
 0023   REF  732  LAST 1501      24,3763  56 154 1             XCH     MPAC
 0024                            24,3764   0 0006 1            EXTEND
 0025   REF   28  LAST 1501      24,3765   7 4753 0            MP      HALF
 0026   REF  733  LAST 1501      24,3766  20 155 1             DAS     MPAC
 0027   REF   69  LAST 1385      24,3767   1 6030 0            TCF     DANZIG                  MODE IS ALREADY AT DOUBLE-PRECISION

 0028   REF    1                 22,2000                          SETLOC RTBCODES
 0029                            22,3621                          BANK

 0030   REF    1                                                  COUNT* $$/RTB
R0040             READ THE PIPS INTO MPAC WITHOUT CHANGING THEM:

 0041                            22,3621   0 0004 0   READPIPS INHINT
 0042   REF   11  LAST 1426      22,3622   3 0037 0            CA      PIPAX
 0043   REF  734  LAST 1501      22,3623  54 154 0             TS      MPAC
 0044   REF    6  LAST 1426      22,3624   3 0040 0            CA      PIPAY
 0045   REF  735  LAST 1501      22,3625  54 157 0             TS      MPAC +3
 0046   REF    8  LAST 1426      22,3626   3 0041 1            CA      PIPAZ
 0047                            22,3627   0 0003 1            RELINT
 0048   REF  736  LAST 1501      22,3630  54 161 0             TS      MPAC +5

 0049   REF  286  LAST 1501      22,3631   3 4772 1            CAF     ZERO
 0050   REF  737  LAST 1501      22,3632  54 155 1             TS      MPAC +1
 0051   REF  738  LAST 1501      22,3633  54 160 1             TS      MPAC +4
 0052   REF  739  LAST 1501      22,3634  54 162 0             TS      MPAC +6

 0053   REF    3  LAST 1182      22,3635   1 6470 0   VECMODE  TCF     VMODE
```

```
R0054              FORCE TP SIGN AGREEMENT IN MPAC:

 0055   REF   8  LAST 1497   22,3636  0 7226 0  SGNAGREE TC      TPAGREE
 0056   REF  70  LAST 1501   22,3637  1 6030 0           TCF     DANZIG

R0057              CONVERT THE DP 1'S COMPLEMENT ANGLE SCALED IN REVOLUTIONS TO A SINGLE PRECISION 2'S COMPLEMENT ANGLE
R0059   SCALED IN HALF-REVOLUTIONS.

 0060   REF   1              22,3640  0 3661 0  1STO2S   TC      1TO2SUB
 0061   REF 287  LAST 1501   22,3641  3 4772 1           CAF     ZERO
 0062   REF 740  LAST 1501   22,3642  54 155 1           TS      MPAC +1
 0063   REF   5  LAST 1152   22,3643  1 6027 0           TCF     NEWMODE

R0064              DO 1STO2S ON A VECTOR OF ANGLES:

 0065   REF   2  LAST 1502   22,3644  0 3661 0  V1STO2S  TC      1TO2SUB          ANSWER ARRIVES IN A AND MPAC.

 0066   REF 741  LAST 1502   22,3645  52 162 0           DXCH    MPAC +5
 0067   REF 742  LAST 1502   22,3646  52 155 1           DXCH    MPAC
 0068   REF   3  LAST 1502   22,3647  0 3661 0           TC      1TO2SUB
 0069   REF 743  LAST 1502   22,3650  54 156 1           TS      MPAC +2

 0070   REF 744  LAST 1502   22,3651  52 160 1           DXCH    MPAC +3
 0071   REF 745  LAST 1502   22,3652  52 155 1           DXCH    MPAC
 0072   REF   4  LAST 1502   22,3653  0 3661 0           TC      1TO2SUB
 0073   REF 746  LAST 1502   22,3654  54 155 1           TS      MPAC +1

 0074   REF 747  LAST 1502   22,3655  3 0161 1           CA      MPAC +5
 0075   REF 748  LAST 1502   22,3656  54 154 0           TS      MPAC

 0076   REF 168  LAST 1493   22,3657  3 4770 0  TPMODE   CAF     ONE              MODE IS TP.
 0077   REF   6  LAST 1502   22,3660  1 6027 0           TCF     NEWMODE

R0086              SUBROUTINE TO DO DOUBLING AND 1'S TO 2'S CONVERSION:

 0087   REF 749  LAST 1502   22,3661  52 155 1  1TO2SUB  DXCH    MPAC             FINAL MPAC +1 UNSPECIFIED.
 0088                        22,3662  20 001 1           DDOUBL
 0089   REF 433  LAST 1499   22,3663  10 000 0           CCS     A
 0090   REF 169  LAST 1502   22,3664  6 4770 0           AD      ONE
 0091                        22,3665  1 3667 1           TCF     +2
 0092                        22,3666  4 0000 0           COM                      THIS WAS REVERSE OF MSU.

 0093   REF 750  LAST 1502   22,3667  54 154 0           TS      MPAC             AND SKIP ON OVERFLOW.
 0094   REF 331  LAST 1495   22,3670  0 0002 0           TC      Q

 0095   REF 434  LAST 1502   22,3671  50 000 1           INDEX   A                OVERFLOW UNCORRECT AND IN MSU.
 0096   REF   8  LAST 1207   22,3672  3 4751 0           CAF     LIMITS
 0097   REF 751  LAST 1502   22,3673  26 154 0           ADS     MPAC
 0098   REF 332  LAST 1502   22,3674  0 0002 0           TC      Q
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L        RTB OP CODES                                                                         USER'S PAGE NO.   3      E5 S3

R0114             THE FOLLOWING ROUTINE INCREMENTS IN 2S COMPLEMENT THE REGISTER WHOSE ADDRESS IS IN BUF BY THE 1S COMPL
R0116    QUANTITY FOUND IN TEM2. THIS MAY BE USED TO INCREMENT DESIRED IMU AND OPTICS CDU ANGLES OR ANY OTHER 2S COMPL
R0118    (+0 UNEQUAL TO -0) QUANTITY. MAY BE CALLED BY BANKCALL/SWCALL.

 0119    REF   5  LAST 1365    22,3675  54 142 1   CDUINC       TS       TEM2             1S COMPL.QUANT. ARRIVES IN ACC  STORE IT
 0120    REF 126  LAST 1369    22,3676  50 130 0                INDEX    BUF
 0121                          22,3677  10 000 0                CCS      0                CHANGE 2S COMPL. ANGLE(IN BUF)INTO 1S
 0122    REF 170  LAST 1502    22,3700  6 4770 0                AD       ONE
 0123                          22,3701  1 3705 1                TCF      +4
 0124    REF 171  LAST 1503    22,3702  6 4770 0                AD       ONE
 0125    REF 172  LAST 1503    22,3703  6 4770 0                AD       ONE              OVERFLOW HERE IF 2S COMPL. IS 180 DEG.
 0126                          22,3704  4 0000 0                COM

 0127    REF   6  LAST 1503    22,3705  6 0142 0                AD       TEM2             SULT MOVES FROM 2ND TO 3D QUAD.(OR BACK)
 0129    REF 435  LAST 1502    22,3706  10 000 0                CCS      A                BACK TO 2S COMPL.
 0130    REF 173  LAST 1503    22,3707  6 4770 0                AD       ONE
 0131                          22,3710  1 3712 1                TCF      +2
 0132                          22,3711  4 0000 0                COM
 0133    REF   7  LAST 1503    22,3712  54 142 1                TS       TEM2             STORE 14BIT QUANTITY WITH PRESENT SIGN
 0134                          22,3713  1 3717 1                TCF      +4
 0135    REF 436  LAST 1503    22,3714  50 000 1                INDEX    A                 SIGN.
 0137    REF   9  LAST 1502    22,3715  3 4751 0                CAF      LIMITS           FIX IT,BY ADDING IN 37777 OR 40000
 0138    REF   8  LAST 1503    22,3716  6 0142 0                AD       TEM2

 0139    REF 127  LAST 1503    22,3717  50 130 0                INDEX    BUF
 0140                          22,3720  54 000 0                TS       0                STORE NEW ANGLE IN 2S COMPLEMENT
 0141    REF 333  LAST 1502    22,3721  0 0002 0                TC       Q
```

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L       RTB OP CODES                                                          USER'S PAGE NO.  4      E5 33

P0142           RTB TO TORQUE GYROS, EXCEPT FOR THE CALL TO IMUSTALL. ECADR OF COMMANDS ARRIVES IN X1.

 0144   REF  38  LAST 1325   22,3722  50 120 1  PULSEIMU INDEX  FIXLOC         ADDRESS OF GYRO COMMANDS SHOULD BE IN X1
 0145   REF  88  LAST 1374   22,3723  3 0046 0           CA     X1
 0146   REF 223  LAST 1499   22,3724  0 4636 0           TC     BANKCALL
 0147   REF   7  LAST  755   22,3725   17244 0           CADR   IMUPULSE
 0148   REF  71  LAST 1502   22,3726  1 6030 0           TCF    DANZIG
```

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L        RTB OP CODES                                                                   USER'S PAGE NO.   5       E5 S3

P0149    EACH ROUTINE TAKES A 3X3 MATRIX STORED IN DOUBLE PRECISION IN A FIXED AREA OF ERASABLE MEMORY AND REPLACES IT
R0151    WITH THE TRANSPOSE MATRIX. TRANSP1 USES LOCATIONS XNB+0,+1 THROUGH XNB+16D, 17D AND TRANSP2 USES LOCATIONS
R0153    XNB1+0,+1 THROUGH XNB1+16D, 17D. EACH MATRIX IS STORED BY ROWS.

 0154    REF  15  LAST 1501    22,3727    02713 0  XNBEB      ECADR   XNB
 0155    REF   5  LAST  299    22,3730    02554 1  XNB1EB     ECADR   XNB1

 0156    REF  16  LAST 1505    E5,1713                        EBANK=  XNB

 0164    REF   1               22,3731   3 3727 0  TRANSP1    CAF     XNBEB
 0165    REF  51  LAST 1498    22,3732   54 0003 0            TS      EBANK
 0166    REF  17  LAST 1505    22,3733   53'716 1             DXCH    XNB +2
 0167    REF  18  LAST 1505    22,3734   53'722 0             DXCH    XNB +6
 0168    REF  19  LAST 1505    22,3735   53'716 1             DXCH    XNB +2

 0169    REF  20  LAST 1505    22,3736   53'720 1             DXCH    XNB +4
 0170    REF  21  LAST 1505    22,3737   53'730 0             DXCH    XNB +12D
 0171    REF  22  LAST 1505    22,3740   53'720 1             DXCH    XNB +4

 0172    REF  23  LAST 1505    22,3741   53'726 1             DXCH    XNB +10D
 0173    REF  24  LAST 1505    22,3742   53'732 1             DXCH    XNB +14D
 0174    REF  25  LAST 1505    22,3743   53'726 1             DXCH    XNB +10D
 0175    REF  72  LAST 1504    22,3744   1 6030 0             TCF     DANZIG


 0176    REF   6  LAST 1505    E5,1554                        EBANK=  XNB1

 0177    REF   1               22,3745   3 3730 0  TRANSP2    CAF     XNB1EB
 0178    REF  52  LAST 1505    22,3746   54 0003 0            TS      EBANK
 0180    REF   7  LAST 1505    22,3747   53'557 0             DXCH    XNB1 +2
 0181    REF   8  LAST 1505    22,3750   53'563 1             DXCH    XNB1 +6
 0182    REF   9  LAST 1505    22,3751   53'557 0             DXCH    XNB1 +2

 0183    REF  10  LAST 1505    22,3752   53'561 0             DXCH    XNB1 +4
 0184    REF  11  LAST 1505    22,3753   53'571 1             DXCH    XNB1 +12D
 0185    REF  12  LAST 1505    22,3754   53'561 0             DXCH    XNB1 +4

 0186    REF  13  LAST 1505    22,3755   53'567 0             DXCH    XNB1 +10D
 0187    REF  14  LAST 1505    22,3756   53'573 0             DXCH    XNB1 +14D
 0188    REF  15  LAST 1505    22,3757   53'567 0             DXCH    XNB1 +10D
 0191    REF  73  LAST 1505    22,3760   1 6030 0             TCF     DANZIG
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L       RTB OP CODES                                                                    USER'S PAGE NO.   6      E5 S3

R0192             THE SUBROUTINE  SIGNMPAC  SETS C(MPAC, MPAC +1) TO SIGN(MPAC)
R0193   FOR THIS, ONLY THE CONTENTS OF MPAC ARE EXAMINED.    ALSO +0 YIELDS POSMAX AND -0 YIELDS NEGMAX.

R0195   ENTRY MAY BE BY EITHER OF THE FOLLOWING:

R0196   1.        LIMIT THE SIZE OF MPAC ON INTERPRETIVE OVERFLOW:
R0197   ENTRY:              BOVB
R0198                               SIGNMPAC

R0199   2.        GENERATE IN MPAC THE SIGNUM FUNCTION OF MPAC:
R0200   ENTRY:              RTB
R0201                               SIGNMPAC

R0202   IN EITHER CASE, RETURN IS TO  THE NEXT INTERPRETIVE INSTRUCTION IN THE CALLING SEQUENCE.

 0204                             22,3761  0 0006 1  SIGNMPAC EXTEND
 0205   REF   3  LAST  420        22,3762  3 4750 1           DCA     DPOSMAX
 0206   REF 752  LAST 1502        22,3763  52 155 1           DXCH    MPAC
 0207   REF 437  LAST 1503        22,3764  10 000 0           CCS     A
 0208   REF 288  LAST 1502        22,3765  3 4772 1  DPMODE   CAF     ZERO                 SETS MPAC +2 TO ZERO IN THE PROCESS
 0209   REF   3  LAST 1501        22,3766  1 6026 1           TCF     SLOAD2 +2
 0210                             22,3767  1 3770 0           TCF     +1
 0211                             22,3770  0 0006 1           EXTEND
 0212   REF   4  LAST 1506        22,3771  4 4750 0           DCS     DPOSMAX
 0213   REF   4  LAST 1506        22,3772  1 6024 0           TCF     SLOAD2


*** END OF ZEUS    .046 ***
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL       DEF   H      REFERENCES    SYMBOL       DEF   H      REFERENCES    SYMBOL       DEF   H      REFERENCES

.05G      26,3241    888   1  857      -MUDT(M)  37,3370    841               =-.1SEC   17,3275   1052   3 1049 1052
.05GBIT      4766 =   59   1 1074      -OCT10       6171   1114   3  638 1114 =-2          7701 = 1048   4 1043 1056
.05GSW       0146 =   59   6  793  877 -ON       40,2330    331   3  330  368 =-4          6061 = 1048   2 1043 1044
.166...   23,3526   1362   2  603 1358 -PHASE1      1155     81   6  196 1409 =14MS     17,3302   1052   7 1038 1052
.3D       11,3750   1352   1 1323      -PHASE2      1157     81   4  196  214 ======================================
.5SEC        5011   1201  10  139 1442 -PHASE3      1161     81   3  196  536 A            0000 =   40 437  144 1506
.5SECDP   14,3272    761   1  758      -PHASE4      1163     81   3  196  703 A-PCHK    13,3252   1320   4 1317 1330
====================================== -PHASE5      1165     81   4  197  829 ABCLOAD   41,2611    353   1  337
+DECSGN   40,2203    329   1  328      -PHASE6      1167     81   3  197 1497 ABLOAD    41,2716    354   1  337
+DOWN     00,2607   1168   1 1167      -ROLL1       4355 =  996   1  994      ABORT        7706 = 1489
+LIMIT    42,3246    350   1  350      -ROLL2    16,3765    996   1  993      ABORT2       5735   1488
+MGA      E7,1625 =  126   8  126  645 -SLOPE    16,3757    996   3  988  990 ABS       00,3225   1181   2 1180
+ON       40,2310    330   3  330  368 -T-3      15,3374   1092   1 1087      ABTCONIC  12,3760   1304   3 1289 1302
+ROLL1       4773 =  996   1  993      -TORQUE   16,3722    993   1  993      ABVAL     00,3200   1180
+ROLL2       5014 =  996   1  993      -TPER     E4,1736 =   95   7   95  525 ABVALABS  00,3175   1180   1 1119
+TORQUE   16,3701    993   1  993      -UP       00,2617   1168   1 1167      ACADN83   24,3551    714   1  740
+2ACTDEG  20,2462    720   2  719      -VDISET      4261    381  10  335  381 ACADN85   24,3555    714   2  712  738
====================================== -VM/360K  15,3400   1092   2 1084 1092 ACBD2Y    17,3377   1055   1 1055
*NBSM*    23,3647   1367   1  508      -VMT/180  15,3400 = 1092   1 1084      ACBD2Z    17,3442   1056   1 1055
*SMNB*    23,3633   1367   5  298  940 -VREL     E7,1525 =  122   3  122  890 ACCEPTUP  07,3701   1445   2 1446
====================================== -VT/180   E6,1613 =  116  13  116 1085 ACCEPTWD  41,2025    334   3  334
-AYO      E3,1711 =   90   2  634 1250 -VT/180E  E6,1570 =  117   1 1083      ACCFINHT     4770 =   85   3  164 1426
-BIT10    06,3000    168   1  164      -1/KB2    26,3213    888   1  874      ACCOMP    11,2456   1336   1 1344
-BIT14       4751 = 1203   2  720  951 -1/12     13,3757   1353   1 1343      ACCWD     E5,1522 =  103   2  441
-CCSPR    01,3123   1218   1 1219      -1/2+2    00,2443   1164   1 1184      ACORBD    E6,1630 =  113   5  113 1056
-CDUT+1   20,3745   1069   1 1068      -1/8         7674   1203   2  393 1100 ACOS=0    00,3634   1189   4 1189 1191
-COMMAX   07,3663   1439   2 1421 1422 -1CHK     43,3225   1395   5 1396 1401 ACOSABRT  00,3720   1191
-COMMAX-  07,3664   1439   2 1421 1422 -15DEGS   06,3557 =  156   1  155      ACOSOVF   00,3716   1191   1 1189
-DELAIG   E6,1676 =  115   5  115 1071 -2SEC     10,3774   1487   1 1473      ACOSSHR   00,3711   1191   1 1189
-DELAMG   E6,1677 =  115   4  115 1071 -4ACTDEG  20,2461    720   1  719      ACOSST    00,3622   1189   1 1189
-DELAOG   E6,1675 =  115   3  115 1071 -50SC     15,3425   1288   1 1277      ACOSST2   00,3637   1189   2 1189
-DTSCALR  04,3302    592   1  592      -6.05DEG  26,3015    814   1  813      ACOSZERO  00,3724   1191   1 1189
-ELR      05,3246    205   2  202      -70DEGS   06,2516    156   1  155      ACOS3     00,3647   1190   1 1191
-ENDERAS     7676   1203   1 1111      -75DEGS   21,2641   1014   1 1015      ACRBDZ    17,3017   1043   2 1043
-ENDVAC      6220   1115   2 1111 1129 ====================================== ACRJETS   17,3136   1047   2 1042 1055
-ERTHRAT  34,2300    541   1  539      /BUF+     00,2720   1172   2 1171      ACROLL    17,2747   1042
-FOURDT   16,2524    731   1  726      /BUF-     00,2714   1171   2 1171      ACTCENT   E5,1632 =   97   3   98  479
-GYROMIN  07,3437   1431   2 1431 1434 /MPAC+    00,2766   1173   2 1173      ACTIVE    22,3304    500   4  476  677
-HSCALED  26,3317    889   1  859      /MPAC-    00,2762   1173   2 1173      ACTLIM    20,3261    974   2  967  971
-KSCALE   26,3321    889   1  859      /NORM     00,2731   1172   1 1172      ACTSAT    20,3614    981   2  975
-KVSCALE  37,3677    896   1  890      /NORM2    00,2724   1172   1 1172      ACYCHECK  17,3055   1044
-MAXADRS     4344 = 1394   1 1399      ====================================== ACYJETS   17,3152   1048   2 1044 1055
-MAXDELV  37,3152    835   1  832      =.24      21,2634   1013   1 1012      AC2Y      17,3415   1055   2 1055
-MAXSRT   07,2626    764   4  764      =+.1SEC   17,3277   1052   5 1049 1056 ADB       E6,1655 =  114  12  114 1030
-MUDT(E)  37,3366    841   1  841      =+14MS    21,3075   1018   1 1014      ADBVEL    E6,1523 =  112   4 1029 1032

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED          = DEFINED BY EQUALS             J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED      CD DEFINITION ASSOCIATED WITH CONFLICT          XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF

SYMBOL        DEF  H      REFERENCES     SYMBOL        DEF  H      REFERENCES     SYMBOL        DEF  H      REFERENCES

ADDINDRF  33,3042    445   1  445      AIG       E6,1662 =  115   3  115 1063 ALT          0752 =   77   9   77 1239
ADDRESS      6052   1110               AIG/PIP   E6,1670 =  115   1  115      ALTCALC   22,2123    404   1  404
ADDRWD       0116     70  79 1108 1369 AINLA     E5,1444    102  53  102  103 ALTI      E7,1736 =  124   3  124  548
ADDTEN    20,2303    461   1  460      AK        E6,1476    107  21  117 1022 ALTIM     E5,1540 =  103   3  438
ADENDEXT  25,3031    871   1  869      AKLOAD    34,2474    546   1  546      ALTIMS    E5,1541 =  103   2  438  440
ADERCOMP  33,3127    447               AK1       E6,1477    107  12  135 1074 ALTVAR       1347     86   1  584
ADIAX     E3,1463     89   1  310      AK2       E6,1500    107  13  135 1078 ALWAYSG   33,2764    445   2  439  445
ADIAY     E3,1464     89   1  310      ALARM        5671   1486  38  150 1426 ALXXXZ    33,2702    443   1  435
ADIAZ     E3,1465     89   1  311      ALARM/TB  05,3270    671   1  661      ALXIS     E5,1454 =  102   4  435  443
ADOT      E6,1533 =  112  11  112 1029 ALARM2       5673   1486   2  788 1394 AM        E6,1764 =  118   4  118  416
ADOTLOOP  21,2316   1004   1 1004      ALCGKK    33,2444    440               AMBGUPDT  22,3560   1036   2 1004 1013
ADOT1     E6,1535 =  112   2  112  136 ALOK      E5,1542 =  103   3  440  441 AMG       E6,1663 =  115   6  115 1071
ADOT2     E6,1537 =  112   1  112      ALFA/PIP  E6,1673 =  115   2  115  895 AMG/PIP   E6,1671 =  115   2  115  828
ADRPCHN2     5414   1407   1 1407      ALFA/180  E6,1665 =  115  10  115 1073 AMGB1     E6,1640 =  113   5  113 1036
ADRS+1    43,3557   1400               ALFACOM   E6,1603 =  116   4  116 1074 AMGB4     E6,1641 =  113   5  114 1036
ADRSCHK   43,3526   1399   2 1399      ALFAPAD   E6,1411    106   2  796  822 AMGB5     E6,1642 =  114   5  114 1036
ADRS1     43,3176   1394   1  273      ALFDK     E4,1422 =   96   2   96  440 AMGB7     E6,1643 =  114   5  114 1037
ADSRAX    E3,1466     89   1  310      ALFLT     33,2406    439   1  438      AMGB8     E6,1644 =  114   5  114 1036
ADSRAY    E3,1467     89   1  310      ALFLT1    33,2412    439   1  235      AMOONBIT     4767 =   48
ADSRAZ    E3,1470     89   1  310      ALFLT3    33,2461    440   1  440      AMOONFLG     0015 =   48   6  521 1329
ADSUM     43,3515   1399   2 1399      ALILP     33,2504    440   1  440      AMOVED    11,3606   1349   1 1348
ADTIME    35,2523    476   1  476      ALINTIME  43,2312    258   1  249      ANDOUT    13,3263   1320   2 1320
ADUPBFM1  42,3745   1495   2 1494 1495 ALK       E5,1456 =  102   9  102  446 ANEXIT    E4,1756 =   95   2  685
ADUPBUFF  42,3744   1495   1 1494      ALKCG     33,2447    440               ANGLTIME  22,3011    416   1  416
ADUPTEMP  42,3743   1495   1 1495      ALKCG2    33,2452    440   1  440      ANGOVCOR  15,2151   1065   5 1073 1089
ADVAN     01,3177   1220   2 1215 1395 ALKLP     33,2513    440   1  441      ANGX      E5,1510 =  102   2  441  442
ADVANCE   37,2560    683   3  220  667 ALLOC/OC  41,3011    356   2  353  355 ANGY      E5,1506 =  102   1  442
ADVTKBIT     4757 =   62               ALLOOP    33,2350    438   1  437      ANGZ      E5,1502 =  102   1  442
ADVTRACK  26,2040    783   1  759      ALLOOP1   33,2356    438   1  235      ANNNNNN   33,3157    447   1  436
ADVTRK       0175 =   62   3  564  759 ALLOOP3   33,2352    438               AOG       E6,1661 =  115  35  115 1077
AD14MSP   17,3203   1049   1 1049      ALLSET    35,2761    483   1  483      AOG/PIP   E6,1667 =  115   3  115  890
AD14MSR   17,3323   1052   1 1052      ALM/END   43,2116    251  21  249  276 AOPOLD       0363     75   4  757  763
AD14MSY   17,3247   1051   1 1051      ALMCADR      1363 =   87  13   87 1489 AOPTIME   E4,1746 =   95  16   95  784
AEARTH    31,3476    639   1  635      ALMCYCLE     4173    372  14  335  373 APOPERI   22,2000 =   30   1  498
AERR      E6,1517 =  112   6  112 1032 ALMXIT    04,3411    661   2  682      APSESBIT     4764 =   63
AERRVEL   E6,1522 =  112   8  112 1031 ALMXITA   04,3407    661   1  678      APSESW       0202 =   63   2 1301 1302
AFAILP    17,2643   1039   1 1039      ALOAD     41,2741    355   1  336      APSIDES   12,3717   1303   1  498
AFTERERN  04,2724    219   8  217  219 ALOADED   11,2320   1320   2 1319 1320 ARATE     22,3001    416   3  416
AGAIN     30,3650    716   2  723      ALP       E7,1703 =  123   7  123  873 ARCCOS    00,3607   1189   1 1119
AGAINMM   04,2133    210   1  210      ALPHA        0010 = 1306   4 1277 1279 ARCSIN    00,3605   1189   1 1119
AGEOFW    E7,1735 =  130   4  284  587 ALPHAM    E4,1700 =   93  14   93 1342 ARCTAN    13,2614   1240   2 1237
AGIN,MON  26,2254    793   1  794      ALPHAV    E4,1551 =   93  46   93 1351 ARCTANXX  13,2642   1240   2 1240
AHEAD5       6402   1122   1 1122      ALRM15       4776 =  748   2  567  750 ARCTRIG   23,3311   1356  12  299 1359
AHFNOROT  21,3272   1024   1 1016      ALSIGNAG     7500   1148   4 1171 1174 ARG+         7234   1142   1 1142
AHOOKDV   E7,1657 =  122   4  123  873 ALSK      33,3432    452   1  441      ARGHI     00,3415   1185   2 1186

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED          = DEFINED BY EQUALS              J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF

SYMBOL      DEF    H       REFERENCES      SYMBOL      DEF    H       REFERENCES      SYMBOL      DEF    H       REFERENCES

ARGLO     00,3465   1186    1 1186      ATTDISP2  34,2413    545    1  545      AVGEXIT      1061 =   79    3  539  833
ARGZERO      7254   1142    1 1142      ATTHOLD   21,3334   1026    3 1024 1027 AVOUTCAD  37,2766    830    1  830
ARGZERO2     7251   1142    1 1142      ATTINIT   17,2270    945    1  945      AX*SR*T   23,3651   1368    1 1367
ARG90        5115   1207    1 1207      ATTKALMN  E6,1617 =  113   10  113 1039 AXC       01,2346   1192    1 1118
AROUT1SF  40,2570    347    1  345      ATTLIM    17,2526    949    2  945      AXISGEN   23,3432   1360    3  451  776
ARTHINSF  40,2743    360    1  359      ATTRATES  15,2314   1073    1 1072      AXISGEN1  23,3440   1360    1 1360
ARTINISF  40,2756    360    1  359      ATTSEC    E6,1560 =  113    3  113 1004 AXISGEN2  23,3467   1360    1 1361
ARTOUTSF  40,2563    347    1  345      AUGEKUGL  32,2105    648    2  647  910 AXISGEN3  23,3512   1361    1 1361
ARUPT        0010 =   40   10  139 1232 AUG2      07,3531   1433    1 1433      AXO       E3,1713 =   90    2  634 1250
ASCALE    13,3731   1352    1 1338      AUG3      07,3510   1432    1 1433      AXT       01,2341   1192    1 1118
ASET      34,3560    597    4  596  600 AUTOCHK      4112    206    2  206  554 AZIMANGL     1352     86    5  216  604
ASINEX    00,3704   1190    1 1189      AUTOCHK1     4116    206    1  555      AZIMBIT      4761 =   67    4  215  599
ASKEP     E7,1730 =  123    2  867  868 AUTOCK    34,3545    597    1  596      AZIMFLAG     0254 =   67    6  216  626
ASKIPNRM  10,2774   1463    1 1463      AUTOCONT  21,3304   1024                AZIMUTH   E5,1400    102    4  427  544
ASMBLWP   17,3346   1054    2 1049 1050 AUTOSEQ      0236 =   66   18  206 1488 AZMTHCG1  43,3132    452    2  233  259
ASMBLWR   17,3366   1055    2 1052      AUTOSET   04,2507    216   15  215  219 AZO       26,3652   1251    1 1249
ASMBLWY   17,3512   1057    2 1051      AUTOSETA  04,2432    215    1  219      A0           0327 =   73    8  863  876
ASPDWN    E7,1733 =  123    1  868      AUTOW     23,3030    586    1  580      A0CALC    25,2406    863    1  863
ASPS      E7,1730 =  123   11  123  138 AUTOW1    23,3046    586    1  586      A1        E7,1663 =  123    4  123  873
ASPS(TM)  E6,1525 =  120    1  868      AUTOW1A   23,3037    586    1  586      =======================================
ASPUP     E7,1732 =  123    1  867      AUTOW11   23,3055    586    1  586      BACK      25,3351    878    1  878
ASP1      E7,1731 =  123    1  867      AUTOW2    23,3133    587    5  586  588 BACK2     25,3374    878    1  879
ASP3      E7,1734 =  123    2  868      AUTOW3    24,2104    587    1  586      BADEND    07,3625   1436    2 1435
ASTNBIT      4755 =   60    2  713      AUTOW4    24,2114    588    2  587      BADR2     10,2453   1302    2 1301
ASTNFLAG     0154 =   60    1  711      AUTOW5    24,2120    588    2  587      BADVCTOR  30,3707    716    1  716
ASTNV99P  24,3476    713                AUTOY     E5,1600 =   97    3   97  685 BADX      12,2347   1280    3 1278
ATAN=90   13,2647   1240    1 1240      AUT037    04,2044    209    4  208  216 BAILOUT      7706   1487    6  242 1489
ATDOTCAD  15,2312   1072    1 1072      AUTPOINT     1012     77    7  206  219 BANKCALL     4636   1104  223  198 1504
ATERJCB   34,2342    543    2  541  546 AUTSQBIT     4762 =   66    2  206  747 BANKJUMP     4660   1104   11  242 1474
ATERSET   34,2470    546                AUTTEMP      1356 =   87    4  216  219 BANKMASK     4344 = 1204    3 1116 1129
ATERTASK  34,2315    541    2  234  537 AVECTR       0024 = 1251    7 1246 1248 BANKRUPT     0016 =   40   26  141 1446
ATIGINC   E4,1421     92    1  472      AVEGBIT      4770 =   50    4  156  829 BANKSET      0165     73   14 1106 1476
ATOPCSM   13,2761   1314    4   34 1349 AVEGDT    E7,1457 =  128    6  128  699 BARELY1   26,3343 =  887    4  864  873
ATOPLEM   13,3034   1316    4   34 1349 AVEGEXIT     1061 =   79   12   79  808 BASEOTP   E4,1623 =   93    2  510  511
ATOPOTH   13,3034 =   34    1  515      AVEGFLAG     0035 =   50    2  517  808 BASEOTV   E4,1637 =   93    2  510  511
ATOPTHIS  13,2761 =   34    1  515      AVEGOUT   37,2762    830    1  829      BASETEMP     1265 =   83    2  221
ATRESET   34,2510    547    2  543      AVEMDBIT     4770 =   65                BASETHP   E4,1653 =   93    2  510
ATTACHED  43,2774    274    1  249      AVEMIDSW     0225 =   65    3  301 1327 BASETHV   E4,1661 =   93    2  510  511
ATTACHIT  17,2000    274    1  274      AVERAGEG  37,3056    833    1  832      BASETIME  E4,1733 =   94    3  510  511
ATTCHBIT     4767 =   61    2  720      AVETOMID  35,3677   1326    1  834      BB           0006 = 1408    5 1407 1414
ATTCHFLG     0166 =   61                AVFLAG       0050 =   52    6  218  652 BBANK        0006 =   40   34  139 1486
ATTCK1    43,2417    260    1  260      AVFLAGA      4553    652    6  466  667 BCDU      E6,1661 =  118   18  115  558
ATTDISP   34,2360    543    2  543  547 AVFLAGP      4565    652    4  466  667 BDDV         7537   1149    2 1117 1149
ATTDISPR  33,3713    544                AVFLBIT      4764 =   51                BDFAIL    20,2572    722    2  721  722
ATTDISP1  33,3672    544    1  544      AVGEND    37,3100    833    1  830      BDF2Z     17,3473   1056    2 1056

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

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BD BADLY DEFINED      CD DEFINITION ASSOCIATED WITH CONFLICT          XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011       11:40 FEB. 26,1971              PAGE 1510

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL       DEF  H      REFERENCES    SYMBOL       DEF  H      REFERENCES    SYMBOL       DEF  H      REFERENCES

BOUT      26,3640   1251   1 1246      BITS15+7  10,3735   1476   1 1464      BLNKBBNK     4304    382   1  381
BORACZ    17,3101   1044   2 1044      BITS3&4      5775 = 1439               BLNKR1       4770 = 1477
BORJETS   17,3137   1047   2 1044 1056 BITS4+10  10,3737   1476   1 1475      BLNKR2       4767 = 1477
BOROLL    17,3035   1044   2 1042      BITS4&5      5001   1201  10  151 1476 BLNKR3       4766 = 1477
BOSU         7031   1135   1 1117      BITS4&6      5004 = 1439   5  194 1418 BLNKSUB1  40,3351    382   2  382
BOT       E7,1704 =  128   7  128  730 BITS4-5      5001 = 1439   1 1424      BLOAD     41,2750    355   1  337
BOZCHECK  17,2773   1042               BITS4-6   31,3527    639   1  638      BMAGX        0042 =   40
BOZJETS   17,3151   1048   2 1043 1056 BITS4,5      5001 = 1002               BMAGY        0043 =   40
BECONSTD  25,3225    875   1  865      BITS5+11  10,3736   1476   3 1468 1475 BMAGZ        0044 =   40
BEE17     15,3402   1288               BITS5-6      5010 =  536               BNKCHK    43,3650   1401
BEE19     15,3414 = 1288   1 1296      BITS7+4      5013   1201   2 1463      BNKOPTN   43,3247   1395
BEE22     15,3420 = 1288   1 1278      BITS7&8   06,2775    168               BODYATT   37,2000 =   33   1  890
BELOW1    10,2516   1409   1 1410      BITS7-9   31,3526    639   1  638      BODYRATE  15,2165   1070   1 1064
BELOW2    10,2533   1409   2 1409      BIT1         4770   1200  69   48 1499 BOKKEP2   05,3404    957   1  957
BELOW3    10,2547   1409   1 1409      BIT10        4757   1200  38   47 1446 BOOP      33,2572    441   1  442
BELOW4    10,2552   1409   2 1409      BIT11        4756   1200  33   47 1443 BOOSTEMP  E6,1705 =  119   5  119  548
BESTI        0302 =   73  12   73  787 BIT12        4755   1200  31   47 1477 BORTENT      5676   1486   2 1487 1488
BESTJ        0303 =   73   4   73  752 BIT13        4754   1200  43   47 1477 BOTHGO    31,2154    510   1  510
BESTTRIM  24,3075    705               BIT13+8   10,3745   1477   1 1463      BOTHJOBS  10,3131   1466   1 1466
BETA/PIP  E6,1674 =  115   3  115  895 BIT13-14     4346 = 1204   1 1475      BOTHPAD   23,2461    519   1  518
BETA/180  E6,1666 =  115   8  115 1074 BIT14        4753   1200  70   47 1488 BOTHSGN   40,2274    330   1  330
BETACOM   E6,1604 =  116   2  116 1074 BIT14+7   10,3747   1477   1 1463      BOTHSHIP  23,2405    518   1  518
BETADOT   E6,1704 =  115   5  115 1079 BIT14COM  10,2545   1409   1 1409      BOV(B)    01,2454   1195   1 1118
BETAM     E4,1607 =   93   6   93 1351 BIT15        4752   1200  50   48 1485 BPL       01,2500   1196   1 1196
BETAV     E4,1557 =   93  11   93 1338 BIT15+6      7667   1203   3  167 1477 BPL/BMN   01,2471   1196   1 1118
BETA1     E7,1743 =  131   4  131  925 BIT15+9      7716   1487   2 1463 1486 BRANCH       6672   1131   8 1142 1196
BETA12    E7,1754 =  132   8  124  917 BIT15/14     4076 =  366   3  364 1473 BRATE     E6,1710 =  118   6  416  558
BFAILY    17,2677   1040   1 1040      BIT2         4767   1200  43   48 1498 BRNBLKTM  E4,1774 =   96   2   96  586
BHIZ      01,2447   1195               BIT3         4766   1200  44   48 1477 BRNCHCON     7700 =  333   1  332
BIAS      E6,1564 =  113   5  113 1027 BIT4         4765   1200  43   48 1477 BRNCHCTR  12,2334   1280   1 1281
BIASAK    E6,1715 =  119   5  119  547 BIT5         4764   1200  37   48 1484 BRUPT        0017 =   40   1 1488
BIASCALE  22,3035    417   1  416      BIT6         4763   1200  40   48 1495 BSUBO     26,3646   1251   1 1246
BIASCOM   40,2513    346   2  346      BIT7         4762   1200  40   48 1477 BTRIMR    24,3101    705   3  705
BIASEDZ   15,2435   1076   3 1078 1079 BIT7-8    04,3050    224               BUF          0130     70 127   70 1503
BIASHI    00,2565   1166   1 1185      BIT8         4761   1200  35   47 1477 BUF+      00,2421   1162   3 1162 1165
BIASLO    00,2270   1159   1 1186      BIT9         4760   1200  31   47 1498 BUF-      00,2415   1162   3 1162 1165
BIASTEMP  E6,1674 =  118   5  416  558 BKRJCT    43,2632    269   1  269      BUFAGREE     7225   1142   1 1162
BIAS1     E6,1565 =  113   5  113 1027 BLANKCHK  10,3356   1470               BUFLIM    15,3401 = 1092   4 1083
BIAS2     E6,1566 =  113   5  113 1027 BLANKCON     4755 =  333   1  333      BUFNEG    00,2530   1165   1 1162
BIGTIME   12,3501   1299   1 1298      BLANKDSP  41,3466    379   2  379      BUFNORM   00,2477   1165   1 1165
BINCON       4355    385   4  143 1204 BLANKET      5516   1459  13  458 1476 BUFPOS    00,2515   1165   2 1162 1165
BINROUND  40,2753    360   3  359  360 BLANKSUB     4264    381   2  366 1470 BUFZERO   00,2363   1162   1 1165
BITSOFF   41,2702    354   1  354      BLAST     E6,1456 =  107  21  107 1061 BUF2         0133     70  24   72 1487
BITSOFF1  41,2706    354   1  354      BLAST1    E6,1460 =  107  22  107 1061 BURNBIT      4757 =   66   1  702
BITSOFF2  41,2714    354   3  354  355 BLAST2    E6,1462 =  107  16  107 1061 BURNFLAG     0233 =   66   4  218  737

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED           = DEFINED BY EQUALS            J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT            XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF   H     REFERENCES     SYMBOL      DEF   H     REFERENCES     SYMBOL      DEF   H     REFERENCES

BURNHOW  04,2517    216  7  217  219 CALCMAN2    0053 =   52  3  416  558 CDRVE    06,2012    142
BURNTMP1 E5,1552 =  105  3  105  220 CALCN83  24,3706    740  1  714      CDUCHKWD    1341     86  2  244
BURNTMP2 E5,1560 =  105  3  105  220 CALCN85  24,3576    737  1  714      CDUINC   22,3675   1503
BURNTMP3 E5,1566 =  105  3  105  220 CALCPHI  22,2674    414  1  414      CDUIND   E3,1474 =   89 19  150 1427
BURNTMP4 E5,1574 =  105  2  220      CALCRVG  37,3336    841  1  833      CDULIMIT E5,1453 =  102
BUTTONS  05,2604    198  1  198      CALCSMSC 16,2756    770  2  751  782 CDULOGIC 24,3754   1501  9  297 1365
BVECTOR  E7,1501 =  125 22  125 1253 CALCSXA  23,2034    298  1  759      CDULOOP  34,3466    596  1  596
BVECTORS 23,2756    574  2  580  615 CALCTFF  27,3261   1380  4  525  814 CDUS        0036 =   40  8  135  512
BVECTR      0032 = 1251  5 1247      CALCTPER 27,3256   1380  1  525      CDUSCMD     0054 =   41  1   41
BVSU        7005   1134  1 1117      CALCUT   16,2115    723              CDUSPOT     1171     81 16   81 1366
BYPASS   27,2566    590  1  590      CALC2BIT    4767 =   52              CDUSPOTX    1175 =   81  1  710
BYPASS1  27,2574    590  2  590      CALFA    E6,1506 =  116  8  116 1090 CDUSPOTY    1171 =   81  1  710
BZE/GOTO 01,2464   1196  1 1118      CALL        6607   1129  1 1196      CDUSPOTZ    1173 =   81  1  710
B12T14      7656 = 1204  1 1120      CALL/ITA 01,2504   1196  1 1118      CDUT        0035 =   40  8  172  757
B15MONCK 41,3307    365  2  365      CALLCODE    5002   1201  1 1121      CDUTCMD     0053 =   40  3   40  178
B2/A2    13,2606   1239  1 1241      CALLCON  26,2660    812  1  814      CDUTODCM 22,2377    409  4  398  558
B2XSC    13,2604   1239  1 1239      CALLCRS  06,2460    156  1  156      CDUTRIG  23,3530   1364  9  508  940
B3TOB4   01,3024 = 1199  2 1198 1199 CALLRECT 11,3273   1344  4 1343 1344 CDUTRIGS 23,3534   1364  1 1364
B5OFF       5626   1484  8  507  941 CALLRPRT 13,2556   1238  1 1238      CDUX        0032 =   40 31  135 1421
B5TOB8   01,2462   1195              CALLRTRP 13,2466   1236  1 1236      CDUXCMD     0050 =   40  4  160 1421
=====================================CALLR52  30,2242    562  1  562      CDUXD    E6,1646 =  114  9  114 1006
C(30)LIM 26,2645    809  2  808  809 CALLR6X  36,2263    556  1  555      CDUY        0033 =   40 18  182 1417
C*MM*N1  23,3634   1367              CALOOP   14,2346    749  1  749      CDUYCMD     0051 =   40  2  160 1009
C*MM*N2  23,3636   1367  1 1367      CALOOP1  14,2376    749  2  749      CDUYD    E6,1650 =  114  4  114  599
C*MM*N3  23,3644   1367  1 1367      CALSAM1  14,3714    787  1  787      CDUZ        0034 =   40 26  135 1417
C/DD     E7,1705 =  123  3  123  875 CAL53A   14,2335    749              CDUZCMD     0052 =   40  2  160 1009
CA+ECE   07,3064   1422  2  156  199 CAL53RET 14,2405    749              CDUZD    E6,1652 =  114  4  114  599
CADRFLSH    0371     75  5  136 1474 CAM      E6,1716 =  118  5  118  405 CEARTH      0016 =  767  3  753  767
CADRMARK    0372     75              CANCOARS 06,3161    171  2  171      CENTANG  E7,1753 =  130  8  133  674
CADRMASK    5004 = 1476  1 1467      CANDEL   23,2611    521  1  519      CFAILP   17,2645   1039  1 1039
CADRSTOR    1245     82 13  204 1472 CANTDO   32,2077    648  2  647      CFPA     E7,1746 =  131  4  131  929
CADRTAB  01,2001 =  230  1 1414      CANTROO  04,2125    210  1  209      CG.CORR  16,3137    952
CAGEBIT     4756 =   84              CANV37   04,2162    210  2  210  834 CGOTO       6652   1130  1 1117
CAGESUB  06,2740    167  1  150      CANZOPT  06,3104    170  2  170  171 CGTRACK  16,2231    726
CAGESUB1 06,2746    167  1  160      CAPSI    E6,1645 =  114  4  114 1036 CHANBITS 41,2667    354  1  354
CAGESUB2 06,2751    167  1  152      CATLOG   15,3775   1391 11  603  787 CHANDSP  41,2477    344  1  343
CAGETEST 07,3606   1435  5 1419 1424 CCALL       6575   1129  1 1117      CHANG1      5152   1208  4  250 1400
CAGETSTG 07,3575   1435  1 1429      CCSL        7617   1151  1 1204      CHANG2      5156   1209  1 1109
CAGETSTJ 07,3616   1435  5 1418 1427 CD*TR*GS 23,3542   1364  1 1367      CHANJOB  01,2677   1213  4 1208 1219
CAGETSTQ 07,3613   1435  3 1425 1426 CDELF/2     0016 = 1371  3  647  819 CHANLOAD 41,3155    358  1  358
CALCDT6  17,3547   1058  2 1059      CDHMVR   27,2674    688  3  220  677 CHANTEMP E6,1633 =  113  4  113 1024
CALCGA   23,3344   1358  4  427  822 CDHTAG   27,2000 =   32  1  688      CHAN12      0012 =   42 55  151 1435
CALCGA1  23,3404   1358  1 1359      CDHTAGS  15,2000 =   29  1  687      CHAN13      0013 =   42 17  194 1443
CALCGRAV 37,3270    840  3  723  841 CDHTAG2  31,2000 =   32  1  686      CHAN14      0014 =   42 19  160 1434
CALCGTA  23,3240   1354  4  451  755 CDHTAG3  37,2000 =   33  2  670  683 CHAN30      0030 =   42  6  147  543

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED         = DEFINED BY EQUALS           J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT            XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL     DEF    H      REFERENCES     SYMBOL     DEF    H      REFERENCES     SYMBOL     DEF    H      REFERENCES

CHAN31      0031  =    42     6  550 1485 CH31TEMP E6,1632  =   113     6  113 1019 CM/FDAIR 15,3333     1090     2 1075 1089
CHAN32      0032  =    42     2  144 1024 CIRCL    23,3161       676     3  674      CM/FLAGS    0102  =   852    24  804 1089
CHAN33      0033  =    42     5  153  590 CIRCULAR 12,3713      1302     1 1301      CM/GYMDT E6,1725  =   116     6  116 1068
CHAN5       0005  =    42     8  194 1132 CKGYMSW  15,2135      1064     1 1064      CM/GYMIC 15,2141     1064     1 1063
CHAN6       0006  =    42     8  194 1061 CKLFTBTS 43,2427       261     2  260      CM/POSE  37,3404      890     1  799
CHAN76      0076  =    42                 CKLSTAUT    4777  =   215     1  215      CM/POSE2 37,3433      890     1  890
CHAN77      0077  =    42     2  194 1332 CKMID2   13,3656      1329     1 1348      CM/POSE3 37,3664      895
CHAR        0117  =    70     5  326  328 CKMODCAD 43,2260       256     2  254  256 CM/RCS   15,2645     1081     1 1075
CHARALRM 40,3275      372    18  326  375 CKNVWRD1 24,3306       710     1  709      CM/SAVE  E6,1623  =   117     3  117 1091
CHARIN   40,2000      326     1 1445      CKOPTVB  43,2342       258     1  249      CM/SWIC1 20,3744     1069     1 1068
CHARIN2  40,2013      326     2  326      CK1K2    32,2223       650     1  649      CM/SWIC2    4355  =  1069     1 1068
CHAZFOGC 43,2352      259     1  250      CK4V32   42,3735      1495     3 1494 1495 CM/TRIO  37,3443      890
CHECKB      5464     1410     1 1407      CLEANDSP 10,2715      1462     7  453  798 CMARMBIT    4755  =    58     3  828 1072
CHECKCTR 12,2716     1286     2 1280 1298 CLEANEND 10,3455      1472     1 1470      CMCSTADL 05,2113  =   183     2  179  190
CHECKMAX 22,2111      404     1  404      CLEANOUT 43,2673       270     1  275      CMCSTA01 05,2043  =   183     1  183
CHECKMM     5354     1402    21  241  780 CLEAR    40,2364       331     1  327      CMCSTA02 05,2052  =   183     2  183
CHECKNJ  43,3264     1395     3 1395 1400 CLEARMRK    5527      1459     9  206 1459 CMCSTA03 05,2057  =   183     1  183
CHECKTAB 04,2132      210     1  210      CLEARSTR 24,3134       706     2  531  707 CMCSTA04 05,2061  =   183     1  183
CHECK123 17,3543     1058     1 1059      CLEARW54 30,3460       620     1  620      CMCSTA05 05,2063  =   183     1  183
CHEKAVEG 37,2740      829     2  236  828 CLEAR1   40,2417       332     1  332      CMCSTA06 05,2072  =   183     1  183
CHEKAXIS 27,2324      399     1  399      CLOAD    41,2765       355     1  337      CMCSTA07 05,2101  =   183     1  183
CHGRMS   35,3125      486     1  486      CLOCKCON 10,3750      1477     1 1462      CMDAPARM    0135  =    58
CHKCOMED 33,3162      447     3  437  446 CLOCKJOB 24,3276       710     1  709      CMDAPMOD E6,1700  =   115    12  115 1089
CHKCORS  07,3017     1421     1 1422      CLOCKON  24,3234       709     1  709      CMDCMP   07,2617      764     3  764
CHKCTR   37,3003      831                 CLOCPLAY 10,2727      1462     2  710  712 CMDSET   10,2131      177     1  177
CHKDSP   40,2057      327     2  327      CLOG2/32 23,2211       303     1  303      CMDSETUP 10,2124      177     4  176
CHKFAIL1    5705     1486                 CLOKNOW  33,3522       528                 CMDSOUT  16,3266      962     1  963
CHKFAIL2    5712     1486     1 1486      CLOKTASK 24,3225       709     5  236  709 CMDTMP   E6,1666  =   110    18  110  976
CHKLINUS 27,2152      395     2  394  395 CLPASHI  40,2402       332     1  331      CMENTRDL 05,2211  =   187     2  179  190
CHKLIST  05,3463     1097                 CLPASS      1220        82    13  204  380 CMENTR01 05,2043  =   187     1  187
CHKNOVAC 01,3600     1413     1 1416      CLRMOON  13,3011      1315     2 1316 1345 CMENTR02 05,2052  =   187     2  187
CHKPOCH  43,2714      271     6  255  390 CLROVFLW 13,2616      1240     1 1240      CMENTR03 05,2057  =   188     1  187
CHKPRIO  10,2670     1461     1 1460      CLR5     40,2422       332     1  332      CMENTR04 05,2061  =   188     1  187
CHKSAB   16,2662      768                 CLUPDATE 35,3101       486     1  485      CMENTR05 05,2260      188     1  187
CHKSB    16,2664      768     1  768      CLUPLOCK 07,3761      1446     1 1446      CMENTR07 05,2101  =   188
CHKSCODE 14,3636      781     2  756  781 CM/ATUP  37,3571       894                 CMENTR09 05,2107  =   188     1  187
CHKSD    16,2702      769     1  768      CM/BIAS  15,2623      1079     2 1076      CMMOVE   17,2011      274     1  274
CHKSDA   16,2724      769     1  769      CM/DAPIC 20,3703      1066     1  795      CMNTOVFL 12,2361     1280     1 1281
CHKSDATA 16,2657      768     2  768  776 CM/DAPON 20,3624      1066     1  796      CMOON       0022  =   767     2  766  767
CHKSUPR  43,3600     1400     1 1400      CM/DAP2C 20,3705      1068                 CMOONBIT    4755  =    62
CHKSWTCH 11,3317     1344     2 1320 1343 CM/DSBIT    4767  =    60     4  804 1089 CMOONFLG    0173  =    62    31   34 1327
CHKTEMX  37,3254      839     1  839      CM/DSTBY    0147  =    60     1  834      CMPG22DL 05,2267  =   189     1  190
CHOOK    26,3251      888     1  865      CM/DUMPR 15,3337      1090                 CMPG2201 05,2043  =   189     1  189
CHRPRIO     4346      385     3  365 1496 CM/END   15,3364      1091     1 1090      CMPG2202 05,2052  =   189     2  189
CH1      26,3255      889     3  865  873 CM/FDAI  15,3325      1090     1 1075      CMPG2203 05,2057  =   190     1  189

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BD BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT                XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL     DEF    H      REFERENCES       SYMBOL     DEF    H      REFERENCES       SYMBOL     DEF    H      REFERENCES

CMPG2204  05,2061 =  190   1  189         COB          0040 = 1251   4 1246 1247  COMPUTER     0122 =   57
CMPG2205  05,2335    190   1  189         CODE         0124 =   70  13  330  386  COMPVER   33,2000    426   2  233  255
CMPG2206  05,2072 =  190   1  189         CODSTOR      4423    386   3  327  370  COMP12    22,2203    406   1  405
CMPG2207  05,2101 =  190   1  189         COEFFADR  E6,1704 =  110  11  110  948  COMSETUP  12,2577   1285   2 1277 1296
CMPOS     34,3327    585   4  579  616    COEFPOLY  34,2616    548   1  543       COMTERM   11,3007   1344   1 1343
CMPOWEDL  05,2001 =  180   1  190         COF       E6,1742 =  118  48  118  558  COMXFLG   43,3077    278   1  278
CMPOWE01  05,2043    180   5  180  189    COFMAXGO  22,2170    405                COMZERO   07,3053   1422   2 1421 1422
CMPOWE02  05,2052    180   6  180  189    COFSKEW   E6,1710 =  118   6  117  406  COM52     14,3120    759   3  758  783
CMPOWE03  05,2057    181   6  180  190    COGA      E7,1767 =  130  18  130 1301  CONC+S1   43,3173   1394   1 1398
CMPOWE04  05,2061    181   5  180  190    COGAFBIT     4765 =   63                CONC+S2   43,3174   1394   1 1398
CMPOWE05  05,2063    181   3  180  186    COGAFLAG     0203 =   63   3 1289       CONICS    12,2000 =   29   4 1276 1303
CMPOWE06  05,2072    181   3  183  190    COGAMAX      0016 = 1307   4 1296 1299  CONICS1   15,2000 =   29   1 1288
CMPOWE07  05,2101    181   5  180  190    COGAMIN      0010 = 1307   3 1297 1299  CONICS2   17,2000 =   30   1 1289
CMPOWE08  05,2075    181   1  180         COGAOVFL  12,3027   1289   2 1289 1301  CONICS3   11,2000 =   29   1 1305
CMPOWE09  05,2107    181   1  188         COGLOLIM  15,3435   1288   1 1300       CONICS4   05,2000 =   28   1 1291
CMPX1     E5,1455 =  102   2  440         COGUPLIM  15,3433   1288   2 1296       CONICS5   10,2000 =   28   1 1302
CMRENDDL  05,2146 =  185   1  190         COLINEAR  05,3747   1291   1 1291       CONICX1   E7,1550 =  131   5  131  923
CMREND01  05,2043 =  185   1  185         COLREG       0770 =   77   6 1347 1349  CONSTD    25,3231    875   1  862
CMREND02  05,2052 =  185   2  185         COMADRS   43,3465   1398   2 1400       CONSTD1   25,3250    875   1  876
CMREND03  05,2057 =  185   1  185         COMAZM    36,2107    554   1  554       CONTBL2   01,3626   1414   2 1416
CMREND04  05,2061 =  185   1  185         COMBLOAD  41,2760    355   1  355       CONTCHK   27,2500    588   1  589
CMREND05  05,2063 =  186   1  185         COMFLAG      5554   1479   1 1479       CONTDRVE  10,2020    175   1  175
CMREND06  05,2072 =  186   1  185         COMGEOM1  23,2000 =   31   1  297       CONTINU   43,3550   1400   5 1399
CMREND07  05,2101 =  186   1  185         COMGEOM2  10,2000 =   28   1  301       CONTINU2  25,3133    873   1  873
CMTMFILE  15,3346   1090   1 1090         COMMAND   E3,1471 =   89   6 1417 1422  CONTIN33  33,3313    450   1  449
CMTMTIME     0304 =   73   3   73 1091    COMMANDO     1325     84   6  176  178  CONTMANU  20,2143    421   1  419
CMTR1     37,3572    894                  COMMFX    43,3457   1398   2 1400       CONTONE   20,2641    734   2  734
CMTR2     37,3643    895                  COMMNOUT  12,3012   1289   1 1302       CONTTWO   20,2642    734   2  734
CMYDOT    E5,1602 =   97   4   97  685    COMMONLM  12,3471   1298   1 1299       CONT1     25,3064    872   1  872
CNTR      E6,1446    107  36  200  996    COMNEG    07,3043   1422   1 1421       CONT3     25,3074    872   1  872
CNTRCHK   43,3420   1397                  COMP         7624   1151   4 1119 1131  CONUMNOR  41,3060    357   1  356
CNTRCON      5004 = 1394   1 1397         COMPAT    15,2727   1082   2 1081 1082  CONVRNGE  27,2534    589   3  579  589
CNTRCOPY  16,3215    953   2  952  963    COMPDISP  31,2034    507   3  510  512  CON1         5433   1407   1 1407
CNTRLOOP  43,3421   1397   1 1398         COMPGS    33,3020    445   1  445       CON2      10,2561   1409   1 1407
CNTRTMP   E6,1661 =  110   7  110  953    COMPICK   41,2506    344   1  344       CON2ADR      5450   1407   1 1407
CNT3TEMP  E7,1731 =  129   4  130  583    COMPMAT   13,2126    514                COPIES    10,3172   1467   1 1460
COARFINE  14,2362    749                  COMPMATX  27,2257    398   1  400       COPIES2   10,3173   1467   1 1464
COARS     07,2734   1420   1 1420         COMPMFSN  27,2336    399   1  399       COPINDEX     0164 = 1476  21 1461 1474
COARSERR  07,3034   1422   2 1421         COMPMU    04,3315    653   1  653       COPMPAC      0157 = 1476   4 1472 1475
COARSTOL  07,3042   1422   1 1422         COMPNUMB     0300     73  12   73 1498  COPYNORM  10,3171   1467   1 1464
COARSTST  07,3570   1435   2 1432         COMPOS    07,2776   1421   1 1420       COPYPACS  10,2660   1461   1 1469
COARSTYP  14,2201    747   1  747         COMPTBIT     4761 =   57                COPYTOGO  10,2656   1461   1 1470
COARSUB   14,3742    787   2  749  774    COMPTEST  41,2423    342   6  342  355  COPY40.9  16,2465    730
COARS1    07,2741   1420   1 1420         COMPTGO   35,3525    645   3  485  735  CORANGOV  37,3671    895   4  894  895
COARS2    07,2764   1420   2 1421 1422    COMPTST1  41,2425    342   1  343       CORCOPY   16,3203    953   1  963

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED           = DEFINED BY EQUALS               J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED      CD DEFINITION ASSOCIATED WITH CONFLICT            XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011       11:40 FEB. 26,1971                PAGE 1514

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF    H        REFERENCES       SYMBOL      DEF    H        REFERENCES       SYMBOL      DEF    H        REFERENCES

COREINC  01,3024      1216    3 1199 1216 CSI/B23   22,3406       673    2  673      CS359+    22,3546       675    1  655
CORFOUND 01,2631      1212                CSI/B23D  22,3421       674    1  674      CTHETA       1310  =    84    2  423 1021
CORPLAN  14,3723       787    2  787      CSI/B3    22,3512       675    1  675      CTLIST       0333       74    6 1097
CORSCALL 14,3753       788    1  788      CSI/CDH   35,2000  =    33    4  466  671 CULTBIT      4762  =    53
CORSCHK2 07,3031      1422    2 1421 1422 CSI/CDH1  04,2000  =    27    2  661  668 CULTED    14,2571       752    4  752
CORSETUP 16,3126       952    2  952  963 CSI/CDH2  12,2000  =    29    1  668      CULTFLAG     0065  =    53    8  300  759
COSCDU      1147  =     81    5   81 1366 CSI/SOL   10,2404       681    1  681      CULTRIX   E5,1735  =    99    1  752
COSCDUX     1153  =     81    6  546  970 CSIALRM   E7,1664  =   133    5  133  682 CVECTR       0010  =  1251    1 1247
COSCDUY     1147  =     81    5  770 1370 CSINEXT   23,3145       675    1  675      CXOFF     E7,1744  =   134    5  134  616
COSCDUZ     1151  =     81    7  545 1370 CSINEXT1  16,2012       677    1  676      CYCLSHFT  43,3427      1398
COSF        0030  =   1307    4 1301 1302 CSINEXT2  07,2440       678    1  678      CYC61BIT     4765  =    48    1  202
COSG/2   E7,1667  =    123    5  123  867 CSINEXT3  10,2316       680    1  680      CYC61FLG     0013  =    48    3  416  597
COSI     26,3630      1251    2 1247      CSINEXT4  31,3535       681    1  681      CYL          0022  =    40   27  214 1398
COSINE   00,3514      1187    2 1119 1365 CSIPROG   06,2000  =    28    2  672  685 CYR          0020  =    40   40  384 1413
COSM     E6,1511  =    116    4  116 1070 CSIPROG2  12,2000  =    29    1  673      C001      26,3267       889    1  862
COSO     E6,1513  =    116    3  116 1071 CSIPROG3  22,2000  =    31    2  673  685 CI/16     34,3770  =   887    1  867
COSOCCSM E6,1515  =    116    2 1070      CSIPROG4  23,2000  =    31    1  675      C1/2         7653      1203    1 1207
COSPHI/2    0022  =   1353    6 1340 1343 CSIPROG5  16,2000  =    30    1  677      C12       26,3207       888    1  867
COSPHIE  11,3221      1343    1 1340      CSIPROG6  07,2000  =    28    2  678  684 C13BANK   04,2000  =    28    1  592
COSTEN   27,2640       607    1  597      CSIPROG7  24,2000  =    31    1  679      C13SLOOP  04,3256       592    1  592
COSTH       0020  =     74   18  299 1358 CSIPROG8  10,2000  =    28    1  680      C13STALL     4542       592    6  392 1098
COSTRIM  15,2627      1079    1 1072      CSIPROG9  31,2000  =    32    1  681      C13STAL1  04,3251       592    1  592
COS15    26,3323       889    1  852      CSISBIT      4763  =    67                 C18       26,3165       887    1  872
COS33    14,2576       753    1  751      CSISFLAG     0256  =    67    5  217  663 C20       26,3217       888    1  874
COUNT       0143  =     71   11  332  386 CSISTEP   10,2377       681    1  681      C21       26,3221       888    1  872
COUNTPL  E5,1552  =    102                CSITAG1   05,2000  =    28    1  671      C372         7672      1203    1 1207
COUNT3MK E5,1550  =    105    8  105  588 CSMCFADR  17,2521       949    1  944      C31BTCHK     5654      1485    8  394 1024
COVCNV   42,3552       940    1  940      CSMCONIC  13,3170      1318   10  500  940 C31CMCHK     5663      1485    1 1485
COZY4    E7,1627  =    126    5  127  493 CSMMASS   E6,1473       107   13  182  957 C31FLWRD     0374        75    6  135 1485
CPHI        1307  =     83    7  394 1021 CSMNID    17,2470       948    1  949      C33JMP    06,2766       168    1  154
CPHIX       1013        78    5  257 1022 CSMPOS       1045        79   11   79  762 C33TEST   06,2366       153    6  150  152
CPSI        1311  =     84    1  423      CSMPREC   13,3145      1318    6   35  912 C4RTE     35,3661       939    1  899
CREWMANU 43,2535       264    1  249      CSMSTORE  22,3310       500    1  500      C45LIM    15,2625      1079    2 1077
CRITCON  40,2212       329    2  328  329 CSMVEC    43,2705       271    1  250      C5/2         5022      1201    1 1207
CRS61.1  34,3432       595    1  572      CSS          0016  =   753    1  752      =====================================
CRS61.2  34,3610       598    1  598      CSSUN     16,2655       768    1  767      D         E7,1637  =   122   23  122  880
CRS61.2A 34,3662       599    1  600      CSS33     14,2604       753    2  752      DACLIMIT  21,2547      1010    3 1010
CSCDES   06,3143       171    1  169      CSS5      16,2653       767    2  766  767 DACLOOP   21,2504      1010    1 1010
CSCTOMAN 06,3154       171    4  170  171 CSS66     14,2600       753    1  751      DACNDLS   21,2416      1007    1 1005
CSCTOZOP 06,3146       171    2  171      CSS6640   14,2602       753    1  751      DAD          6744      1132    1 1117
CSI/A    06,3672       672    1  662      CSTEER    E7,1702  =   128    6  128  737 DANZIG       6030      1109   73  222 1505
CSI/B    06,3704       672    1  682      CSTH      E5,1733  =   100   11  100 1302 DAPBIT1      0132  =    58    1 1066
CSI/B1   06,3744       673    3  678  681 CSTH-RHO  E5,1737  =   100    4  100 1297 DAPBIT2      0133  =    58    1 1066
CSI/B2   12,2050       673    2  673  680 CSUBT     26,3333  =   938    1  904      DAPCK     34,3554       597    1  597
CSI/B22  12,2070       673    1  673      CSUN         0020  =   767    1  767      DAPDATR1  E6,1465       107   66  135 1066

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT                XX MISCELLANEOUS TROUBLE
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DAPDATR2  E6,1466      107   8  182  722 DECNEG23     4616     1025                DELAYEX      5273     1224   1 1224
DAPDISP   43,2544      265   1  249      DECON     40,2217      329   1  328      DELAYJOB  00,3731     1481  17  209 1066
DAPFIG    43,2465      262   1  261      DECOUNT      0117  =    70  25  338  361 DELAYLOC     1000       77   7  204 1481
DAPINIT   20,3227      974   2  949  981 DECRET       0115  =    70   2  357  358 DELAYNUM     6214  =    35   1 1481
DAPINIT5  17,2535      949   1  946      DECRM61   37,2416      572   3  571  572 DELAY200  21,2545      101   1 1010
DAPMASS   05,2000  =    28   1  956      DECROUND  40,2343      331   1  368      DELBARP   20,2766      968
DAPROLL   16,2000  =    30   3  951  987 DECTEM       0122  =    70   3  344      DELBARY   20,3152      971
DAPS1     20,2000  =    30   1 1066      DECTOBIN  40,2121      328   1  327      DELBKTMP  E6,1662  =   110  10  110  975
DAPS2     20,2000  =    30   1  965      DECTWO    35,3152      488                DELCDUX   E6,1575  =   113   6  113 1006
DAPS3     21,2000  =    30   4  734 1025 DEC182    26,3325  =   623   1  618      DELCDUY   E6,1577  =   113   4  113  600
DAPS4     17,2000  =    30   1 1038      DEC15        4777  =   887                DELCDUZ   E6,1601  =   113   4  113  600
DAPS5     17,2000  =    30   1 1060      DEC17        4352  =   432   2  427  444 DELCOMP   22,2522      411   4  398  558
DAPS6     20,2000  =    30   3  718  733 DEC20        4124  =   214   2  215  218 DELDEP    E5,1761  =   100   5  100 1286
DAPS7     17,2000  =    30   1  943      DEC227    14,3727      787   1  787      DELDV     E7,1463  =   133  13  133  681
DAPS8     22,2000  =    30   1 1036      DEC23        4615     1025   2  258  385 DELEL     E7,1451  =   126   5  126  476
DAPT5     20,3617      981               DEC31        4342  =   214   1  217      DELELD       0032  =   457   3  473  476
DAP1      E6,1615  =   109  15  109  978 DEC32        4763  =   214   1  217      DELINDEP     0014  =  1307   2 1285 1286
DAP1BIT      4752  =    58   1  703      DEC33        5003  =   214   1  218      DELLOOP   00,3734     1481   1 1481
DAP2      E6,1617  =   109  16  109  979 DEC34        4260  =   215   1  218      DELLT4    E7,1422  =   121   9  121  723
DAP2BIT      4753  =    58   2  735 1036 DEC35     04,2403      215   2  218      DELM      E5,1560  =   103   5  440  441
DAP3      E6,1621  =   109  12  109  980 DEC36     04,2402      215   1  217      DELMAX1   05,3311      671   2  681
DB        16,3756      996   4  987  990 DEC40        5004  =   214   1  217      DELMLP    33,2463      440   1  440
DBPTC     E6,1773  =   119   5  119  571 DEC409    20,2612      733   1  721      DELOGA    E6,1652  =   110   5  110  990
DCDU      E6,1603  =   113   9  113 1370 DEC41     04,2377      214   2  216  218 DELOGAC   16,3405      988
DCDUINCR  21,2372     1005               DEC45        5006     1201   3 1028 1194 DELOGART  E6,1650  =   110   7  110  990
DCDULOOP  34,3671      599   1  599      DEC46     20,2613      733   1  721      DELOK     12,2704     1286   1 1285
DCMKPERF     4761  =  1477   2 1460 1469 DEC50        5011  =   215   1  215      DELOOP    21,2373     1005   1 1006
DCMTOCDU  22,2647      413   2  399  418 DEC500       7704     1225   1  390      DELOPCMD  10,2175      178   2  177
DCOGA        0014  =  1307   4 1298 1299 DEC52     04,2401      214   2  218      DELPBAR   E6,1601  =   109   8  109  969
DCOMP        7641     1151   2 1151      DEC57        4351  =   432                DELRDONE  32,2073      648
DCOMPTST  41,2436      343   3  342      DEC76     04,2400      214   1  219      DELRSPL   32,2027      647   1  521
DCONSTD   25,3220      875   2  868  869 DEC79     04,2404      215   1  219      DELRSPL1  32,2000  =    32   1  647
DCTSTCYC  41,2445      343   2  357  358 DEC86     04,2405      215   1  215      DELSTOR   34,2561      548   1  545
DDV          7533     1149   1 1117      DEGCOM    40,2546      346   2  346      DELT      E5,1644  =   100   3  100 1279
DDV/BDDV  00,2353     1162   1 1149      DEGCON1   40,2737      360   1  359      DELTACSM  E3,1572       90   2  585  633
DDVCALL   00,3003     1173   1 1173      DEGCON2   40,2741      360   1  360      DELTALEM  E3,1644       90   1  585
DE-GR-50  30,2427      564   1  564      DEGINSF   40,2674      359   1  359      DELTAQ    E7,1523  =   125   5  125 1254
DEBIT        5565     1479   4  278 1479 DEGINSF2  40,2705      359   1  361      DELTAT    E7,1725  =   131   2  131  132
DEC-12    04,3771     1206               DEGOUTSF  40,2531      346   2  345  346 DELTATOK  27,3616     1497   1 1497
DEC-6     04,3770     1206   1  215      DEGREE1   16,2742      769   1  749      DELTATT   21,2167     1001   1 1021
DECBRNCH     1203       82  18  327  373 DEGREE10  27,2644      607   1  596      DELTATT2     7663  =  1001   3 1001 1021
DECCEND   40,2156      328   2  328      DEGTAB    40,2556      346   2  346      DELTATT3  17,2624     1039   1 1038
DECDSP    41,2516      344   1  336      DEG359    16,2743      769   1  749      DELTAX       1113  =    79  20   79 1259
DECDSP3   41,2570      345   2  345      DEL       E7,1425  =   125  12  398  418 DELTEEO   E7,1447  =   126   5  126  476
DECEND    40,2161      328   2  328  334 DELATT20     7663  =  1039   1 1038      DELTEMPX  E6,1515  =   112   5  112 1004

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DELTEMPY E6,1517 =  112  3  112 1003 DIFCHK   07,2325     246  3  244      DL110    E6,1477 =  182
DELTEMPZ E6,1521 =  112  2 1003      DIFEQ+0  11,3445    1347  1 1343      DL111    E6,1500 =  182
DELTIME  12,2462   1283  3 1279 1298 DIFEQ+1  11,3451    1347  1 1343      DL112    E6,1501 =  182
DELTLOAD 20,2215    460  1  461      DIFEQ+2  11,3462    1347  1 1343      DL113    E6,1573 =  182
DELTLONG E7,1545 =  134  4  134  460 DIFEQCNT E3,1500      89 25   89 1349 DL114    E6,1574 =  182
DELTYME  27,2643    607  1  597      DIFEQCOM 11,3625    1349  2 1347      DL115       0776 =  182
DELV        1314     84 13   84  856 DIFEQTAB 11,3234    1343  1 1343      DL116    E6,1573 =  182
DELVCSI  E7,1461 =  133 15  133  681 DIFEQ0   11,3304    1344  1 1348      DL117    E6,1574 =  182
DELVCTL  E7,1664 =  127  3  740  741 DIFF     E7,1607 =  122  7  122  875 DL118       0375 =  182
DELVEET1 E5,1444 =  105  5  105  674 DIFFALT  E5,1632 =  105  5  185  689 DL119       0037 =  182
DELVEET2 E7,1666 =  133  5  129  690 DIFFOLD  E7,1611 =  122  5  122  875 DL120       0040 =  182
DELVEET3 E7,1645 =  127 12  127  723 DIMOBIT     4770 =   54              DL121       0041 =  182
DELVIMU  E7,1674 =  128  7  128  741 DIMOFLAG    0073 =   54 20  227 1349 DL122    E6,1473 =  182
DELVLVC  E7,1404 =  121 26  216  910 DIRADRES    6055    1110  2 1124      DL123    E6,1466 =  182
DELVOV   E7,1537 =  126 14  126  663 DISDVLVC 37,2537     670  2  662  669 DL124    E6,1570 =  182
DELVREF  E7,1431 =  121  8  725  858 DISPLACE 41,3055     356  1  357      DL125    E6,1571 =  182
DELVSAB  E7,1653 =  127  3  127  695 DISPLAYS 10,2000 =   28  3 1459 1487 DL126    E6,1525 =  182
DELVSIN  E7,1645 =  127 12  127  905 DISPMGA  35,3517     645  1  645      DL127       1307 =  182
DELVSLV  E7,1404 =  121  6   36  644 DISPN5X  31,2012     507  1  507      DL128       1334 =  182
DELVSUM  E6,1726 =  110  6  110  730 DISPN90  06,3756     685  2  657  670 DL201       0303 =  184
DELVSUMP E6,1734 =  110  3  111  728 DISPTARG 04,3731     820  2  813      DL202    E4,1744 =  184
DELVTPF  E5,1636 =   98  4   98  468 DISP14   33,3503     528              DL203    E6,1424 =  184
DELVTPI  E5,1634 =   98  4   98  468 DISP45   35,3520     645              DL204       0025 =  184
DELVX       1314 =   84 13  308  839 DISP7071 31,3360     637  1  638      DL205    E5,1761 =  184
DELVY       1316 =   84 10  310  839 DISTEM      0122 =   70  3  342      DL206    E5,1763 =  184
DELVZ       1320 =   84  9  310  839 DIVIDE   31,3344     637  7  635  636 DL301    E7,1703 =  186
DELX     E5,1642 =  100  6  100 1280 DLAYFAIL    4767 =   85  5  150  163 DL3015      0772 =  186
DELYBAR  E6,1603 =  109  8  109  973 DLAYJOB  00,2000 =   27  1 1481      DL302    E5,1462 =  186
DEP         0036 = 1307  1 1285      DLEWD    E7,1641 =  122  4  122  871 DL303    E4,1713 =  186
DEPREV   E5,1763 =  100  2  100 1285 DLEWD0   26,3157     887  1  871      DL304       0025 =  186
DESUPMOD    1330     84  2  169  171 DLOAD       6021    1108  1 1117      DL305    E7,1402 =  186
DESUPTS     1313     84  5  176  763 DLOAD*      7666    1203  1 1112      DL306    E7,1760 =  186
DESUPTT     1312     84  7  176  764 DLOADCOD    7665    1203  1 1124      DL401    E6,1701 =  188
DEXDEX      0142 =   71  7 1364 1369 DLY2        5244    1223  2 1224 1481 DL402    E6,1702 =  188
DEXI        0143 =   72  1 1368      DL101    E6,1424 =  181              DL403    E6,1703 =  188
DEX1        0143 =   72  5   72 1369 DL102    E6,1624 =  181              DL404       0301 =  188
DEX2        0144 =   72              DL103       0025 =  181              DL405       0302 =  188
DFAILY   17,2701   1040  1 1040      DL104    E6,1624 =  182              DL406       0303 =  188
DFRNT    40,3227    371              DL105       1340 =  182              DL407    E6,1714 =  188
DFT      E6,1547 =  112  7  112 1056 DL1055   E7,1722 =  182              DL408    E7,1677 =  188
DFTMAX   17,3276   1052  4 1049 1052 DL1056   E7,1724 =  182              DL409    E7,1701 =  188
DFT1     E6,1550 =  112  4  112 1050 DL106       0035 =  182              DL410    E7,1402 =  188
DFT2     E6,1551 =  112  4  112 1051 DL107    E6,1533 =  182              DL411    E6,1666 =  188
DHOOK    E7,1655 =  122  5  122  873 DL108    E6,1533 =  182              DL412       0025 =  188
DHOOKYQ7 25,3003    870  2  865  870 DL109       0033 =  182              DL413       0776 =  188

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DL414    E6,1570  =  188                  DOALARM     5205  = 1489                DOV5N71  30,2244     562   1  564
DL415    E6,1571  =  188                  DOBRATE  15,2125    1064   1 1064       DOV6N78  36,2061     553   1  553
DL416    E6,1572  =  188                  DOBRATE? 15,2115    1063                DOW..    11,3664    1351   2 1344 1349
DL417    E6,1573  =  188                  DOBRATE1 15,2126    1064   1 1064       DOW..1   11,3712    1351   2 1351
DL418    E6,1574  =  188                  DOCSM    36,3743    1259   1 1258       DOWNCNTL 25,3257     875   1  872
DL419    E6,1701  =  188                  DOCSM1   36,3746    1259   1 1259       DOWNENT2 10,3762    1478   5 1468 1474
DL420    E6,1702  =  188                  DODELAY  36,2314     557   1  557       DOWNFLAG    5561    1479  75  206 1488
DL421    E6,1703  =  188                  DODELVZ  37,3220     838   1  839       DOWNMRK  07,2304     246   1  245
DL422    E6,1473  =  188                  DODLOAD     6427    1124   1 1121       DOWNTELM 05,2000  =   28   2  179 1096
DL423    E6,1466  =  188                  DODLOAD*    6113    1112   2 1121 1124  DOWNX    43,3065     278   6  257  277
DL424    E6,1715  =  188                  DODNADR  05,3455    1097                DP(-22)  34,3764    1386   1 1381
DL425       1340  =  188                  DODNCHAN 05,3523    1097                DP-.01   35,3153     488   3  485
DL426       0375  =  188                  DODNPTR  05,3545    1098   1 1097       DPADD    21,2072     997   1 1006
DL501       0025  =  190                  DODOWNTM    4621    1096   1  139       DPADD+   21,2112     997   1  997
DMENFBIT    4760  =   57                  DOFSTART 05,2414     194   2  201  202  DPADD-   21,2114     997   1  997
DMENFLG     0121  =   56  11  581 1259  DOGAMDOT 37,3605     894   1  894       DPADD2+  21,2117     998   1  997
DMODE       7266    1143   1 1182       DOJET    21,3757    1034   3 1032 1034  DPAGREE     7224    1142   9  258 1444
DMP         7052    1137  15  328  362  DONEADR  37,3267     839   1  838       DPB-14   27,2425     400   2  398  400
DMPINCP2 30,3171     616                  DONOUN46 42,2000     265   2  265       DPB-9    16,2532     731   1  725
DMPINTEG 30,2544     610                  DONOUN47 42,2016     265   1  266       DPBIT14  01,3451    1235   1 1234
DMPR        7530    1149   1 1117       DONOUN48 42,2042     266   3  266       DPCONFIG    4076  =  107  16  199 1036
DMPSUB      7056    1137  22 1139 1369  DONTPULS 07,3601    1435   1 1435       DPFRACIN 40,3007     361   1  359
DMPSUB2     7075    1137   1 1142       DOP41    04,2637     218   1  218       DPFRACOT 40,2633     348   1  345
DMP1        7526    1149   1 1117       DOREMIS  20,2176     421   1  421       DPHALF   26,3333  = 1205  15  405  544
DNADRDCK 05,3462    1097   1 1099       DOR60    31,2756     632   2  567  630  DPINCOM  40,3013     361   1  361
DNDUMP   05,3656    1102   1 1102       DOR608   31,2765     632   1  629       DPINORM  40,3021     361   1  361
DNDUMPI  05,3643    1101   2  271 1102  DOSPSOFF 24,3024     704                DPINSF   40,2776     361   3  359  361
DNDUMP1  05,3670    1102   1 1102       DOSSHFT  00,2322    1160   1 1160       DPINSF2  40,3023     361   1  359
DNDUMP2  05,3672    1102   1 1102       DOSTORE     6331    1120   1 1109       DPINSF4  40,3027     361   1  359
DNECADR     0335  =   74  15 1096 1099  DOSTRULL 24,2755     703   1  232       DPIPAY   E5,1532  =  103   3  439  445
DNEDUMP  43,2706     271   2  249  271  DOSUBLST 05,3621    1099   1 1098       DPIPAZ   E5,1536  =  103   1  439
DNLADPOG    4772  =  227   1  212       DOSWITCH 11,3354    1345   1 1343       DPMODE   22,3765    1506   2  927  935
DNLKFAIL    4755  =   85   1  391       DOT         7265    1143   1 1117       DPNDX    E6,1507  =  112  25  112 1029
DNLSTADR    0332  =   74                  DOTICK   23,2525     520   1  520       DPOSMAX     4747    1200   4  368 1506
DNLSTCOD    0332      74  11   74 1499  DOTINC      0136      71   7   71 1144  DPOUT    40,2607     347   3  347
DNPHASE1 05,3446    1096   2  205 1102  DOTIXBR  01,2421    1193                DPPOSMAX 26,3343    1205  12  430 1386
DNPHASE2 05,3454    1097   1 1099       DOTPER   23,2731     525   1  525       DPTEST   41,2260     338   4  338  358
DNRNGERR E7,1715  =  123   4  123  879  DOTRET      0137      71   8   71 1183  DPTEST1     6706  =  339   5  339
DNTABLE  05,2362     190   1 1097       DOTSUB      7125    1139   3 1144       DPZERO   04,3761  = 1352   3  751 1344
DNTMBUFF    0337      74  30  179 1102  DOTVCON  24,2724     702   1  232       DP1/2    04,3757  = 1239   5 1239 1251
DNTMEXIT 05,3635    1099   6 1098 1102  DOTVCRCS 24,3027     704                DP1/20   37,3374     841   1  840
DNTMFAST 06,2674     165   1  168       DOUBLK   40,2470     333   2  332  333  DP1/4    15,3411  = 1352   2 1302 1352
DNTMGOTO    0334      74   8  202 1102  DOVECPT  31,2552     629   1  629       DP1/4TH  26,3325    1205   9   34 1254
DNTM1       0034  =   42   1 1099       DOVLOAD     6432    1124   1 1121       DP1/6    26,2132     784   1  783
DNTM2       0035  =   42   1 1099       DOVLOAD*    6435    1124   1 1121       DP1MIN   23,3143     626   1  626

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DP1OUTSF  40,2574    347  1  345      DSPDECVN  40,3146    369  4  347  382 DTHETASM  E6,1611 =  113 19  113 1370
DP2(-3)   34,3766   1386  2  938 1383 DSPDECWD  40,3072    368  4  345  349 DT2IPR    E7,1647 =  131  5  131  918
DP2(-4)   34,3770   1386  6  791 1377 DSPDELAY  31,2004    507  1  507      DUMMYAD   04,2171    211  1  224
DP2/3     11,3770   1352  3 1333 1352 DSPDPDEC  40,2657    352  1  336      DUMMYJOB  01,3171   1220  2  136 1219
DP2OUTSF  40,2601    347  2  345      DSPFLG       1273 =   83  3 1469 1471 DUMPCNIC  27,3217   1375
DP3OUTSF  40,2603    347  1  345      DSPFMEM   41,3341    367  1  337      DUMPFISH  26,3047    816
DP9/10    15,3423   1288  4 1280 1286 DSPIN     40,3161    370  5  327  372 DUMPLOC      0335 =   74  5 1101 1102
DQUARTER  15,3411 = 1352  2 1338      DSPINI    40,3212    371  2  370  372 DUMPP61   26,2276    793
DRCON     E7,1665 =  131  6  131  919 DSPLAY    06,2047    143  1  143      DUMPRPRA  27,3255   1377
DRFTBIT      4752 =   50  4  315 1423 DSPLIST      1246     82  6  204 1472 DUMPTFF1  27,3340   1381
DRFTSUB2  06,3474    313  1  317      DSPLOCK      1215     82  9  204 1474 DUMPTFF2  27,3435   1382
DRHO      E6,1552 =  112  6  112 1004 DSPLV     41,3374    370              DUMPTRIG  27,3070    825
DRHOLOOP  21,2223   1002  1 1003      DSPMMJB   40,3377    382  1 1402      DUMPVGAM  26,3076    818
DRHO1     E6,1554 =  112  1  113      DSPMMJOB  40,3377 = 1402  2  391 1402 DURATION  16,3351    987
DRHO2     E6,1556 =  113  1  113      DSPMMTEM     0140 =   71  2  382      DV        E7,1705 =  131  9  131  936
DRIFTFLG     0036 =   50  5  747  833 DSPMSK       4774 =  370  1  370      DV/SC        7572   1150  2 1150
DRIFTI    E5,1514 =  103  1  428      DSPOCTIN  40,3255    372  1  370      DVCALC    32,3665    935  3  930  933
DRIFTO    E5,1512 =  103  2  428      DSPOCTWD  41,3351    370  3  336  367 DVECTR       0010 = 1251  1 1247
DRIFTSUB  06,3454    313  3  310  311 DSPOFF    05,3165    204  1  204      DVL       E7,1661 =  123  8  123  873
DRIFTT    E5,1452 =  102              DSPONLY      4772 = 1477  2 1462      DVLOS     E5,1610 =   97  7   97  461
DRIVEDAC  21,2537   1010              DSPOUT    06,2063    143  2  142      DVMAX1    05,3301    671  1  673
DSALMOUT     0011 =   42 29  157 1471 DSPOUTSB  06,2024    143  2  143  145 DVMAX2    05,3303    671  1  673
DSEXIT       0114 =   70  3  370  371 DSPSCAN   06,2032    143  2  143      DVNORM    00,2504   1165  3 1164
DSKYBIT      4752 =   56  2  143 1445 DSPSFNOR  41,2555    345  1  344      DVNORMCT     0137 =   71  6 1162 1173
DSKYFLAG     0113 =   56              DSPSIGN   40,3055    368  3  368  369 DVOK      16,3544    990  1  990
DSLV      40,3241    371  2  371      DSPTAB       1226     82 49  142 1486 DVOVF     00,2404   1162 11 1164 1175
DSMAG        0142 =   71  2  371      DSPTEMX      1254 =   82  4   82  519 DVPREV    E7,1467 =  133  5  133  680
DSMSK     40,3243    371  2  371      DSPTEM1      1250     82 29   82  746 DVSIGN       0136 =   71 10 1162 1179
DSPA      41,2364    342  1  336      DSPTEM2      1253     82 11   82  432 DVTHRESH     1344     86  1  725
DSPAB     41,2357    342  1  336      DSPWDRET     0144 =   71  3  368      DVTHRUSH     4775 =  835
DSPABC    41,2352    342  1  336      DSP0633   35,3437    644              DVTOTAL   E7,1425 =  121 19  121  833
DSPABORT     4245    381  2  381      DSP2DEC   40,3133    369  1  352      DVTOTUP   37,3037    832  1  832
DSPALARM  40,3261    372  5  336  359 DSQ       00,3173   1180  1 1119      DVTRANS   13,2150    514  1  514
DSPB      41,2372    342  1  336      DSQSUB    00,3277   1183  5 1180 1188 DVXSC        7364   1146  2 1145
DSPC      41,2377    342  1  336      DSREL        0141 =   71  4  370  371 DV40/41   04,2535    217  1  216
DSPCNT       1201     82  7  143  204 DSRUPTEM     0073 =   69  5  143      DV47TEMP  E7,1457 =  128  4  128  740
DSPCOM1   41,2403    342  3  342  344 DSRUPTSW     1322     84 11  140  203 DWNRPTBB     4051 =  140  1  139
DSPCOM2   41,2404    342  1  342      DSTORE    25,2162    858  1  859      DXCHT12   17,3566   1059  1 1058
DSPCOM3   41,2412    342  1  342      DSU          6754   1134  1 1117      DXCHT23   17,3572   1059  1 1058
DSPCOUNT     1202     82 52  144 1445 DT/2      E4,1704 =   93 10   94 1349 DXCOMP    12,2222   1278  1 1278
DSPDCEND  41,2561    345  4  345  350 DT/2COMP  13,3425   1323  1 1324      DXITFIX   05,3445    958  1  956
DSPDCGET  41,2522    344  1  344      DT/2MAX   13,3514   1324  2 1323 1324 DXTEST    05,3340    956
DSPDCPUT  41,2532    344  1  345      DT/2MIN   13,3512   1324  1 1324      DYNDISP   24,3271    709  1  709
DSPDCWD1  40,3106    368  3  368  369 DTEAROT   E7,1605 =  122  8  122  857 DZCALL    15,3305   1089  2 1083 1084
DSPDC2NR  40,3126    369  3  350  369 DTF       E4,1754 =   96  2   96  530 DZCALL1   15,3323   1089  1 1082

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DZCOM     15,2462     1076   1 1076        EBUF2        1114 =   80 11   80  425 END-DELV  E7,1425     121  2  121  125
DZNOCOM   15,2463     1076   1 1076        ECC       E5,1753 =  100  3  100 1303 END-E7    E7,1777 =   134
DZ1       15,3013     1084   1 1083        ECDISAB   06,3257     173  2  171      END-IN/M  E7,1631 =   127  2  127  131
DZ2       15,3020     1084   1 1084        ECENAB    06,3263     173  1  171      END-KALC  E7,1447 =   125  3  121  126
D0        E7,1707 =    123   4  123  875   ECENAB1   06,3272     173  1  173      END-P30S  E7,1664 =   127  2  127  129
D0EQ      25,2316      861   1  861        ECLIPOL   16,2643     767  2  602  767 END-SVCR  E7,1451 =   121  2  121  122
D1/1024   15,3417     1288   2  671 1297   ECSTEER   E7,1424 =   121  5  185  898 END-W     E5,1642 =    97  3   99  101
D1/128    15,3405     1288   3 1281 1292   EDUP         0023 =    40 13  366 1398 ENDALL    40,2154     328  2  328
D1/16     15,3413     1288   2 1294 1301   EDOT      E6,1515 =   112 16  112 1033 ENDALM       4201     372
D1/256    15,3421     1288   3 1282 1288   EDOTVEL   E6,1520 =   112  7  112 1031 ENDAVEG   37,3141     834  1  834
D1/32     15,3415     1288   8  653 1342   EDRIVEX   E6,1503     108  3 1009 1010 ENDBLFF      4305 =   382
D1/4      15,3411     1288   7   34 1352   EDRIVEY   E6,1504     108  1 1009      ENDBUF       0324 =    73  3   73 1091
D1/64     15,3407     1288   5 1277 1303   EDRIVEZ   E6,1505     108  1 1009      ENDCOPY   37,3072     833
D1/8      15,3403     1288   1 1303        EE        13,2610    1239  1 1239      ENDDAMP   21,3433    1027  1 1027
D6OR9BIT     4767 =     54                 EFIMP01   E3,1764      91  1  733      ENDDCM    22,2522 =   411
D6OR9FLG     0072 =     53   5  588 1349   EFIMP16   E3,1765      91  3   91  733 ENDDOT       7154    1139  1 1183
=========================================  EGFLGBIT     4761 =    59               ENDDPDEC  40,2673     352
E(-AT)    20,3623      981   4  968  972   EGRESS    E4,1710 =    94 15   94 1327 ENDDPUSH     6517    1126  1 1126
E/BKCALL  13,2036      424                 EGSW         0141 =    59  3   59  878 ENDEXIT   25,3574     881  2  797  871
E/CALL    13,2055      425                 EIGHT        4765 =  1204              ENDEXT       5524 =  1476 35  242 1499
E/JOBWAK  12,2000      426                 EIGHTEEN     5000 =   224  1  223      ENDEXTVB     5524 =   251  7  254  257
E/PROG    12,2000 =     29   1  426        EIMP1SEC  E3,1763      91  1  733      ENDFIND      5210    1210  4 1212 1216
E/PROG1   13,2000 =     29   1  424        EISOI     42,3527     940  2  940      ENDGTSAL  33,3043     446
E/SWITCH  13,2053      424                 EJSCAN    01,3111    1218  2 1215 1218 ENDIDLE   10,3516    1472
EARROT1   23,2213      305   1  854        EJ1       01,3156    1219  6 1218      ENDIDRET  10,3557    1473  1 1472
EARROT2   23,2223      305   3  305  857   EJ2       01,3165    1219  1 1219      ENDIGN    24,2772     703
EARSPH    11,3347     1345   1 1345        EKPRIME   E6,1414     106  1  944      ENDIMU    07,3563    1435  3 1419 1424
EARTCNTR  13,2363      766                 EKTLX/I   E6,1416     106  2  944  947 ENDINST      4170 =   366  6  330 1471
EARTHALT  34,2555      547   1  547        ELCALC    35,2271     473  1  476      ENDINT    13,2732    1314  1  228
EARTHGON  23,2647      522   2  519  521   ELEPS     35,3150     488  1  473      ENDIT     10,3602    1474  1 1470
EARTHL    26,3617     1250                 ELEV      E7,1743 =   130 14  130  677 ENDJETS   17,3556    1058
EARTHMU   16,2514      731   1  730        ELEVEN       4775    1200 10  174 1204 ENDJOB1   01,3074    1218  1 1210
EARTHMX   26,3567     1249   2 1243 1245   ELEX      35,2546     476  1  473      ENDLAMB   16,2423     729
EARTHMXX     0051 =   1251   4 1246 1250   ELOOPFIN  43,3371    1397  2 1396 1397 ENDMANU   10,2311     422  1  415
EARTHPAD  23,2457      519   1  518        ELRCODE      5000 =  1447  1 1446      ENDMANUV  27,2141     395  1  422
EARTHR    33,2146      431   2  431  538   ELRCODE1  40,2212 =   329  1  326      ENDMANU1  27,2150     395  2  394  396
EARTHR*   33,2175      431   2  437  446   ELRSKIP   05,2632     199  1  198      ENDMARK      5524    1459  2  570 1476
EBANK        0003 =     40  52  155 1505   EMATRIX   E5,1570 =    97  3  619  621 ENDMASSP  05,3403     957
EBANKSAV     1273       83   3   83 1467   EMBDSPCK     4226     378  2  378  381 ENDMAXDV  00,2623    1168  2 1168 1170
EBANKTEM     1275       83   5  195 1475   EMDOT        1350      86  2  725  903 ENDMODE   07,3641    1436  1 1436
EBANK3       5024 =   1204   5  200  895   EMSALT    E4,1417      92  3  612  940 ENDMUNDO  41,3336     366
EBANK4       4756 =   1204   3  428  905   ENABL1    16,3244     961  3  961  962 ENDMRC    17,2204     944
EBANK5       5043     1202   4  255  786   ENABL2    16,3255     961  1  963      ENDNMTST  40,2136     328  2  327  328
EBANK6       5045 =   1204   2  155  713   ENABT6    17,3721    1061  2 1061      ENDNUM    40,2150     328  1  328
EBANK7       5046     1202   4  217 1467   ENATMA    43,2445     261  1  249      ENDNVSB1  41,3555     380

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ENDOFJOB     5205     1210  103  210 1496 ENDV99P  24,3510      713               EP4(45)L 16,2516      731     1  729
ENDPASTE     4170      366    1  366      ENDV99PI 24,3504      713               ERAD     13,2612     1239     1 1242
ENDPINBF     4463 =    388                ENDZOPT  06,3171      171    1  170     ERADFBIT     4754 =    49
ENDPINS1 40,3636 =     393                END2DEC  40,3145      369               ERADFLAG     0021 =    49    13  458 1242
ENDPLAC  14,3263       761    4  588  836 ENEMA    05,2712      201    2  270 1438 ERADM    E4,1637 =     93    12   93 1242
ENDPRCHG 01,2756      1214    2 1213 1219 ENGINOFF 24,3023      704    3  231  706 ERASCHK  43,3271     1396     1 1395
ENDP76   13,2234       515    2  513      ENGONBIT     4762 =    57    6  160  952 ERASCON1 43,3166     1394     1 1396
ENDRDLU  40,2656       348                ENGONFLG     0123 =    57               ERASCON2 43,3167     1394     1 1396
ENDREP11 34,2270       540    1  540      ENGREQST 24,3427      712    1  710     ERASCON3     5030 =  1394     1 1396
ENDRET   10,3555      1473    5 1468 1475 ENG2BIT      4756 =    49    1  700     ERASCON4 43,3170     1394     1 1396
ENDRET1  10,3571      1473    2 1474      ENG2FLAG     0023 =    49    4  693  737 ERASCON5 43,3175     1394     1 1397
ENDRET2  10,3573      1473    1 1474      ENTANSWR 07,2042      241    1  241     ERASCON6     5024 =  1394     3 1396 1397
ENDROLL  10,2306       422                ENTCADR  26,2427      798    1  798     ERASER   10,3713     1476     1 1469
ENDRQLAT 41,2313       339                ENTER    41,2000      334    1  372     ERASID       5041 =    35     1 1102
ENDRQWT  41,3465       374                ENTERJMP     4200     372    1  327     ERASLOOP 43,3321     1396     4 1396 1397
ENDRSTRT 05,2534       196    2  201      ENTEXIT      0136 =    71   10  335  373 ERASPIP  E4,1400 =     92     2  428
ENDR57   37,2247       568    2  568      ENTMASK  25,2113      854    1  852     ERASZERO     0007 =   179     1  179
ENDSAM   13,2432       767    1  766      ENTMID1  13,3616     1329    1 1329     ERCNT        0117 =    70     7  390  393
ENDSCALE 40,2727       360    5  359  361 ENTMID2  13,3612     1329    1 1328     ERCOM    40,3623      393     1  392
ENDSLECT 17,3727 =    1061                ENTPASHI 41,2010      334               ERCOMP   E5,1647 =    103     4  447  538
ENDSPBIT     4754 =     58    1  881      ENTPAS0  41,2040      335    3  334  380 ERCOMPPL 33,3210      448     1  447
ENDSPF   41,3350       367                ENTRET       0136 =    71    6   71  379 ERCOMP1  E5,1647 =    103     8  431  451
ENDSPMIN 42,3360       351                ENTRYDSP     0134 =    58    4  796  804 ERCON    40,3216      371     1  392
ENDSPOCT 40,3257       372                ENTRYSW  25,2114      854    1  852     ERCOUNT      1365 =    87     3   87 1394
ENDSTATE 11,3556      1348    1 1347      ENTRYVN      1122 =    79    6  796  882 ERECTIME E5,1646 =    103     1  435
ENDSUPS  43,2764       273    1 1400      ENTSET   41,3536      379    2  379     ERECTIM1 E5,1646 =    103     3  445  447
ENDSYS-4 E4,1641 =      96                EPC1RTE  35,3643      939    1  913     EREPFRAC E6,1421      106     2  726  945
ENDSYS-5 E5,1657 =     103                EPC10RTE 35,3657      939    1  933     ERESTORE     1360 =    87    11   87 1397
ENDS40.6 20,2457       720                EPC2RTE  35,3645      939    1  901     ERMINUS  40,3615      392
ENDS40.9 16,2477       730    1  731      EPC3RTE  35,3647      939    1  901     ERPLUS   40,3620      392     1  392
ENDT(X)  27,3544      1385    1 1385      EPC4RTE  35,3651      939    1  915     ERRBTMP  E6,1664 =    110    23  110  977
ENDTASK      5274     1225    4  203 1231 EPC6RTE  35,3653      939    1  917     ERRLIM       4754 =    981     2  974
ENDTEST1 33,2113       428    2  432  443 EPC7RTE  35,3655      939    1  918     ERROR    40,3553      392     1  326
ENDTFF   27,3432      1382    3 1382 1384 EPC8RTE  16,3034      920    1  920     ERRORLIM 20,3246      974     2  967  971
ENDTNON  06,2265       150    1  150      EPC9RTE  35,3575 =    939    2  932  934 ERRORS   43,3211     1394     1 1394
ENDTNON2 06,2305       151    1  151      EPHEM    26,2000 =     31    1  790     ERRORX   E6,1567 =    113    15  113 1029
ENDTPUSH     6521     1126    2 1126 1182 EPREMM1  04,3173 =    227    1  227     ERRORY   E6,1570 =    113    13  113 1027
ENDTSLC  00,2212      1157    1 1157      EPSFOUR  35,3155      488    1  480     ERRORZ   E6,1571 =    113    12  113 1082
ENDTVCIN 17,2343       946                EPSILN1  05,3305      671    2  681  685 ERTHR    33,2157      431     1  431
ENDVLOAD     6460     1125    2 1127      EPSILONG 30,2141      462    2  460  461 ERTHRVSE 32,2000      431     2  435  442
ENDVPUSH     6507     1126                EPSILONL E7,1771 =    130    2 1296 1298 ERVECTOR E5,1404      102     2  431
ENDVXV       6747     1132    4 1132 1148 EPSILONT     1025      78    2 1278 1279 ESCAPE       0136 =    71     4 1189 1190
ENDV6N79 36,2075       553    1  553      EP4(10)H 24,3537      714    1  716     ESCAPE2      0137 =    71     2 1189 1190
ENDV97E  24,3362       711                EP4(10)L 16,2520      731    1  729     ESTICADR 33,2073      428     2  428
ENDV97P  24,3426       712                EP4(45)H 24,3535      714    1  716     ESTIMS   33,2227      435     2  428  447

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ETDECAY  E6,1413     106    1  726        FAKEPRET    5213     1210    2 1208 1218 FINALBIT    4763 =   51     1  485
ETPI8IT     4762 =    51                  FALTON      4362      385   16  214 1500 FINALDV  00,2624    1169     3 1162 1168
ETPIFLAG    0046 =    51    7   51  476 FAZA     36,3520     1256    1 1258      FINALFLG    0047 =   51    10  467  905
ETRYDAP  15,2000 =    29    3 1063 1070 FAZAB    36,3655     1258    1 1259      FINCMPTM E4,1776 =   96     2   96  586
EXDAP    15,2466    1077    1 1074       FAZAB1   36,3703     1259    1 1259      FINCOPY  16,3315     962     1  961
EXDAPIN  15,2417    1074    1 1078       FAZAB2   36,3707     1259    1 1259      FINDGIMB 27,2345     399     2  398
EXDAPOFF 43,2526     262                 FAZAB3   36,3716     1259    1 1259      FINDTIME 01,3542    1412     2 1412
EXDAP1   15,2530    1078    3 1078 1079 FAZAB4   36,3726     1259    1 1260      FINDVAC     5135    1208    39  194 1496
EXDAP2   15,2555    1078    1 1077       FAZAB5   36,3735     1259    2 1259 1327 FINDVAC2 01,2576    1211     1 1208
EXDAP3   15,2522    1078    2 1078       FAZA1    36,3524     1257                 FINEK2   43,2246     256
EXDAP4   15,2513    1078    2 1077       FAZA2    36,3753     1260    3 1257      FINEONLY 14,2400     749     1  749
EXDSPRET 10,3064    1465    3  254  256 FAZB     36,3577     1257    1 1257      FINETIME    4510     432     2  432 1443
EXECBANK    4756 =  1210    8 1208 1210 FAZB1    36,3602     1257                 FINVAC20    5134    1208     2  701  711
EXECB1   01,2000 =    27    3 1211 1234 FAZB2    36,3630     1258    1 1258      FIRELOOK 16,3647     992
EXECCOPY 16,3074     951    1  951       FAZB5    36,3635     1258    1 1258      FIREPLUG 16,3653     992     1  992
EXECF2      4000 =    27    2 1208 1220 FAZC     36,3643     1258    2 1258      FIRSTBIT    4762 =   51
EXECPHS  16,3225     961                 FBANK       0004 =    40   30  206 1481 FIRSTFLG    0046 =   51     4  694  730
EXECTEM1    0061 =    69    4 1208 1216 FBANKMSK    4344 =  1116    2 1216      FIRSTIME 12,2660    1286     1 1285
EXECTEM2    0062 =    69    4 1211 1216 FBIASSUB 06,3636      317    3  315      FIRSTTME 16,2442     730     1  730
EXIT        6712    1131    1 1109       FBR3     11,2436     1335    1 1349      FISHCALC 26,3033     816     3  812  814
EXITEM      0114 =    70    6  356       FCADRMM1 04,3055 =   225    1  221      FIVE        4773    1200    29  205 1495
EXITGYRO 07,3457    1432    1 1432       FCORFRAC    4754 =   953    1  952      FIXCLPAS 40,2277     330
EXPIN    43,2676     270    1  270       FDAIDSP1 21,2422     1007                 FIXCW    05,3347     956     3  951  956
EXPIN1   43,2701     270    1  270       FDAIDSP2 21,3202     1021    1 1007      FIXDB    36,2416     559     7  396  559
EXRSTRT  16,3325     962    1  961       FDAITOTL 21,3217     1021    1 1021      FIXDELAY    5255    1223    11  531 1421
EXTENTST 16,3657     992                 FDOT     26,3636     1251    1 1246      FIXLOC      0120      70    38  512 1504
EXTVBACT    1247      82   20  195 1488 FEARTH   30,2145      462    1  460      FIXROOT  00,3450    1185     3 1184
EXTVBS   42,2000 =    34    1  265       FENG     24,3531      714    1  693      FKPRIMDT 17,2532     949     1  947
EXTVERBS 43,2000 =    34    6  249 1492 FETCH2WD 05,3607     1099    2 1097      FLAGEND  35,3025     484
EXTVRBS1 17,2000 =    30    2  274  275 FFTAG1      4000 =    27    9  238 1479 FLAGGON  23,2363     518     1  517
E1345678 43,3302    1396    1 1397       FFTAG10     4000 =    27    2  206  208 FLAGOFF  35,3023     484     1  484
E3J22R2M E3,1766 =    91    2   91 1343 FFTAG12     4000 =    27    7  141 1096 FLAGON   35,3003     484     2  484
E3RTE    35,3675     939    1  901       FFTAG13     6000 =    27    1 1487      FLAGTABL 04,3032     222     1  222
E32C31RM E3,1767 =    91    2   91 1342 FFTAG2      4000 =    27    4  551 1414 FLAGWRD0    0074 =   47    22  136 1480
E6SETTER    4611     713   15  200 1068 FFTAG3      4000 =    27    1 1417      FLAGWRD1    0075 =   48    42  156 1446
E7SETTER    4606     713   15  208  383 FFTAG4      4000 =    27    2 1459 1483 FLAGWRD2    0076 =   50    27  202 1423
======================================= FFTAG6      6000 =    27    3 1065 1225 FLAGWRD3    0077 =   52     9  196 1440
F        E7,1726 =   128    4  128  724 FFTAG7      4000 =    27    2 1486 1488 FLAGWRD4    0100 =   54    32  204 1478
FACEREG     0154 =  1476    8 1468       FFTAG8      4000 =    27    5  366  384 FLAGWRD5    0101 =   56    16  143 1445
FACTOR   E7,1613 =   122    5  122  874 FIFPSDP  05,3307      671    1  680      FLAGWRD6    0102 =   58    26  199 1036
FACT1    E7,1615 =   122    5  122  873 FIFTYFPS 10,2330      680    1  680      FLAGWRD7    0103 =   60    27  210 1496
FACT2    E7,1617 =   122    4  122  872 FIGTIME  35,2333      474                 FLAGWRD8    0104 =   61    22  162 1492
FAILBIT     4346 =  1485    1 1485       FIG2EXIT 30,2476      609                 FLAGWRD9    0105 =   63    12  222 1021
FAILDSP  24,3313     710                 FILDELV  E5,1474 =   103    1  103      FLASHOFF    4417     386     6  257 1470
FAILREG     0375      75   14  182 1486 FILDELV1 E5,1474 =   103    8  103  445 FLASHON     4360     385     4  335 1472

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BC BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT                XX MISCELLANEOUS TROUBLE
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GAP: ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971              PAGE 1522

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H      REFERENCES     SYMBOL      DEF     H      REFERENCES     SYMBOL      DEF     H      REFERENCES

FLASHSUB 10,3504     1472   3 1470 1472 GAIN1     21,3121     1020   1 1002      GENRET    E6,1770  =  119   5  119  572
FLGWRD10    0106  =   65  22  196 1325 GAIN2     21,3137     1020   1 1004      GENSCL    00,2346     1161   2 1161
FLGWRD11    0107  =   67   5  196  599 GAMA      E6,1722  =  116   3  116  894 GENSCR    00,2277     1160   4 1159 1181
FLSHRCST    4765  = 1477   7 1463 1475 GAMCOMP   11,2602     1337   3 1336 1337 GENSHFT2  00,2224     1158   1 1158
FLUSHJET    6000     1065   3 1063 1066 GAMDIFSW     0136  =   58              GENSHIFT  00,2214     1158   1 1149
FMOON    30,2147      462   2  459  460 GAMDOT    E6,1723  =  116   7  116 1072 GENTRAN      5607     1483  11  223 1483
FORCEV25 42,3501      363   1  362      GAMDVX    32,3663      934   3  932  934 GEOCOMPS  E5,1643  =  103
FOREHUNT 25,3021      871   2  862  871 GAMDV10   32,3464      932   3  928  929 GEOCOMP1  E5,1643  =  103   4  435  444
FORTYONE 13,3553     1325   1 1317      GAMDV15   32,3511      932   1  932      GEOCONS1  33,3440      452   1  445
FOUR        4766  = 1204  22  308 1430 GAMDV20   32,3515      932   2  932      GEOCONS2  33,3442      452   1  445
FOURSEC  16,2526      731   2  726  727 GAMDV25   32,3520      932   1  934      GEOCONS3  33,3444      452   2  445
FOURTEEN    4321  = 1178   1 1175      GAMDV30   32,3530      932   1  932      GEOCONS4  33,3446      452   1  445
FOURTH   26,3325  =  889   2  856  888 GAMDV32   32,3550      933              GEOCONS5  26,3333  =  448   1  445
FPX2     17,3355     1054   2 1054      GAMDV33   32,3554      933   1  933      GEOIMUTT  33,2002      427   1  444
FRANDRES 05,2000  =   28   1  194      GAMDV35   32,3557      933   1  933      GEOM      05,3717     1291   2 1289 1296
FRCS2    24,3533      714   1  737      GAMDV40   32,3563      933              GEOMSGN   E5,1674  =  100   7  100 1297
FREECHK  21,2205     1002               GAMDV45   32,3570      933              GEORGEJ   33,3436      452   2  441  442
FREECCNT 21,3310     1024   1 1024      GAMDV47   32,3616      934   1  933      GEOSAVED  E5,1631  =  103
FREEFBIT    4766  =   48               GAMDV50   32,3622      934   2  933      GEOSAVE1  E5,1631  =  103   5  438  447
FREEFLAG    0014  =   48   7  755  776 GAMDV55   32,3641      934   1  934      GET.LVC   04,3200      495   2  695  723
FREEFUNC 21,3076     1018   1 1017      GAMDV60   32,3647      934   1  934      GET+MGA   27,2444      495   2  485  645
FREETAU  21,3112     1020               GAMDV65   32,3654      934   2  934      GETAKS    21,3227     1021   1 1022
FREPFRAC 17,2533      949   2  727  947 GAMMA     E7,1455  =  125   5  125 1256 GETANGLE  25,2217      857
FREPSET  16,2325      727   1  726      GAMMAEI   E7,1760  =  124  13  123  910 GETARG    32,2046      647   1  648
FRESHCAP 21,2551     1012   1 1001      GAMMAL    E7,1760  =  123   4  865  868 GETCADR   01,3142     1219   1 1235
FRSTPAS  24,2206      680   1  679      GAMMALI      0026  =  123   6  864  867 GETCOMP   41,2510      344   5  342  344
FSUBO    26,3644     1251   1 1246      GAMMASB   E4,1713  =   94   2  292  941 GETDHOOK  25,2533      865   1  865
FT99999  40,3771      642   2  641      GAMPREV   E7,1465  =  133   7  133  681 GETDLEWD  25,2677      868   1  868
FUDGE    E7,1547  =  134   3  134  460 GAMRP        0010  = 1241   3 1237 1241 GETDOWN   34,2331      541   1  538
FULLDSP  40,3546      391   1  390      GCOMP     E3,1471       89  20   89  775 GETECC    12,3726     1303   1 1303
FULLDSP1 40,3547      391   1  390      GCOMPSUB  06,3425      312   6  310  311 GETERAD   13,2570     1239   4  635 1242
FULTKBIT    4767  =   66   1  279      GCOMPSW   E3,1477       89   9  308  435 GETETA    26,3077      859   1  857
FULTKFLG    0243  =   66   3  279  587 GCOMPVER  33,3212      449   1  426      GETINREL  40,2221      329   5  327  332
FURST3      7673  =  608   2  394  597 GCOMP1    06,3544      314   1  314      GETLCX    15,2667     1082   1 1081
FV       E4,1601  =   93  15   93 1351 GCOMP4    33,3354      451   1  451      GETMAXDT  13,3452     1324   1 1323
FVACCADR 01,3506     1411   1 1413      GCOMP5    33,3370      451   3  241  451 GETNEWNM     5455     1407   1 1407
FWDFLTR  20,3300      975   2  967  971 GDESELCT  07,3560     1434   1 1429      GETNOW    23,2443      519   1  519
FX       E7,1652  =  122   8  122  880 GDT/2        1045  =   78   4   79  841 GETOFF    15,3106     1085   1 1085
FXADRS   43,3511     1399   2 1400      GDTSETUP  20,2413      719              GETOFF2   15,3132     1086   1 1085
FXFX     43,3475     1399   1 1400      GDT1/2       1106  =   79   2   79  841 GETON1    15,3047     1084   1 1084
FYX2     17,3521     1057   2 1057      GEADDR       6105     1111   1 1111      GETON2    15,3072     1085   1 1085
F2RTE       0012  =   48   3  925  933 GENDDV    00,2567     1167   2 1166 1170 GETOPCMD  10,2047      176   1  177
F2RTEBIT    4764  =   48               GENMARK   10,3250     1468              GETPART2  01,3502     1411   1 1218
====================================== GENMASK      0162  = 1476   4 1461 1473 GETPRIO      5451     1407   2 1407 1410
GAINCHNG 16,3067      951               GENPL     E5,1444  =  102              GETRPSV   11,2554     1337   1 1337

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SYMBOL      DEF   H     REFERENCES       SYMBOL      DEF   H     REFERENCES       SYMBOL      DEF   H     REFERENCES

GETRVN   31,2301     512   2  510  511 GOEXTVB  43,2000     249   1  336      GOTOGE      6644    1130   1 1129
GETRVN5  31,2264     511   1  510      GOFLASH  10,2743    1463  27  402 1463 GOTOPOOH    4103     206  55  201 1444
GETRVN6  31,2275     512   2  511      GOFLASHR 10,3101    1465   5  616  905 GOTOR23  43,2600     268   1  249
GETTCRLQ 41,3063     357   2  356      GOFLASH2 10,2745    1463  13 1460 1465 GOTOUPSY 25,3032     872   1  868
GETTF    31,2357     619   6  610  617 GOGOMARK 10,2634    1460               GOTOV56     4546     640   2  396  585
GETUM    23,3017     576   3  580  762 GOGOPROG 04,2266     213   1  213      GOVNUPDT 40,3156     369   1  340
GETUNITV 25,2137     856   1  856      GOINT    35,2734     483   2  476      GOXDSPF  10,2576 =  1476  17  254 1495
GETVEL   25,2133     856   1  856      GOITER   12,3451    1298   1 1298      GRABANG  21,3410    1027   1 1024
GETX     12,3032    1292   3 1289 1302 GOLOADLV 43,2265     257   6  249  250 GRAD     E7,1651 =   122   3  122  879
GET45    35,3055     485   3  485      GOLOC       0705 =    76  30 1411 1416 GROUPKIL 04,2255     212
GIMBY    21,2710    1015   2 1015      GOMARKF  10,2576    1460   5  258 1476 GRP2PC   11,2327    1332  30  574 1348
GIMDTEST 20,2415     719   1  719      GOMARKFR 10,2607    1460   3  568  941 GRP2SVQ  E7,1536 =   125   4  125 1332
GIMLOCK1 23,3422    1359   1 1358      GOMARK2  10,2601    1460   1  785      GRRBKBIT    4764 =    57   2  261  448
GIMTRIM  20,2444     719   3  719      GOMARK4  10,2604    1460   1  241      GRRBKFLG    0125 =    57   1  271
GL+NOATT    5004 =   393   1  392      GOMAXL/D 25,3470     880   4  874  880 GSELECT  07,3352    1430   3 1429
GLAMPTST 06,2513     156   1  156      GOMOD    04,2264     212   1  214      GSHIFT      7555    1149   1 1117
GLIMITER 25,3474     880   1  880      GOMOVE   27,2435     402   1  402      GTSCPSS  33,2703     443   1  426
GLINVERT 06,2504     156   1  156      GONEBIT     4757 =    58               GTSCPSSA 33,2711     444   1  443
GLOCKCHK 06,2433     155   2  155      GONEBY      0160 =    61   4  857  879 GTSCPSS1 33,2001     426   1  225
GLOCKMON 06,2426     155   1  153      GONEGLAD 25,3466     880   3  879  880 GTSFIN   42,2122     283   1  358
GLOCKOK     5323 =   168   4  156      GONEPAST    0137 =    58   4  861  881 GTSFINLC 41,3153     358   1  358
GLOKFAIL    0056 =    52   2  428 1359 GONXTBNK 43,3614    1400   3 1400      GTSFOUT  42,2114     282   1  345
GLOKFBIT    4753 =    52   1  428      GOPERFRS 10,3151    1467               GTSFOUTL 41,2557     345   1  344
GMAX     E7,1721 =   123   3  123  814 GOPERFS  10,3071    1465               GTSOPNDZ E5,1655 =   103
GMAX/2   26,3161     887   2  880      GOPERF1  10,3067    1465  11  215 1442 GTSWTLST E5,1645 =   103
GMDIFBIT    4756 =    58   2  894 1066 GOPERF1R 10,3147    1466   1  795      GTSWTLT1 E5,1645 =   103   3  435  438
GMERGE   07,3417    1431   1 1434      GOPERF2R 10,3154    1467   1  394      GUESSBIT    4767 =    50
GOALMCYC 41,2347     340   1  359      GOPERF4  10,3074    1465   3  456  744 GUESSW      0034 =    50   4  490 1297
GOANIDLE 10,3365    1470   1 1471      GOPIN    43,2117     251  16  252  278 GWAKE    07,3314    1428   1 1428
GOBAC    13,3563    1325   2 1325      GOPLAY   10,3315 =  1476   1 1465      GWAKE2   07,3254    1427   1 1428
GOBAQUE  11,2726    1339   3 1341 1348 GOPOOCAD 10,3753    1477   1 1474      GYCRS    14,2212     747   1  748
GOBB        4051     140   2  139  140 GOPOOFIX 04,2000     206   1  206      GYMDIBIT    4770 =    60   3  804 1064
GOBKCALB 33,3202     448   1  447      GOPOSLAD 25,3521     880   1  880      GYMDIFSW    0150 =    60
GOBL/2      1053 =    79   3   79  836 GOPROG   05,2563     198   2  139  140 GYROAGRE 07,3266    1427   1 1427
GOBL1/2     1114 =    79   4   79  840 GOPROG2  05,3015     201   1  213      GYROBUSY 07,3307    1428   1 1427
GODSP    10,2702    1462               GOPROG3  05,2730     200   3  200      GYROCMD     0047 =    40   8  160 1433
GODSPALM 41,2350     340  19  335  379 GOPROG4  05,2744     200   3  200  201 GYROEXIT 07,3463    1432   1 1432
GODSPR   10,2710    1462   4  395  809 GOP76    27,2042     220   1  223      GYROFRAC 07,3561    1434   2 1431 1434
GODSPRET 10,2705    1462   3  449  774 GOQ      41,3020     356   1  356      GONBYBIT    4761 =    61
GODSPRS  10,3103    1465   4 1460 1467 GOREDO20 27,2213     396   1  395      ======================================
GODSPRS1 10,3105    1466   2 1462 1463 GOSHOSUM 43,2735 =   273   1  250      H        E4,1611 =    93   8   93 1349
GODSPR1  10,2711    1462               GOSLEEPS 10,3210    1467   3 1465 1475 HABIT       4762 =    67
GODSPR2  10,2712    1462   1 1462      GOTO        6615    1129  13 1130 1196 HAFLAG      0255 =    67   3  653  662
GODSP2   10,2703    1462               GOTOADDR E7,1645 =   122  14  122  883 HAFPA1   E7,1471 =   133   5  674  677
GOESTIMS 33,2070     428   1  428      GOTOERS     6631    1129   1 1129      HALF        4753 =  1204  26  427 1501

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HALFDP   04,3757 = 1206   1 1338      HIND        0143 =   59   3  868  871 ICDUFAIL 06,2706 =  167   1  168
HALFNFLT 23,2265    306               HINDBIT     4763 =   59               ICDUFLBT    4755 =   84   1  391
HALFPR      4752 = 1081   1 1082      HIPRIO   10,2766   1463   1 1463      ICDUINHT    4766 =   85   3  151 1419
HALFREV  27,2442    495   2  495      HISCALAR    0003 =   42   2  432 1132 ICORK2   43,2151    254
HALVE    26,3333 =  889   7  865  889 HISECON  42,3304    350   1  350      IDADDTAB 42,2557    291   2  282
HAMDELH  E4,1767 =   96   2   96  654 HITEMIN     0123 =   70   3  362  363 IDAD1TEM    0150     71   4  282  357
HANG20   06,2072    143   1  142      HITEMOUT    1212 =   82   4  349  351 IDAD2TEM    0151     71   2  282
HAPO     E4,1754 =   96   3   96  646 HIUNITX  26,3333 =   34   4  298  940 IDAD3TEM    0152     71
HAPOX    E4,1742 =   95   6   95  524 HIUNITY  26,3331 =   34   2  298  941 IDLEBIT     4763 =   49
HARTBURN 27,2000    219   1  219      HIUNITZ  26,3327 =   34   3  298  941 IDLECADR 43,2720    271   1  262
HAVDNRNG 25,3451    879   1  879      HI10     07,3774   1447   1 1446      IDLEFAIL    0030 =   49   3  706  712
HAVEBASE 31,2177    510   1  507      HI5         4344    385   9  143 1400 IDLEMASK    7675 = 1477   1 1472
HAVEGUES 11,2002    490   1  729      HI6ZEROS 26,3335 =   34  31  525 1386 IDLERET1 10,3522   1472   1 1473
HAVENORM 05,3751   1291   1 1291      HMCSI    23,3233    677   1  676      IDLESLEP 10,3743   1476   1 1468
HBCFADR  17,2522    949               HMSIN    42,3361    362   1  359      IERASTST    6074   1111   1 1111
HBD11/2  E6,1430    106               HMSOUT   42,3137    348   1  345      IFAILINH 05,3240    205   1  199
HBD12    E6,1431    106               HOLDFLAG    1340     86  20  182 1029 IFAILJMP 06,2760    168   1  148
HBD21/2  E6,1435    106               HOLDFUNC 21,3404   1027   1 1024      IFAILOK  07,3155   1425   1 1424
HBD22    E6,1436    106               HOLDW    E5,1664 =  101   7  101 1258 IFLAGC   13,3176   1318   1 1319
HBD31/2  E6,1442    107               HOPALONG 30,2061    459   1  461      IFLAGP   13,3153   1318   1 1318
HBD32    E6,1443    107               HOP1     20,2212    460   1  460      IFLEGAL  10,3025   1464   1 1464
HBN10    E6,1425    106   1  949      HOP2     20,2214    460   1  460      IGC      E5,1761 =   99   6   99 1359
HBN11/2  E6,1426    106               HOP29DSP 30,2015    459   1  457      IGNFLAG     0153 =   60   1  711
HBN12    E6,1427    106               HORISLP  E6,1775 =  120   1  634      IGNFLBIT    4754 =   60   2  702  713
HBN20    E6,1432    106               HORIZ.1  31,3155    635   1  637      IGNITION 24,2664    702   2  233  713
HBN21/2  E6,1433    106               HORIZ.2  31,3321    637   1  637      IGSAMEX  27,2312    399   1  399
HBN22    E6,1434    106               HORIZ.3  31,3330    637   1  637      IMEDIATE 01,3561   1413   4 1412 1415
HBN30    E6,1437    107               HORIZ.4  31,3333    637   1  637      IMODES30    1333     84  69  135 1440
HBN31/2  E6,1440    107               HORIZ.5  31,3335    637   1  637      IMODES33    1334     85  43  144 1425
HBN32    E6,1441    107               HORIZ.6  31,3324    637   1  634      IMPLBURN 24,2773    703   1  702
HDOT     E7,1740 =  124   2  293  547 HORIZALT    1345     86   1  635      IMPLCONT 24,3016    704   1  704
HDSUPBIT    4756 =   66   2  196  216 HORIZON  E7,1752 =  134   6  134  638 IMPULBIT    4760 =   51   2  702  704
HDSUPFLG    0232 =   66               HPER     E4,1756 =   96   2  291  646 IMPULCHK 24,2702    702
HEADSUP  E6,1726 =  116   6  116  853 HPERMIN  E4,1711 =   94   5   94  525 IMPULSW     0044 =   51   1  733
HERE     26,3565   1248   1 1248      HPERX    E4,1744 =   95   5   95  525 IMUAOK   21,2622   1013   1 1013
HIDPHALF 26,3333 =   34  12  305 1356 HRCON    42,3446    363   2  362      IMUATTCK 43,2364    260   1  249
HIDP1/4  26,3325 =   34   4  820 1386 HRCON1   42,3206    349   1  349      IMUBACK  33,2005    427
HIENERGY 12,3465   1298   1 1298      HUNTEST  25,2373    863   4  863  875 IMUBAD   07,3625 = 1435   4  151 1435
HIGHGAIN 20,2114    420   1  420      HUNTEST1 25,2442    864   1  863      IMUCADR     1335 =   85   3  204 1435
HIGH1    15,3432 =  663   1  663      HUNTEST3 25,2561    865   1  870      IMUCAGE  06,2566    160   1  168
HIGH2    23,3137    587   1  676      ====================================== IMUCAL   33,2000 =   33   6  427  452
HIGH3    23,3141    587   1  582      I        E6,1653 =  110  14  110  993 IMUCAL3  32,2000 =   32   1  431
HIGH4       7675   1203   5  141 1477 IAVG     E6,1470    107   2  734      IMUCOARK 43,2143    253   1  253
HIGH9       7677   1203   4  487 1112 IAVG/TLX E6,1471    107   1  948      IMUCOARS 07,2724   1420   3  254  788
HIMINCON 42,3305    350   1  350      IBNKCALL    4714   1106  39  145 1426 IMUCOARV 43,2164    254   2  254  255

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IMUCOMP   06,2000  =   28    1  308       INCRQCK      5651    1485    5  168 1435 INRLBIT      4764  =   59
IMUFAIL   06,2706  =  167    1  168       INCRSVG   24,3137     706    1  726      INRLSW       0144  =   59    2  861  862
IMUFINE   07,3133    1424    3  256 1439 INDEP     E7,1767  =  130    4 1285 1286 INROLOUT  25,2351     862    3  861  862
IMUFINED  07,3153    1424    2 1424 1429 INDERASE     6155    1112    1 1112      INT-ABRT  11,2751    1339    1 1339
IMUFINEK  43,2227     256    1  249       INDEX        6115    1112    1 1110      INT/W     35,3753    1327    2 1326
IMUFINEV  43,2257     256    1  256       INDEXI    23,3737    1369    1 1368      INTADR    13,2241     515    1  514
IMUFINHT     4765  =   85    5  151 1425 INDEXLOC     0130  =   70   12 1112 1194 INTALM    35,2055     467    1  467
IMUFIN20  07,3133  = 1439    1  788       INDEX2       6133    1112    1 1112      INTBANK   13,3144    1317    1 1317
IMUFLBIT     4754  =   84    2  391 1425 INDINC    07,2273     246    2  245  246 INTBIT15     0115      70    6   70 1112
IMUMON    06,2167     147    1  145       INDJUMP      6243    1117    6 1111 1114 INTB15+      0114      70    2   70
IMUNITBT     4763  =   85    7  151 1435 INDWORK      6153    1112    1 1112      INTEGRV   13,3236    1320   12  227 1329
IMUOP     06,2620     162    1  168       INFINAPO  12,3755    1303    2 1303      INTEGRVS  13,3211    1319    7  457  923
IMUOPBIT     4760  =   84    4  150 1440 INFINBIT     4762  =   62                 INTEGRV1  13,3240    1320    2 1318
IMUOP2    06,2646     163    1  162       INFINFLG     0200  =   62    4 1289 1298 INTEGRV2  13,3243    1320    1 1349
IMUPULSE  07,3244    1427    7  256 1504 INFINITY  12,3250    1295    5 1292 1295 INTERB0   00,2000  =   27    2 1119 1152
IMUSE        0007  =   47    5  214 1442 INFLIGHT  23,2000  =   31    1 1354      INTERB1   01,2000  =   27    1 1192
IMUSEBIT     4761  =   47    2  162  212 INHOLD    21,3474    1029    1 1029      INTERCEP  16,3761     996    1  989
IMUSEFLG     4761  = 1439    3  151  162 INITA     27,2620     590    1  591      INTERF3      6000  =   27    2 1108 1120
IMUSTALL  07,3644    1437   11  252  788 INITDSP   10,3263    1469    1 1411      INTEXIT   13,3331    1321    3 1323 1324
IMUSTLLG  33,2126     430    5  427  442 INITIALW  27,2612     590    3  580  633 INTFLAG      0227  =   65
IMUVAR    27,2460     588    2  581  584 INITLOC2  17,2537     949    1  944      INTFLBIT     4753  =   65    4  199 1325
IMUVARR   32,2025     623    1  615       INITRET   04,3024     222    2  222      INTGRATE  11,3275    1344    2 1344 1345
IMUZERO   07,2627    1418    2  252  427 INITRL1   25,2362     862    1  861      INTIME    E7,1502  =  126    6  126  492
IMUZEROA  07,2637    1418    1 1418      INITROLL  25,2260     861    1  853      INTINIT   13,2000  =   29    4  227 1328
IMUZERO2  07,2677    1419    1 1418      INITST    05,3277     671    1  672      INTINIT1  11,2000  =   29    1 1320
IMUZERO3  07,2706    1419                 INITST1   35,3560     671    1  680      INTINIT2  35,2000  =   33    1 1326
IMUZROBT     4764  =   85    2 1418 1419 INITSUB   04,2767     221    2  206  211 INTINIT3  05,2000  =   28    1 1330
IM30INIF  05,3247     205    1  195       INITSUBA  04,3002     222    3  212  222 INTINT    35,2740     483    6  479  686
IM30INIR     7660  =  205    1  199       INITSUBB  04,3030     222    1  270      INTINT2C  31,3606     686    2  676  677
IM33INIT     5055  =  205    2  195  199 INITV     12,3546    1300    2 1298 1299 INTINT3P  31,3615     686    2  667
INBOUND   27,3341    1381    1 1380      INITVEL   11,2000     490    2  480  716 INTLOOP   35,2044     467    1  467
INCORBIT     4756  =   56                 INITVELX  11,2240     494    1  494      INTMCTBS  41,2116     335    2  335
INCORFLG     0117  =   56   10  579  616 INITVEL1  11,2022     490    1  490      INTOTHIS  13,2176     514
INCORPEX  E4,1641  =   93    5  542 1239 INITVEL2  11,2056     491    1  493      INTPRET      6006    1108  245  211 1496
INCORP1   36,3260    1252    3  581  631 INITVEL3  11,2101     491    2  491      INTPRET1  26,2000  =   31    1 1205
INCORP2   36,3472    1256    3  582  632 INITVEL4  11,2133     492    1  492      INTPRET2  04,2000  =   27    1 1206
INCOR1    36,3314    1253    1 1253      INITVEL5  11,2157     492    1  492      INTRSM       6017    1108    1 1215
INCOR1A   36,3323    1253    1 1253      INITVEL6  16,2000     493    1  493      INTSETUP  36,2150     555    1  554
INCOR1B   36,3352    1253    1 1253      INITVEL7  16,2003     493    1  492      INTSTALL  13,3516    1324   31  211 1496
INCOR1C   36,3360    1253    2 1253      INITVEL8  11,2221     494    1  493      INTTEMP   E6,1506     108    2  108  112
INCOR2    36,3421    1254    2 1254 1261 INITZOPT  06,3213     172    1  171      INTVAL    33,2671     443    2  435  439
INCOR2AB  36,3451    1255    1 1255      INLINK       0045  =   40    2  204 1446 INTVALUE  05,3420     958    1  956
INCOR3    36,3455    1255    1 1255      INPUTDSP  04,3546     663    2  653  661 INTVAR    E4,1777  =   96    1  581
INCR      01,2403    1193    1 1118      INREL        0137  =   71   24  327  333 INTVEC    E5,1476  =  103
INCRDCDU  22,3100     418    2  419  421 INRELTAB  40,2225     329    2  329  331 INTVEC1   E5,1476  =  103    3  445

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED           = DEFINED BY EQUALS           J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL        DEF  H      REFERENCES    SYMBOL        DEF  H      REFERENCES    SYMBOL        DEF  H      REFERENCES

INTVEL    11,2000 =    29   2  490  493 ITEMP3       0063      69   6   69 1479 JETADDR   21,3767    1035   1 1034
INTVEL1   16,2000 =    30   1  493      ITEMP4       0064      69   8   69 1434 JETAG     E6,1711 =   115  10  115 1089
INTWAKE   13,3527    1325   3  642 1321 ITEMP5       0065      69   2   69 1408 JETCALL   15,3276    1039   1 1088
INTWAKEC  27,3120    1331   1 1331      ITEMP6       0066      69   3  167 1408 JETCALL1  15,3237    1088   1 1088
INTWAKEM  27,3115    1331   1 1331      ITERATOR  12,2610    1285   1 1298      JETCALL2  15,3262    1088   3 1088
INTWAKEU  27,3072    1331   1 1499      ITERCTR      0026 =  1307   2 1285 1286 JETCALL3  15,3246    1088   1 1089
INTWAKEX  27,3132    1331   1 1331      ITISMASK     7667 =  1477   1 1472      JETEM     E6,1720 =   116  23  116 1078
INTWAKE0  13,3525    1324   4  274 1332 ITISMOON  37,3324     840   1  840      JETEM2    E6,1624 =   117   3 1076
INTWAKE1  13,3547    1325   3 1325      ITNON1BT     4762 =    85   3  150  159 JETROLL   16,3664     992   2  992
INTWAKLM  27,3130    1331   1 1331      ITNON2BT     4761 =    84   3  150      JETS      21,3452    1029   4 1018 1027
INTWAKUP  27,3141    1332   1 1331      ITR0         6337    1120               JETSLECT  17,2541    1038   1 1035
INTY      E5,1500 =   102   6  440  441 ITR1         6326    1120               JJ        E7,1761 =   123   8  878  879
INTYBIT      4765 =    53               ITR10        6111    1111               JLOOP     21,3456    1029   1 1034
INTYPFLG     0070 =    53  18  456 1329 ITR11        6151    1112               JN        21,3666    1032   5 1031 1032
INTZ      E5,1504 =   102               ITR12        6103    1111               JNDX      E6,1617 =   116   9  116 1087
INVC100   32,2455     912   1  899      ITR13        6162    1112   1 1112      JNDX1     E6,1620 =   116   6  117 1088
INVC107   32,2475     913               ITR14        6206    1114               JOBSLEEP     5163    1210   8  428 1481
INVC109   32,2500     913   1  913      ITR15        6072    1111               JOBSLP1   01,2767    1215   1 1210
INVC115   32,2525     913   1  913      ITR7         6230    1115               JOBSLP2   01,3000    1215   1 1217
INVC120   32,2531     913   1  913      ITSAJOB   01,3576    1413   1 1412      JOBWAKE      5167    1210  14  383 1481
INVC125   32,2540     913   1  913      ITSAJOB2  01,3707    1415   1 1414      JOBWAKE2  01,3014    1216   1 1210
INVRSEQN  12,3172    1294   1 1294      ITSATBL   01,3612    1413   1 1411      JOBWAKE3  01,3026    1216   2 1216
IOGARATE  E6,1654 =   110   3  110  989 ITSAVAR   01,3512    1411   1 1411      JOBWAKE4  01,3020    1216   1 1216
IRETURN   E4,1613 =    93   8   93 1321 ITSAWAIT  01,3531    1412   1 1411      JOBXCHS   10,3226    1468   2 1463 1464
IRETURN1     0773      77   5 1328 1330 ITSEVEN   01,3713    1416   1 1413      JP        21,3675    1032   6 1031 1032
IRIGCCMP  06,3344     310               ITSINDIR     5470    1412   1 1412      JSWCHBIT     4753 =    47
IRIGX     06,3346     310               ITSLGCL1     5477    1414   2 1414 1415 JSWITCH      0001 =    47   5 1344 1349
IRIGY     06,3362     310               ITSLGCL2  01,3650    1415   1 1414      JTAGTIME  37,3153     835   1  829
IRIGZ     06,3376     310               ITSLIKE8  01,3563    1413   1 1411      JTIME     21,3740    1034   4 1031 1032
IRIG1     06,3422     312   2  308  312 ITSLNGCL  01,3675    1415   1 1411      JUMPTVC4  16,3313     962   2  962
ISCADR+0     4240     381   2 1472      ITSNOVAC  01,3606    1413   1 1413      J18       21,3641    1031   2 1030 1032
ISITN00   10,3401    1470   1 1470      ITSWBIT      4753 =    60               J2REQSQ   13,3753    1353   1 1341
ISITP00   04,2116     210   1  209      ITSWICH      0152 =    60   5  467  667 J20       21,3645    1031   1 1030
ISITPRIO  10,3462    1472   2 1472      ITSWTLST  01,3702    1415   1 1414      J21       21,3656    1031   1 1030
ISITP79   31,2137     509   1  508      ITURNON   06,2537     158   1  168      J22       21,3704    1032   5 1030 1031
ISSERVON  04,2151     210   1  210      ITURNON2  06,2562     159   2  158  163 J23       21,3715    1032   7 1030 1031
ISSUP     06,2320     151               IXX       E6,1467     107   4  734  957 J24       21,3727    1032   2 1031
ISSWOFF   06,2721     166               ======================================= J4REQ/J3  13,3743    1353   2 1341
ISSWON    06,2731     166   1  166      J/M       E6,1623 =   113   3  113 1034 J6.       21,3527    1029   1 1029
ISSZERO   06,2354     152   1  160      J/M1      E6,1624 =   113   2  113  734 J7        21,3553    1030   1 1030
ISWCALL      4720    1106   1  962      J/M2      E6,1625 =   113   2  113  734 J8        21,3562    1030   1 1030
ISWRETRN     4727    1106               JAMTERM      4247     381   1 1472      =======================================
ITCTR     E7,1504 =   126   4  490  493 JANESUB   27,2000 =    32   1  219      K.01      37,2165     458   1  458
ITEMP1       0061      69  46   69 1486 JCAXIS    31,3516     639   1  632      KACDS     26,3247     888   1  860
ITEMP2       0062      69  24   69 1480 JETACTN   15,3270    1088   2 1088 1089 KALCMAN3  22,2000     403   2  395  597

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT          XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971                PAGE 1527

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL       DEF    H       REFERENCES      SYMBOL       DEF    H       REFERENCES      SYMBOL       DEF    H       REFERENCES

KALCMON1 22,2000  =   30    5  403  423 KNOWNBIT     4761  =   59                   LANDLONG E4,1750  =   95    5   95  619
KALCMON2 22,2000  =   30    1  409      KNOWNFLG     0141  =   59    4  563  611 LANDMARK E7,1751  =  134   20  134  783
KALCMON3 10,2000  =   28    1  422      KPIP1    37,3364      841    2  833  841 LARGE    00,3064     1175    1 1175
KALIM    26,3315      889    2  861      KPRIMEDT E6,1626  =  109    6  109  947 LARGE2   00,3111     1177    2 1175 1176
KALUPDT  21,3170     1021    1 1014      KRESUME1 21,2424     1007    1 1002      LARGE3   00,3073     1177    1 1175
KASCALE  26,3233      888    1  856      KRESUME2 21,3177     1021                LARMENT      5703     1486
KAT      E7,1717  =  123    4  123  862 KR1      26,3013      814    1  813      LASINEX  00,3626     1189    1 1189
KATEST   25,2354      862    1  862      KR2      26,3017      814    1  813      LASTBIAS 06,3655      317    1  826
KA2      26,3307      889    1  861      KR3      26,3021      815    1  813      LASTGTS  33,3050      446
KA3      26,3311      889    1  862      KR4      26,3027      815    1  813      LASTMASP E6,1522  =  108
KA4      26,3313      889    1  862      KSPNDX   E6,1664  =  118    7  118  419 LASTSEG  07,3447     1432    1 1433
KC3      26,3257      889    1  868      KT       E4,1754  =   95    7   95  472 LASTTIME 01,3453     1235
KDPNDX   E6,1665  =  118    4  118  419 KTETA    26,3235      888    1  859      LAT          0746  =   77   15   77 1238
KEEPPRIO 10,3010     1464    2 1469 1473 KTETA1   04,3751      820    1  820      LAT(SPL) E7,1400      121   13   36  911
KEP      25,3312      877    1  872      KTLX/I   E6,1630  =  109    4  109  948 LAT-LONG 13,2453     1236    6  458  911
KEPCONVG 12,2375     1281    3 1279 1280 KTRCS        4753  = 1092    1 1084      LATANG   E7,1675  =  123    8  123  881
KEPC1        0042  = 1306    3 1277 1293 KT1      26,3237      888    1  859      LATBIAS  26,3243      888    1  881
KEPC2        0044  = 1306    3 1277 1293 KVSCALE  26,3231      888    1  856      LATITUDE E5,1402      102    3  431  538
KEPLERN  12,2077     1277    2 1334      KWE      26,3245      888    1  890      LATLONG  13,2000  =   29    2 1236 1241
KEPLOOP  12,2233     1279    1 1280      KID      26,3225      888    1  875      LATLONG1 16,2000  =   30    1 1241
KEPPREP  11,2336     1333    3 1322 1339 K1K2LOOP 32,2145      649    1  649      LATSLOPE 26,3150  =  889    1  852
KEPRTN   E4,1667  =   93    3 1281 1334 K1ORK2   07,2500      678    1  678      LATSW        0145  =   59    1  874
KEPZERO  04,3761  = 1288    3 1278 1302 K1RTE    35,3663      939    2  899      LATSWBIT     4765  =   59    1 1081
KEPZ     25,3316      877    2  861  877 K2.      24,2123      679    2  679      LAUNCHAZ E5,1633  =  103    8  183  544
KEYCALL  07,2142      243                K2CALC   32,2143      649    1  649      LBCFADR  17,2523      949    1  947
KEYCOM   07,3675     1445    1  243      K2D      26,3227      888    2  875  876 LBN1     17,2502      949    1  949
KEYRPTBB     4052  =  140    2  139  140 K2ROLL   E7,1643  =  122    7  122  881 LBUF2    00,2467     1164    2 1188 1190
KEYRUPT  07,2000  =   28    1 1445      K2RTE    35,3665      939    1  899      LCHAN        0001  =   42   17  144 1496
KEYRUPT1 07,3666     1445    1  139      K3RTE    35,3667      939    1  900      LCX/360  E6,1614  =  116   18  116 1085
KEYTEMP1     0073  =   69    6 1446 1447 K4RTE    35,3671      939    1  900      LDANZIG  00,3710     1190    1 1189
KEYTEMP2     1137  =   81    2 1446      ==================================== LDLOOP72 27,3667     1498    1 1499
KILLGRP4 26,2505      804    1  875      L            0001  =   40  217   42 1498 LDNDUMP  05,3654     1102    1 1102
KILLJETS 16,3752      995                L/D      E7,1633  =  122   13  122  883 LDNDUMPI 43,2711      271    1  271
KILLMON  41,3303      365    1  365      L/DCALC  E7,1726  =  123    1  858      LDNDUMP1 05,3655     1102    1 1102
KILLSIVB 33,3611      531    1  530      L/DCMINR E7,1627  =  122    4  122  883 LDNPHAS1 05,3241      205    1  202
KILL20   04,2321      213    2  213      L/D1     E7,1635  =  122    5  122  883 LDNPHAS2 05,3574     1099    1 1096
KILMONON     4235      380    4  372  391 LAD      E7,1623  =  122   17  122  881 LDPLANET 31,3464      639    1  638
KLAT     E7,1631  =  122    3  122  881 LADPAD   E6,1407      106    1  852      LDPOSMAX 04,3772  = 1305    1 1303
KLEENEX  10,2575     1460    3  241  762 LALOTORV 13,2524     1238    8  538  853 LEFT     00,2342     1161    1 1158
KMATRIX  21,2355     1004    2 1001 1002 LAMBERT  12,3255     1296    1  492      LEFT-    00,2336     1161    1 1158
KMJ      E6,1620  =  113    3  113 1004 LAMBLOOP 12,3364     1297    3 1298 1299 LEFTNCOM 40,3037      361    1  361
KMJ1     E6,1621  =  113    2  113  734 LAMENTER 12,2751     1287    1 1300      LEFT5        4333      384    5  342 1400
KMJ2     E6,1622  =  113    2  113  734 LAMPTEST 06,2771      168    2  156  157 LEGALTST 40,2424      332    2  332
KMPAC    E6,1510  =  112   37  112 1053 LANDALT  E4,1752  =   95    4   95  619 LEMCONIC 13,3202     1318    4  500  758
KMPTEMP  E6,1512  =  112    3  112  997 LANDLAT      0746  =   77    2  294  563 LEMMASS  E6,1472      107    6  135  957

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT                 XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL       DEF    H      REFERENCES      SYMBOL       DEF    H      REFERENCES      SYMBOL       DEF    H      REFERENCES

LEMNO    05,3321      956                  LMYDOT   E5,1604  =   97    2  221  500 LOOPCT   E7,1763  =  133    6  133  682
LEMPOS      1053  =    79    5   79  585 LNG(SPL) E7,1402  =  121    7  121  911 LOOPMX   15,3416  =  671    1  673
LEMPREC  13,3161     1318    3   34  512 LNGCALL2 01,3425     1234    1 1234      LOOPSET  32,2140      649    4  648  649
LEMSTORE 22,3300      500    1  500      LOADCDUD 22,3163      423    1  404      LOOPSIN  22,2406      409    1  409
LEMTEST  05,3315      956                LOADCOEF 17,2412      947    2  944  947 LOOP1    23,3672     1368    1 1368
LEMVEC   43,2703      271    1  250      LOADITIS 10,3703     1475    1 1473      LOOP2    23,3671     1368    1 1369
LEMYES   05,3324      956    1  956      LOADLV   41,3001      355    7  334  363 LOOSE    33,2545      441    1  441
LEM52    14,3066      758    1  758      LOADLV1  41,3001  =  334    1  257      LOSCALAR    0004  =   42    5  432  592
LENGTHOT E5,1412      102    8  435  447 LOADSTAT    1217       82    7  356 1475 LOSVEC   E5,1413      102    4  102  451
LEQ      E7,1653  =   122    7  122  880 LOADSTDT 33,2337      437    2  438  439 LOTEMIN     0124  =   70
LESCHK   05,3242      205    1  204      LOADTIME 24,3751     1501   31  431 1330 LOTEMOUT    1213  =   82    1  351
LEWD     E7,1724  =   122   11  863  874 LOADYZ   22,3165      423    1  422      LOTHRUST 24,3143      706    1  725
LEWDOVFL 25,2740      869    1  869      LOC         0164       73   42  223 1476 LOUNITX  04,3757  =   34
LEWDPTR  25,2744      869    1  869      LOCCTR      0064  =   69   29  383 1471 LOUNITY  04,3755  =   34
LEWD1    26,3153      887    1  871      LOCHECK  16,2217      725                LOUNITZ  04,3753  =   34
LFTFLGON 43,2713      271    1  249      LOCSAM   13,2345  =  766    2  750  786 LOWIDCOD 05,2000      179    1 1102
LGCLCADR 01,3137     1218    1 1415      LOCSKIRT 22,2745  =  416    7  404  407 LOWLOAD     4354  = 1476    1 1472
LGCLNCTM 01,3431     1234                LOD      E7,1625  =  122    3  122  880 LOWMEMRY 14,2000      640    1  639
LGCL2CDR    5342     1234    1 1234      LODMIXNN 42,2074      282    1  282      LOWSUPER 30,2000  =   32   14   34 1500
LGCOMP   06,3535      314    2  308  314 LODNLV   42,2112      282    1  282      LOWVERB  41,2037      334    1  335
LGWAKE   07,3323     1428    3 1428 1435 LODNNLOC 41,2114      335    8  335  355 LOW10       5041     1202   18   35 1399
LGYRO       1324       84   11  204 1435 LODNNTAB 42,2056      282    1  335      LOW11       4347      385    6  142 1120
LGYROBIN 43,2255      256    1  256      LODPAD   E6,1410      106    1  852      LOW2        6214  = 1204    1 1158
LIFTTEMP    1126  =    80    5   80  540 LODPHALF 04,3757  =   34    3  726 1302 LOW3        4774  = 1204    2  221 1155
LIGHTON  34,3420      589    2  579  590 LODPMAX  04,3772     1206    1 1305      LOW4        4777     1201    6  215 1479
LIGHTSET 05,3023      201    2  198  200 LODPMAXI 04,3774     1206                LOW5        4342      385   14  214 1446
LIM(-22) 34,3762     1386    1 1381      LODP1/4  15,3411  =   34    1 1240      LOW7        6043     1109   14  210 1475
LIMITCOM 42,3243      350    1  350      LODSAMPT    4366      365    3  365 1446 LOW7+2K     5042     1202    1 1115
LIMITL/D 25,3524      881    8  861  880 LOENERGY 12,3504     1299    1 1298      LOW8        4350      385   18  384 1498
LIMITS      4751  =  1200    9  895 1503 LOG      23,2155      303    1  867      LOW9        5021     1201    7  160 1218
LINUS       5516  =  1476    1  395      LOLIM    12,3543     1300    2 1297      LO6ZEROS 04,3761  =   34    4  729 1288
LINUSCHR 10,3623     1474    2 1463 1464 LOMAT    35,2721      483    4  480  657 LRUPT       0011  =   40
LITTLSUB 33,3450      452    2  450  451 LONG        0750  =   77   12   77 1238 LSDISP   14,2115      745
LLASRD   31,2363      619    3  617  763 LONGBASE    1302       83    2 1409 1415 LSPOS    26,2136      790    3  601 1336
LLASRDA  31,2371      619    2  563  745 LONGCADR    1300       83    2 1219 1234 LSTBNKCH 43,3655     1401    1 1400
LMCRATE  16,3760      996    2  989  990 LONGCALL    5332     1234    5  428 1314 LSTIME   26,2146      790    2  790
LMKLMCOM 14,3105      759    1  758      LONGCLCL 01,3670     1415    2 1415      LSTMRK   14,3411      763    1  762
LMK52    14,3075      759    1  758      LONGCYCL 01,3440     1234    2 1234 1235 LST1     E3,1400       88   46  140 1411
LMMOVE   17,2044      275    1  275      LONGEXIT E3,1434       68    3 1234 1235 LST2     E3,1410       88   36  203 1231
LMOONBIT    4756  =    62                LONGFOR  E7,1543  =  134    4  134  459 LST2CON     5004  =  336    1  336
LMOONFLG    0174  =    62    4   35 1316 LONGGYRO 07,3503     1432    1 1431      LST2FAN  43,2002      249    2  249  389
LMPOS    34,3336      585    2  579  583 LONGPASS 30,2004      458    2  457  461 LTHVACA     5005     1201    5  143  204
LMPTSTBT    4770  =    85    5  166  391 LONGRTRN 01,3457     1235    1 1235      LT5      41,2031      334    2  334
LMTOCM   17,2033      275    1  275      LONGTIME    1304       53   13 1234 1415 LUNABIT     4755  =   52
LMTOCMSV 43,3001      274    1  249      LOONE    27,2673      608    1  600      LUNAFLAG    0060  =   52   23  457 1242

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LUNCHAZ1 E5,1633 =  103    5  103  444 MANUOFF  22,3153    419    1  419      MATRIX   11,3227   1343    2 1340
LUNENT   26,3002    814    1  812      MANUSTAL 22,3131    419                MATRXJOB 34,2115    538    2  231  432
LUNPOS   26,2141    790    3  634 1344 MANUSTAT 20,2064    420    1  418      MAX         0016 = 1307    4 1285 1286
LUNVEL   26,2144    790    1 1345      MANUSTOP 10,2303    422    1  419      MAXANG   22,2367    409    1  404
LV          0044 =   41    2 1175 1177 MANUSTUF 20,2000 =   30    2  420  422 MAXCHECK 12,2677   1286    1 1286
LVBUF       6242   1116    1 1140      MANUVER  27,2000 =   32    2  394  400 MAXCHK   23,2745    525    4  524  646
LVSQUARE    0042 =   41    2 1175 1180 MANUVER1 27,2000 =   32    1  400      MAXCOGA  12,3337   1297    2 1296
LVWTLIST    5251   1223    1 1227      MARKBIT     4765 =   50    3  202  247 MAXDB    24,3521    714    1  708
LWDSTORE 25,2706    869    1  869      MARKCONT 07,2204    244    2  244      MAXDBBIT    4755 =   64    2  222  559
LXA      01,2351   1192    1 1118      MARKCOP  10,2653   1461    1 1461      MAXDBFLG    0212 =   64    2  265  266
LXC      01,2355   1192    1 1118      MARKDATA    1077 =   79    3   79  762 MAXDT    13,3446   1324    2 1323
L14/OUT  40,2575    347    1  347      MARKDIF  07,2165    244    1  244      MAXDV    00,2641   1170    1 1166
L350     25,3536    881                MARKDISP 37,2230    568    1  246      MAXDVSW     0140 =   71    6 1162 1177
L353     25,3551    881    1  881      MARKDONE 07,2275    246    2  246      MAXIN    42,2050    266    1  265
L355     25,3564    881    4  881  883 MARKDOWN E7,1674 =  129    7  129  778 MAXLIM   16,3763    996    2  988  990
L357     25,3627    883    1  881      MARKFLAG    1274     83    2 1460 1461 MAXNM    23,2754    525    3  525
====================================== MARKFLG     0032 =   50    2  245  247 MAXOUT   42,2014    265    1  266
M.6RTE   35,3607    938    1  918      MARKFMSK    7664 = 1477    2 1460      MAXPHI   32,2203    649    3  649
M/SCON1  42,3306    351    1  349      MARKFORM 10,2602   1460                MAXPHIC  32,2207    649    2  649
M/SCON2  42,3307    351    1  350      MARKINDX    0301 =   73   12   73  780 MAXPLS   10,2210    178    2  177
M/SCON3  42,3311    351    4  350      MARKIT   07,2154    244    1  243      MAXPLS1  10,2211    176    2  177
M/SLIMIT 42,3235    350    2  349  350 MARKMONR 10,2612   1460    1  570      MAXRA    27,3252   1377    2 1377
M/SNORM  42,3251    350    7  349  351 MARKNV      0367     75    6 1461 1470 MAXRATE  27,2641    607    2  597
M/SOUT   42,3212    349    1  345      MARKOCT  10,3741   1476    1 1468      MAXRNG   25,3767    887    1  879
MAGCK    07,2574    764    1  764      MARKOVER 10,3643   1475    1 1459      MAXTEST  00,2564   1166    4 1165 1179
MAGVECZ  E5,1721 =  100    6  100 1300 MARKPERF 10,2677   1461    1 1471      MAXTFF   27,3442   1383    1 1382
MAJ+     07,3406   1431    1 1430      MARKPLAY 10,2630   1460    4 1460 1476 MAXTFF1  27,3441   1383    1 1380
MAJ-     07,3541   1434    1 1430      MARKRET  10,3640   1474    1 1473      MAXTFIRE 16,3623    992    1  991
MAKECADR    4665   1105    6  241 1481 MARKRUPT 07,2105    243    2  139  140 MAXTST   16,3627    992
MAKEGEN  10,3744   1476    1 1466      MARKTIME    1061 =   79   19   79  634 MAXVTEST 15,3025   1084    1 1084
MAKEMARK 10,2615   1460    1 1464      MARKWAKE 10,3252   1468    1 1475      MAXVTIM1 15,3044   1084    1 1084
MAKEPLAY 10,3012   1464    3 1463 1476 MARK1/2  05,2340    190    1  189      MAXVTIM2 15,3062   1085
MAKEPRIO 10,2756   1463    1 1464      MARK2    07,2221    245    1  245      MAXWTIME E4,1775 =   96    2   96  586
MAKESERV 37,2747    829    1  830      MARK2DWN E7,1460 =  121    2  183  778 MAX250   35,3144    488    1  473
MAMAX1   E7,1651 =  131    3  131  926 MARK2PAC    1276     83    2 1469 1470 MBDYTCTL 27,2651    607    1  599
MAMAX2   E7,1653 =  131    3  131  926 MARK3/4  05,2347    190    1  189      MCDUYDOT E6,1642 =  109    5  109  970
MANEUBIT    4764 =   66                MARK3MSK 10,3754   1477    1 1460      MCDUZDOT E6,1643 =  109    5  110  970
MANEUFLG    0240 =   66    4  216  586 MARK4MSK 10,3723   1476    1 1460      MCLEANJR 17,2355    946
MANRCT   21,3063   1018    3 1016 1024 MARK5    05,2356    190    1  189      MCOS22.5 35,3635    939    1  904
MANTABLE 21,3065   1018    2 1017 1018 MARSDP   35,3551    645    1  645      MCOS7.5  35,3631    938    1  904
MANTOCSC 06,3137    171    2  171      MARSLEEP 10,3676   1475    1 1461      MDOTRCS  35,3625    938    1  903
MANTOMAN 06,3127    171    1  171      MASSPROP 05,3313    956    5  209  956 MD1         4353    385    4  382 1495
MANUCALL 20,2153    421    1  421      MASSTMP  E6,1734 =  111    2  725  726 MEASINC  36,2000 =   33    1 1252
MANUDES  06,3115    171    1  169      MATINC      0140     71    8   71 1144 MEASINC1 36,2000 =   33    1 1256
MANUEXIT 35,3166    600    1  597      MATMOVE  16,2730    769    4  748  782 MEASINC3 31,2000 =   32    1 1260

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MERRORX  E6,1541 =  112    5  112 1018 MINPERE  23,2455    519    2  522  815 MMTEMP      1264 =   83    2  221
MERRORY  E6,1543 =  112    1  112      MINPERM  23,2453    519    1  522      MNKEYIN     0015 =   42    2  202 1445
MERRORZ  E6,1545 =  112    1  112      MINTAU      4614   1025    3 1024      MNKGOPOO    4105    206    4  486  748
MERUPDAT 21,3042   1018    1 1017      MINTIME2 05,3456   1097    1 1097      MNKPST41 24,3462    712    1  712
METHOD1  22,2234    406    1  406      MINIST   16,3622    992                MODABORT 07,3661   1438    2 1437 1438
METHOD2  22,2210    406                MINUS1      7702 = 1204    1 1431      MODDONE  12,2172   1278    3 1278
METHOD3  22,2260    406    2  405  406 MINUS2      7701 = 1416    2 1258 1411 MODE        0163     73   26  308 1476
MFI      E7,1425 =  125   12  403  405 MIN5     14,3650    781    1  780      MODECADR    1335     85   12   85 1438
MFISYM   E6,1666 =  118   12  405  407 MIS      E6,1720 =  118   18  118  558 MODEEXIT 07,2675   1419    8 1419 1437
MFS      E7,1425 =  125    5  125  403 MISCJUMP    6303   1118    1 1115      MODEGOOD 07,3652   1438    1 1437
MGC      E5,1763 =   99    5   99 1358 MIXAD    41,2257    338    1  338      MODESLP  07,3656   1438    1 1437
MGIM     27,2000 =   32    1  495      MIXBR       0140 =   71   12  282  361 MODESW   07,2000 =   28    1 1418
MGLVFBIT    4767 =   57                MIXCON      5004 =  282    1  282      MODNGDEL 12,2652   1285    2 1285
MGLVFLAG    0130 =   57                MIXNN1   41,2233    338    1  338      MODPSDEL 12,2710   1286    2 1286
MG2      07,3650   1437    1 1438      MIXNN2   41,2245    338    1  338      MODREG      1214     82   23  195 1499
MIDAVBIT    4767 =   65                MIXNOUN  41,2220    338    1  335      MODROUTB 04,2007 =  373    1  373
MIDAVFLG    0224 =   65    3 1321 1348 MIXTEMP     0125 =   70    3  332  338 MODULO   20,2272    461    1  460
MIDOGIM  04,2000 =   28    1  495      MKABORT  07,2071    242    1  242      MONADR   40,2721    359    1  372
MIDFLAG     0002 =   47    6 1320 1351 MKCDUS      0357     74    1  243      MONBACK  41,2433    343    1  366
MIDFLBIT    4754 =   47                MKCDUT      0361     75    1  243      MONBUSY  41,3337    366    1  365
MIDTOAV1 13,3576   1328    1  699      MKCDUX      0362     75    3  243  245 MONDEL      5016 =  365    1  365
MIDTOAV2 13,3566   1328    2  740  808 MKCDUY      0356     74    3  243  245 MONDO    41,3314    365    1  365
MID1FBIT    4766 =   65                MKCDUZ      0360     74    3  243  245 MONITOR  41,3224    364    7  336
MID1FLAG    0223 =   65    4 1328 1330 MKDNCDR  17,2103    778    1  778      MONIT1   41,3226    364
MID2     13,3675   1330    1 1329      MKNOX       0353     74    3  244  246 MONIT2   41,3241    364    2  364
MID5        4343    385    1  356      MKOVBIT     4766 =   56    3 1461 1474 MONREF   41,3233    364    1  365
MID7        4171    366    4  365 1476 MKOVFLAG    0110 =   55                MONREQ   41,3267    365    2  365
MIN         0010 = 1307    4 1285 1286 MKREJECT 07,2344    247    1  243      MONSAVE     1223     82    7  204  366
MIN+     07,3403   1431    1 1430      MKRELEAS 07,2073 =  242    4  429  780 MONSAVE1    1224     82    9  204  388
MIN-     07,3536   1434    1 1430      MKRLEES  07,2073    242    3  241  555 MONSAVE2    1225     82    4  364  378
MINANG   22,2366    409    1  404      MKRQST      4752 = 1477                MOONBIT     4755 =   47
MINBLKTM E4,1772 =   96    2   96  586 MKRUPTBB    4052    140    2  139  140 MOONCASE 16,2462    730    1  730
MINB12      7674 = 1100    1 1097      MKT2T1      0354     74    5  243  246 MOONCNTR 13,2405    766    1  766
MINB1314 05,3511   1097    1 1097      MKVBDSP  07,2023    241    2  242  248 MOONFLAG    0003 =   47   32  457 1351
MINCHECK 12,2643   1285    1 1285      MKVB5X   07,2052    242    2  241  246 MOONGON  23,2635    522    2  518  522
MINCOGA  12,3354   1297    1 1300      MKVB50   07,2054    242                MOONGONA 23,2631    522    1  521
MINCON   42,3450    363    1  362      MKVB51   07,2021    241    1  242      MOONMX   26,3416   1246    2 1243 1245
MINCON1  42,3204    349    1  351      MKVRET   07,2050    242                MOONOTH     0174 =   35    3  274  275
MINCON2  42,3202    349    2  349      MM       E7,1650 =  122    7  122  879 MOONTHIS    0173 =   34    7  274 1258
MINDB       5007   1201    3  558  708 MMADREF  41,2036    334    1  334      MOREROLL 16,3607    991    1  991
MINDEX      1177     81    4  210  221 MMATRIX     0024 = 1251    8 1243 1343 MORNUM   40,2145    328    1  328
MINIRECT 11,3434   1346    2  515 1326 MMCHANG  41,3376    373    2  334  337 MOVATHIS 13,2774 =   35    1 1326
MINKDISP 04,2434    215    6  217  218 MMDSPLAY    5350   1402    1  201      MOVEACSM 13,2774   1315    4   35 1315
MINLIM   16,3762    996    1  989      MMNUMBER    1200     81   15  208  216 MOVEALEM 13,3047   1316    3 1259 1316
MINLIMAP 16,3537    990                MMOK     04,2035    208    1  208      MOVEPCSM 13,3023   1315    3 1259 1315

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MOVEPLEM 13,3070    1316   3 1258 1316 MBRTEB28 35,3615     938   1  901      NEGOPT   40,2521     346   1  345
MPAC        0154      73 752  200 1506 M9RTEB28 35,3613     938   1  899      NEGOUT   13,2644    1247   1 1240
MPAC+    00,2436    1164   2 1163      ====================================== NEGP     12,3462    1298   3 1297 1298
MPAC+6      0162  =  347   6  347  385 NAVKEYIN    0016  =   42   5  201  243 NEGRATE  07,2610     764   1  764
MPAC-    00,2432    1163   2 1163      NBDONLY  06,3561     315   1 1225      NEGSGN   40,2271     330   1  326
MPACSHR  00,2033    1152   2 1160 1181 NBDX     E3,1460      88   6  308 1225 NEGTESTS 25,3202     874   1  875
MPACSRND 00,2050    1153   1 1152      NBDY     E3,1461      88   2  310  315 NEGTFF   27,3436    1383   2 1382
MPACTST  42,3464     363   1  362      NBDZ     E3,1462      88   2  311  315 NEGTOVFL 12,2373    1281   1 1280
MPACVBUF    7466    1148   4 1144 1367 NBD2     06,3577     315   1  317      NEGVEL   21,3520    1029   3 1029
MPAC2SAV    0165  = 1476   2 1461 1470 NBD3     06,3606     315   1  315      NEG0        4771    1200  18  143 1421
MPERFMSK 10,3733    1476   1 1460      NBPOSPL  33,2011     427   1  449      NEG1        7702  = 1204   6  314 1435
MPERIOD  26,2134     784   1  783      NBRANCH  11,3212    1343   4 1340 1351 NEG1/2      4751    1209  10  176 1231
MPTEMP      0135      70  62  386 1191 NBRCYCLP E6,1725  =  110   4  110  728 NEG100      5221    1223   2  638
MR.KLEAN 05,2536     196   2  195 1489 NBRCYCLS E6,1724  =  110   9  113  731 NEG12    00,3726    1191   3 1159 1181
MRCLEAN  17,2166     943   2  943  962 NBUSMASK 10,3727    1476   1 1464      NEG180   40,2731     360   1  359
MRKBUF1  E7,1722  =  129  58  129  834 NB1NB2   23,2277     306   2  297  629 NEG2        7701    1203  11  217 1416
MRKCHK22 07,2235     245   1  245      NB2NB1   23,2255     305   4  298  299 NEG3        7700    1203   8  333 1498
MRKIDBIT    4752  =   54               NCDU     E6,1666  =  118   3  418  419 NEG30    04,2406     215   1  208
MRKIDFLG    0074  =   54               NDCMPTST 41,2435     343               NEG30000    7671    1203   2  394  597
MRKNVBIT    4760  =   55   1 1460      NORMSBIT    4757  =   60               NEG37    31,3525     639   1  638
MRKNVFLG    0102  =   55               NOUTINPT 36,2117     554   3  556      NEG4        6061    1110   4 1048 1473
MRKREJCT 07,2367     247   1  247      NDXCHNGE 12,2305    1279   2 1279      NEG47    14,3647     781   1  781
MRKRTMP  E6,1444  =  107   4  698  719 NDXCTR   E5,1421     102   3  427  428 NEG47UT  36,2475     560   1  556
MRUPTBIT    4764  =   55   1 1468      ND1         4352     385   7  330  448 NEG6     04,3770  =  215   1  209
MRUPTFLG    0106  =   55               NEARLY1  26,3343  =  303   1  303      NEG7        5736  =  224
MSIN7.5  35,3633     938   1  904      NEARONE  26,3343  = 1386   7  303 1383 NEG79    04,2031     208   1  208
MSTORE1  01,2364    1192   2 1193 1196 NEAR1/4  26,3163     887   2  857      NEJETBTS 24,3616     737   2  737
MU(P)       0032  = 1353               NEEDLBIT    4760  =   47   1 1021      NETZERO     6070    1111
MUCHTIME 01,3462    1235   2 1234      NEEDLEIN 17,2321     945   1  945      NEWANGL  22,3052     418   3  416  559
MUEARTH  13,3737    1353   9  491 1353 NEEDLER  21,2425    1009   9  541 1090 NEWANGLE 26,3543    1248   4 1246 1249
MULTEXIT    5722    1486               NEEDLER1 21,2436    1009   1 1009      NEWAZMTH E5,1635  =  103   3  447  452
MUM      13,3735  = 1353               NEEDLER2 21,2467    1009   2  260 1009 NEWAZ1   E5,1635  =  103   2  444
MUSUBC   E7,1557  =  134   3  134  460 NEEDLES  21,2503    1010   1  261      NEWDEL   12,2706    1286   2 1286
MUSUBE   E7,1551  =  134   4  134  460 NEEDLES3 21,2476    1010   1 1009      NEWDELHI 22,3037     418   1  421
MUSUBN   E7,1573  =  134   2  459  460 NEEDLEUP 16,3063     951               NEWDELX  12,2325    1280   3 1279 1280
MUSUBS   E7,1565  =  134   3  134  460 NEEDLE11 21,2450    1009   1  260      NEW1BIT     4754  =   62
MUTABLE  11,2300    1305   5  496 1289 NEEDLFLG    0006  =   47   1  257      NEW1FLG     0172  =   62   3 1319 1324
MWAITBIT    4756  =   54               NEG         6710    1131   4 1131      NEWJOB      0067      69  23  203 1401
MWAITFLG    0100  =   54               NEG.2    40,2525     346   1  360      NEWLIST  05,3467    1097   2 1097
MXM3     22,2304     408   4  398  418 NEGAMA   25,2750     870   1  865      NEWLMBIT    4753  =   62
MXV         7270    1143   1 1117      NEGBPW   05,3444     958   1  956      NEWLMFLG    0171  =   62   3  565  763
MYSTEND  22,3161     420   1  418      NEGCOS   13,2636    1240   1 1240      NEWLOC      0065  =   69  10  224 1216
MYSUBS   21,2000  =   30   1  997      NEGMAX      4752  = 1204  12  421 1226 NEWMODE     6027    1109   6 1125 1502
M144RTE  35,3601     938   1  932      NEGONE      7702    1203  26  169 1394 NEWMODEA    5347    1402   4  215 1499
M15RTE   35,3603     938   1  915      NEGOPCMD 10,2170     177   1  177      NEWMODEX    5344    1402  11  435 1493

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NEWOPS       6037     1109    1 1108       NO.MMS       0047  =  227    1  227       NOLEM     17,2614    1039    1 1038
NEWPAR    14,2545      752    1  752       NO.PASS      0737      76    2  565  763  NOLEMVAL  05,3410     958    1  956
NEWPHASE     4126      238    8  438  829  NO.I5VAR  21,2633    1013    1 1012       NOMDNLST  05,2113  =  179
NEWPRIO      0063  =    69   12  221 1466  NO.WDS       6213    1114    5 1114 1182  NOMTIG    E7,1447  =  121    6  121  730
NEWRNVN   26,2257      793    1  793       NO.05G    25,2255     858    1  858       NOMTPI    E4,1754  =   96    9  467  668
NEWROLL   16,3612      991    2  991       NO.12-10  16,3735     993    1  993       NOMXFIRE  16,3635     992    1  992
NEWSTATE  12,2723     1287    1 1289       NO.13-15  16,3705     993                 NONAVKEY  05,3043     202    5  196  202
NEWTBIT      4757  =    56                 NO.16-14  16,3726     993                 NOOPRATE     4077     178    3  171  177
NEWTFLAG     0120  =    56    2  457  461  NO.9-11   16,3714     993    1  993       NOPC      04,2642     218    1  218
NEWTN     10,2347      680    2  680       NOACCALM     4764  =   85    1 1425       NOPIE     35,2622     479    1  479
NEWZCMP1  31,3730     1260    2 1260       NOACY     17,3111    1045    3 1044       NOPOLY    34,2612     548    3  540
NEWZCCMP  31,3705     1260    1 1254       NOADJUST  42,3567     941    2  940  941  NOPOLYM   33,3750     545    1  548
NEXBNKSS  33,3336      450                 NOATTOFF  07,3207    1425    4  151 1424  NOP01BIT     4755  =   49    3  195 1446
NEXTBNKS  33,3322      450                 NOAZCHGE  33,3152     447    1  445       NOP20     04,2431     215    1  215
NEXTCDU   07,3004     1421    4 1421 1422  NOAZFLG1  34,3505     596    1  596       NOQBRSM      5327    1232    1  140
NEXTCCL   11,3541     1348    2 1349       NOAZIM    36,2105     554    1  553       NOQRSM       5325    1232    4  204  995
NEXTCORE  01,2667     1212    2 1211       NOBDZ     17,3027    1043    3 1042 1043  NORATE    21,3032    1018    1 1017
NEXTES    35,2500      476    1  475       NOCHANGE  21,2753    1016    1 1016       NORESET   07,3347    1429
NEXTIME   E6,1671  =   118    3  421       NOCHORLD  33,3155     447    1  446       NORFBIT      4756  =   47
NEXTINCL  05,3474     1097    1 1097       NOCOARSE  05,2676     199    1  199       NORFHOR      0004  =   47    4  637  638
NEXTINSL  05,3622     1099    1 1097       NODAPUP   43,2522     262    1  262       NORFINAL  13,3405    1323
NEXTLINE  23,2573      521    1  521       NODDOT    26,3634    1251    1 1246       NORMADR   42,3310     351    1  350
NEXTOPT   10,2157      177    4  177  178  NODIO     26,3642    1251    1 1246       NORMBNCH  10,3306    1469    1 1475
NEXTVEC1  31,2527      629    1  629       NODISKY   25,3604     882    1  881       NORMEX       1023      78   16  473  670
NEXTVEC2  31,2537      629    1  629       NODOBIT      4770  =   52    3  210 1067  NORMGAM   E4,1614  =   93    5   93 1261
NEXTW2W8  30,2521      610    1  610       NODOFLAG     0054  =   52    7  228 1488  NORMLIZE  37,3154     836    3  234  827
NEXT1     25,3177      874    1  874       NODOP01      0022  =   49    1  537       NORMLOP   33,2421     439    1  439
NICKELOP  35,3556      671    1  674       NODSPOUT  06,2126     145    2  143       NORMRET   10,3651    1475    3 1473
NINE         4322  =  1204    8  447 1044  NODSPY    06,2150     145    1  145       NORMSW       0156  =   60    7  491 1291
NINE84    26,2232      791    1  791       NOEBANK   43,3314    1396    1 1397       NORMTEM1     1250  =   82    3  769 1466
NINETEEN     4351  =   949    2  945  951  NOFLASH   24,3466     712    1  710       NORMTEST  00,3507    1186
NJET      17,3342     1053    3 1049 1052  NOGAMDOT  37,3620     894    1  894       NORMT4    06,2007     141    2  141
NJETSBIT     4752  =    48    2  721       NOGAMDUT  15,2300    1072    1 1071       NORMWAKE  10,3553    1473    1 1475
NJETSFLG     0017  =    48    3  732  903  NOGIMRUN  06,2466     156    3  155  156  NORMZI       0044  = 1261   12 1260 1261
NJ22      21,3600     1030    2 1030       NOGO      22,2723     415    1  404       NOROLL    16,3661     992    6  989  992
NJ23      21,3631     1031    2 1031       NOGOM2    22,2720     415    1  418       NOROLLI   16,3746     995    1  996
NN        E7,1765  =   133   12  130  676  NOGOM3    22,2717     415    1  557       NOROLIT6  16,3754     996    1  992
NNADTAB   42,2127      283    1  282       NOGOOD    36,2253     556    1  556       NOSAM     14,3664     787
NNADTEM      0146       71    8  282  358  NOGUESS   12,3530    1299    1 1297       NOSAVPIP  37,2723     829    1  828
NNTYPTAB  42,2273      287    1  282       NOHIAUTO  21,2724    1015    1 1015       NOSWBIT      4762  =   59
NNTYPTEM     0147       71    5  282  357  NOIBNKSW     6032    1109    1 1149       NOSWITCH     0142  =   59    3  872  881
NN1       E7,1765  =   131    1  292       NOIMUDAP     4763  =   85   11  151 1424  NOTBIT12     7674  =  393    2  392  393
NN1A      E7,1727  =   131   12  899  929  NOINT     13,2753    1314    1 1313       NOTCDH    27,2066     221    1  220
NN2       E7,1545  =   131    8  131  932  NOKILL    43,2750     273    1  273       NOTIME    05,3756    1330    2 1329 1330
NC.CORES  01,2627     1211    2 1211 1216  NOLDCALC  25,2253     858    2  858       NOTPLAN   14,3700     787    1  787

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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SYMBOL      DEF    H       REFERENCES       SYMBOL      DEF    H       REFERENCES       SYMBOL      DEF    H       REFERENCES

NOTR67ND 22,2740      415   1  415         NVBNKTEM     1243      82   1  378         N49DISP  E7,1501 =  125  13  292  632
NOTSET   35,3544      645   1  645         NVBUSMSK 10,3732     1476   3 1471 1477    N89ERRX  30,2323     563   2  563
NOTTPI   27,2044      220   1  220         NVCADR   10,3724     1476   1 1472         N90/N81  12,2005     657   2  654  656
NOTYET   20,3644     1066   1 1066         NVCOM    40,2254      330   1  330         N90RET   E5,1551 =  105   5  105  663
NOT4TH   14,3407      763   1  762         NVDSP    10,3315     1469   3 1461 1476    N90TAG   12,2000 =   29   1  656
NOUN     40,2265      330   1  327         NVDSP1   10,3347     1470   1 1470         ====================================
NOUNADD      0145 =    71  25  338  384    NVMONOPT     4203     378   1 1470         OBLATE   11,2754    1340   2 1336 1337
NOUNCADR     1222      82   9  335  384    NVQTEM       1242      82   3  378         OBTAINEL 30,2300     562   1  564
NOUNREG      1205      82  15  204  383    NVSAVE       0370      75   3  195 1475    OCCLCOMP 31,2515     629   1  631
NOUNTEM      0122 =    70   3  338         NVSBBBNK     4223     378   2  378         OCCOS    13,2445     767   2  766  767
NOUNTEST 41,2453      343   2  353  354    NVSBENDL 40,3431      383   1  372         OCCULT   14,2552     752   2  751
NOUT         1221      82   9  143  390    NVSUB        4202     378   3  250 1476    OCDUFBIT     4762 =   85   5  169 1405
NOUTCON      4775 =  1204   1  204         NVSUBB   41,3513 =    334   1  378         OCDUFTST 06,3221     173   2  169  172
NOUVEAU  04,2352      214   1  211         NVSUBCOM     4212     378                  OCDUINMT     4767 =   86   2  170  173
NOVAC        5121    1208  23  241 1475    NVSUBEND     4224     378   3  379  383    OCTAL3       6214    1114   1 1204
NOVACADR     5310    1225   1 1413         NVSUBUSY 10,3476     1472                  OCTBACK  41,3372     370   1  372
NOVAC2   01,2620     1211   1 1208         NVSUB1   41,3513      379   2  334  378    OCTHIRTY     5001 =  174   4  169
NOVAC3   01,2623     1211   1 1212         NVSUB2   41,3537      379   1  379         OCT00010     4765 =  221
NOVAC30      5120    1208   5  144 1445    NVTEMP       0123 =    70   8  378  382    OCT00060 21,3061    1018
NOVRWRT  35,2676      481   1  482         NVWORD       0366      75   6 1467 1475    OCT00300 21,3062    1018
NOV37MM  04,3173      227   1  210         NVWORD1      0777      77  23  528 1471    OCT01120 04,3051     224
NOXLNCMD 17,2625     1039   1 1038         NV50DSP  10,3350     1470   3 1461 1471    OCT01400 21,3060    1018   1 1030
NO2Y     17,3370     1055   4 1055         NWAITBIT     4757 =    55                  OCT01760 21,3057    1018   1 1016
NO2Z     17,3374     1055   3 1056         NWAITFLG     0101 =    54                  OCT02200 20,2460     720   1  718
NPJETS   E6,1523 =    112   7  112 1050    NWNGL17D 22,3073      418                  OCT02202 24,3520     714   1  700
NRJETS   E6,1522 =    112  13  112 1056    NXPOSVEL 40,3724      641   1  641         OCT10000     4754 =  201
NRMAG        0040 =  1371   7  818 1381    NXTBNK   43,3565     1400   2  273 1401    OCT10001     7617 = 1204
NRMIDBIT     4754 =    54                  NXTFL33  06,2424      154   7  164  165    OCT11        4322 = 1200   1  579
NRMIDFLG     0076 =    54                  NXTIBT   06,2412      154   3  154         OCT12        4355 =  714   1 1092
NRMNVBIT     4761 =    55                  NXTIFAIL 06,2222      148  11  157  163    OCT120       5014 = 1204   1  996
NRMNVFLG     0103 =    55                  NXTIFBIT 06,2210      148   3  148         OCT13        4775 =  174   2  170  747
NRTERM       0020 =  1371   7  818 1380    NXTRST   05,2766      201   1  201         OCT14        5775    1409   5  168 1476
NRUPTBIT     4765 =    55                  NXTSUPR  43,3612     1400   1 1400         OCT140       5015 = 1204
NRUPTFLG     0107 =    55                  NXXTBNN  33,2717      444                  OCT1400      5024    1201  11  211 1411
NSEC     15,2620     1079   1 1077         NYJETS   E6,1524 =    112   6 1041 1051    OCT14000     5053 = 1408   2 1407 1408
NTP/2    23,3165      676   2  676         NZERO    17,2524      949   2  943  946    OCT15        4776    1200   4  166 1178
NTP/2A   23,3177      676   1  677         NZEROJR  17,2525      949   1  946         OCT15000     5054 =  168   1  166
NUCHANG2 01,3002     1215   1 1220         N10      E6,1705 =    110  39  110  980    OCT16        4321 = 1178   2  786 1178
NUDIRECT 01,3207     1220   1 1220         N22ORN17     0220 =    64   2  257         OCT16000 21,3064    1018   4 1016 1027
NUFAZ+1C     4140     238                  N2217BIT     4763 =    64   1 1021         OCT17        4777 =  589   1  578
NUJET    E6,1612 =    116   7  116 1088    N26/PRI      1016      78   5  283  374    OCT1720  06,2776     168   1  164
NUM      40,2074      327   9  326  327    N26/2CAD     1017      78   1  374         OCT176   00,2126    1155   2 1161
NUMGRPS      4773 =   205   2  200  201    N45ENAJ  35,3113      486   1  486         OCT177       6043 = 1406   1 1413
NUVCSM   E3,1600       90   1  633         N45NORM  35,3075      486                  OCT17770     5036    1202   2 1406 1408
NUVLEM   E3,1652       90                  N45PROC  35,3071      485   1  485         OCT21        4352 =  354   1  354

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SYMBOL      DEF    H       REFERENCES     SYMBOL      DEF    H       REFERENCES     SYMBOL      DEF    H       REFERENCES

OCT22       5000     1201   2  224 1447 OCT77770    5736     1488   2  224 1394 OMEGAYB   E6,1535 =  108   1  967
OCT220   01,3750     1440   1 1440      OC40010     7664 =    168   1  167      OMEGAYC   E6,1527 =  108   2  943  966
OCT23       4351 =   1204   1 1114      OGA       E6,1647 =   110   6  110  989 OMEGAZB   E6,1537 =  108   2  970  971
OCT24       4124      208   8  174 1492 OGAD      E6,1447     107   2  702  951 OMEGAZC   E6,1531 =  108   1  970
OCT25       4353 =   1204               OGAERR    E6,1647 =   110   1  951      OMEGMOON 13,3136     1317   1 1317
OCT2600     5044     1202   1 1470      OGANOW    E6,1645 =   110  10  110  987 ONCEMORE 33,2612      442
OCT27/24    4615 =    714               OGAPAST   E6,1646 =   110   3  110  987 ONE         4770 =   1204 173  143 1503
OCT272   06,2774      168   1  160      OGARATE   E6,1533 =   110  10  136  991 ONE/C    31,3474      639   2  630
OCT30       5001 =    354   1  354      OGC       E5,1757 =    99  21   99 1359 ONEBIT   15,3431     1288   3  663 1299
OCT30000    4346 =    201               OGCPL    33,2220      432   1  442      ONEB4    34,3770 =    791   1  791
OCT30002    6440 =   1204               OHWELL1  42,3647     1494   5 1494      ONEDPF   33,2667      443   2  433  447
OCT31       4125      208   5  363  833 OHWELL2  42,3672     1494   4 1494 1495 ONEORTWO    5416     1407   1 1408
OCT34       4172      366   3  245  362 OKGIMB   21,2717     1015   3 1015      ONETHTH  35,3562      672   1  674
OCT34300 10,3734     1476   1 1460      OKMAX    35,2454      475   1  475      ONMNITOR 37,2770      831   1  831
OCT37       4342 =   1201   3  202  700 OKN81    22,3550      685   3  685      ONROLL   16,3500      990   1  989
OCT37737 06,2160      145   1  156      OKPHI    22,2715      414   1  414      OPDEGIN2 40,2766      360
OCT37766    7661     1203   2  551 1000 OKTHETA  22,2675      414   1  414      OPDEGOUT 40,2505      345   1  345
OCT37774    7662     1203   1  202      OKTOCOPY 10,3002     1464   2 1463 1468 OPDISAB  06,3256      173   1  169
OCT37776    7663     1203   7  145 1473 OKTOENT  10,3530     1473   1 1475      OPFAILOF 06,3247      173   1  173
OCT40       4763 =    174   1  171      OKTOGRAB 13,3561     1325   1 1324      OPFAILON 06,3232      173
OCT40001    6056     1110   2 1204 1226 OKTOPLAY 10,3043     1464   3 1464      OPIMDIFF 43,2165      254   1  253
OCT40010    7664 =   1423   2 1423 1425 OKU12    22,2250      406   1  406      OPJUMP      6046     1109   1 1109
OCT40200    7670     1203   2 1485      OKU21    22,2224      406   1  406      OPJUMP2     6216     1115   1 1109
OCT40201 01,3117     1218   1 1226      OKU31    22,2274      407   1  407      OPJUMP3     6232     1116   1 1115
OCT404   14,3310      761   1  761      OKZDELAY 00,3745     1481   1 1481      OPMD1BIT    4764 =     85   1  169
OCT41    26,2545      806   1  795      OLDAZMTH E5,1637 =    103   3  444  447 OPMD2BIT    4765 =     85
OCT44571 04,3046      224   1  211      OLDAZ1   E5,1637 =    103               OPONLY   06,2342      152   1  150
OCT50       5004     1201  11  214 1476 OLDBT1      1277 =     83   1  833      OPTCADR     1336 =     85   2  241  242
OCT51    17,2032      274   2  274  275 OLDELP   E6,1706 =    115   3  115 1071 OPTCOARK 43,2166      255   1  253
OCT54       5005 =    143               OLDELQ   E6,1707 =    115   3  115 1070 OPTCOARV 43,2164 =    255   1  255
OCT55000 40,3634      393               OLDELR   E6,1710 =    115   3  115 1071 OPTC1    43,2207      255   3  255
OCT600   04,3047      224   1  211      OLDMKTME E7,1733 =    130   3  130  587 OPTDATA  33,3221      449   1  449
OCT60000    4076 =   1204   2  107 1408 OLDPRIO     5430     1407   1 1410      OPTDATA8 33,3231      449   1  449
OCT605   35,3627      938   3  901  932 OLDUYA   E7,1533 =    122   3  122  890 OPTDEGIN 40,2761      360   1  359
OCT612   35,3630      938   1  913      OMEG/MS  33,2223      432   2  431  432 OPTDRIVE 10,2000      175   1  145
OCT613   16,3036      920   1  920      OMEGA    E7,1457 =    125   9  125 1256 OPTDRV   10,2000 =     28   1  175
OCT62       5011 =   1442   2  215 1442 OMEGAB   E6,1533 =    108   9  108  182 OPTFLAG  E7,1545 =    126   5  513  515
OCT6200  05,2562      197   1  196      OMEGAC   E6,1525 =    108  13  108  727 OPTIND      1323       34  23  169  757
OCT7        4774 =   1478   3 1406 1411 OMEGACLC 16,2323      727               OPTINITH 05,3251      205   1  195
OCT700   10,3732 =   1477   1 1470      OMEGAES  E4,1546 =     93   1  791      OPTINITR    5001 =    205   1  199
OCT740   06,2777      168   1  161      OMEGAM1  E5,1642 =    101   3  101 1257 OPTIONEV    1256       33   1  518
OCT74777 05,3245      205   1  202      OMEGAM2  E5,1650 =    101   3  101 1257 OPTIONVN 24,2102      506   1  506
OCT75       5012     1201   1  167      OMEGAM3  E5,1656 =    101   3  101 1257 OPTIONX     1255 =     32   5  279  506
OCT75252 06,3557      314   1  156      OMEGAXB  E6,1533 =    108               OPTION1     6775       71   6  135 1465
OCT77603 05,3244      205   1  202      OMEGAXC  E6,1525 =    108               OPTION2     6776       71  14  182  903

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OPTMODES     1337        85   33  135 1485 PACTIVE   05,2774        201    1  201      PDXCHNGE 12,2341     1280    2 1280
OPTMON    06,3001       169    1  145      PACTOFF   E6,1423        106   16  135  962 PEGGY    05,3362      957    2  958  957
OPTNTYPE     1351        86    4  555  744 PACTIMP   E6,1655   =    110    4  110  953 PERFCHEK 10,3361     1470
OPTTEST   06,2124       145    2  145      PADLONG      1135   =     80    1  538      PERFDLAY E5,1656  =  103    3  428  444
OPTVARK   20,3356       976    1  976      PARAM     17,3727       1289    4  915 1303 PERFERAS 33,2607      442
OPT2      10,2046       176                PARAM30   35,3505        644                PERFMASK 10,3717     1476    2 1465 1467
ORBITAL   11,2000   =    29    2 1332 1333 PARTRACK  43,3103        279                PERFRQST    4764  = 1477    2 1461 1470
ORBITAL1  11,2000   =    29    1 1352      PASSCNT      1131   =     80    3  565  765 PERF2MSK    5001  = 1476    1 1467
ORBITAL2  13,2000   =    29    1 1352      PASSIVE   22,3314        500    4  476  667 PERF2D   14,2320      748    2  747  749
ORBWFBIT     4763   =    53                PASSNN    04,3561        663    1  663      PERF4MSK    5775  = 1476    1 1465
ORBWFLAG     0066   =    53   15  227 1349 PASSOUT   30,2122        461    2  460      PERIAPO  22,3204      498    1  674
ORDERBIT     4763   =    63                PASSTIME  E7,1541   =    134    5  134  461 PERIAPO1 22,3174      498    3  468  677
ORDERSW      0201   =    62    3 1285 1286 PASS75    04,3516        662    1  662      PERIODCH 12,2160     1278    1 1278
ORIGCHNG  11,3360      1345    2 1320 1345 PASS82    04,3537        663    1  663      PERORLIM 20,2727      967
ORIGEX    E4,1667   =    93    7   93 1345 PASTEOPT     4157        366    1  366      PERRB    E6,1575  =  109    4  109  969
OTHINT    31,2244       511    1  512      PASTEVB      4151        366    3  343  372 PFAILOK  07,3175     1425    1  151
OTHPREC   13,3161   =    34    2  515  518 PAXERR    E6,1476   =    117    1 1090      PFAILOK2 07,3170     1425    1 1425
OT40010      7664      1203    3  168 1477 PAXERR1   E6,1713   =    115    9  115 1090 PFORWARD 20,2730      967
OUT       13,2227       515                PBIAS     24,3545        714    1  697      PFRATBIT    4765  =   52    2  700  744
OUTPULSE  07,3461      1432    2 1432      PBIASX    E3,1452         88    1   88      PFRATFLG    0051  =   52    4  698  755
OUTPUT    20,2431       719    3  719      PBIASY    E3,1454         88                PGNCSALT    1133  =   80    2   80  538
OUTTAG    E6,1611   =   116    4  116 1089 PBIASZ    E3,1456         88                PHASCHNG    5402     1406  112  206 1500
OUTO         0010   =    42    5  142  146 PBLASTOK  17,3211       1050    1 1049      PHASETAB 10,2000  =   28    2 1402 1408
OVERADAY  23,2243       305    1  305      PBODY     E4,1550         93   19   93 1351 PHASETMP E6,1611  =   11    2  946  947
OVERFFIX  33,2122       430    1  431      PBYPASS   17,3361       1054    1 1049      PHASE1      1156       81    4  201 1410
OVERFLOW     6766      1134    3 1133 1156 PCBIT        4770   =     67    1  216      PHASE2      1160       81
OVERFLWY     6763      1134    4 1132 1156 PCDUDOTS  20,2653        966                PHASE3      1162       81
OVERFLWZ     6760      1134    4 1132 1156 PCDUYPST  E6,1636   =    109    4  109  974 PHASE4      1164       81
OVERNOUT  25,3575       881                PCDUZPST  E6,1637   =    109    4  109  974 PHASE5      1166       81    3  540  838
OVF+      00,2413      1162    2 1162      PCFLAG       0244   =     67   10  216  748 PHASE6      1170       81
OVFIND       0121        70   13  898 1214 PCLOOP    05,2745        200    1  200      PHEXIT   13,3302     1321    1 1321
OVFLCLR   12,3253      1295    1 1295      PCMANBIT     4752   =     65    1  555      PHICALC  32,2166      649    1  649
OVRLINE   15,3060      1085    1 1085      PCMANFLG     0226   =     65    5  208  509 PHIDOT   E6,1705  =  115    7  115 1090
OVRLINE1  15,3066      1085    2 1083 1085 PCMD      E6,1623   =    109    9  109  969 PHIV     E4,1565  =   93    8   93 1347
OVRLINE2  15,3070      1085    1 1085      PCON      E7,1717   =    131    3  131  935 PHI2     E7,1750  =  131    6  131  927
OVSPOT    21,2524      1010    1 1010      PCOPY     20,3004        969    2  963  968 PHI333   E6,1506  =  108   11  108  937
OZONE     10,2016       175    2  175      PCOPYCYC  20,3002        968                PHSBB1   E3,1437       88
====================================== PCP76     04,2644        218    1  218      PHSBB2   E3,1441       88
P         E5,1741   =   100   15  100 1303 PDA          0026   =     74    2  299      PHSBB3   E3,1443       88
P(T1)     E7,1745   =   131    3  131  912 PDAPEND   20,3003        968                PHSBB4   E3,1445       88
P/RJCODE  15,2634      1080    4 1074 1088 PDDL         6472       1126    1 1117      PHSBB5   E3,1447       88
P/RPRE       0032   =   132    2  915  916 PDELOFF   E6,1605   =    109    7  109  967 PHSBB6   E3,1451       88
PAC       E5,1775   =    99   10   99  786 PDSPFBIT     4755   =     54    3  395  590 PHSCHK2  16,3302      962
PACLIM    20,2745       967                PDSPFLAG     0077   =     54    3  395  572 PHSCHNG2 10,2473     1408    1 1407
PACTEMP      0330   =    74    4  759  764 PDVL         6526       1127    1 1117      PHSNAME1 E3,1436       88    7  223 1413

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

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BD BADLY DEFINED      CD DEFINITION ASSOCIATED WITH CONFLICT          XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF

SYMBOL     DEF    H      REFERENCES       SYMBOL     DEF    H      REFERENCES       SYMBOL     DEF    H      REFERENCES

PHSNAME2 E3,1440      88                PIPASCFY E3,1455      88                POLY        7171     114   10  303 1385
PHSNAME3 E3,1442      88                PIPASCFZ E3,1457      88                POLYCNT     0140 =    71    4 1140 1141
PHSNAME4 E3,1444      88                PIPASR   37,3171     837    2  827  828 POLYCOEF 12,3074    1292    1 1294
PHSNAME5 E3,1446      88    2  895      PIPAX       0037 =    40   11  135 1501 POLYCOM     7201     114    1  114
PHSNAME6 E3,1450      88                PIPAY       0040 =    40    6  135 1501 POLYLOC  E6,1673 =   118    1  548
PHSPART2 01,3724    1416    1 1218      PIPAZ       0041 =    40    8  182 1501 POLYLOOP    7211    1141    1 1141
PHSPRDT1    1260      83    5 1407 1415 PIPCHECK 37,3012     832    1  832      POLYNUM  E6,1661 =   118    3  118  543
PHSPRDT2    1262      83    3  211  628 PIPCTR      1066 =    79    4   79  831 POLYRET     0141 =    71    3 1140 1141
PHSPRDT3    1264      83    1   83      PIPFAIL  06,2653     164    1  168      POLYSTOP E6,1703 =   119    2  119  543
PHSPRDT4    1266      83    1  221      PIPFREE  07,3231    1426    1  834      POLY2       7214    1141    1 1141
PHSPRDT5    1270      83    1  869      PIPFREE2 07,3226    1426    1 1426      POOBIT      4760 =    55
PHSPRDT6    1272      83    2  645      PIPLOOP  37,3026     832    2  832      POODOO      5726    1488   10  372 1464
PHS2CADR 01,3127    1218    1 1411      PIPSDONE 37,2653     828    1  839      POOFIZZ  04,2311     213    1  213
PI/16    34,3760    1386    2 1382 1384 PIPTIME     1043      78   20   78 1327 POOFLAG     0063 =    55    2 1314 1324
PI/4.0   23,3015     575    2  574  631 PIPTIME1    1104 =    79    9   79 1329 POOH     04,2216     211
PICEND   14,2606     753    1  751      PIPUSE   07,3214    1426    2  317  435 POOKLEAN 05,2542     196    1  212
PICKANG1 27,2334     399    1  399      PIPUSE1  07,3220    1426                POSDEL   12,2672    1286    1 1285
PICKAXIS 27,2355     400    2  398      PIP2FLBT    4754 =    85    3  154 1425 POSDELX  12,2313    1280    1 1279
PICKX    27,2407     400    2  400      PITCHANG    0026 =   941                POSEC    42,3323     351    2  351
PIC1     14,2456     751    3  751  752 PITCHDAP 20,2644     966    1  981      POSECADR 26,2430     799    1  795
PIC2     14,2461     751    1  751      PITCHTIM 17,3153    1049    3 1055 1056 POSEXIT  E6,1724 =   116    5  116  895
PIC3     14,2470     751    6  751  752 PITCHT5  20,3616     981    2  970  974 POSGN    40,2304     330    1  326
PIC4     14,2473     751    1  751      PJETS    17,2722    1041    3 1040 1061 POSITON  E5,1423     102    4  427  432
PIKUP20  36,2157     555    2  230  555 PLANET   14,3651     786    4  754  776 POSMAX      4750     120   35  157 1231
PINACT   05,3001     201    1  201      PLANTIN  26,2000 =    31    1 1243      POSNV    E5,1530 =   103    2  441
PINBALL1 40,2000 =    34   11  326  640 PLANVCUT E7,1731 =   130    3  130  603 POSNI7C  33,2744     445    2  444  447
PINBALL2 41,2000 =    34    7  334  378 PLANVEC  E5,1600 =    97    6   97  776 POSOPCMD 10,2153     177    1  177
PINBALL3 42,2000 =    34    3  282  362 PLAYJUM1 10,3061    1465    3 1469 1476 POSTAND  26,3735    1443    2 1442 1443
PINBRBIT    4763 =    55                PLAYTEM1    0155 =  1476   23 1459 1467 POSTBURN 24,3174     708    3  233  708
PINBRFLG    0105 =    55    1 1469      PLAYTEM3    0157 =  1476    3 1467 1474 POSTCDH  E7,1471 =   133    4  133  681
PINBRNCH 10,3275    1469    6  210 1475 PLAYTEM4    0160 =  1476   12 1459 1474 POSTCOM  26,3762    1444    2 1444
PINDEX   E6,1520 =   112    3  112 1040 PMANNDX  E6,1657 =   114    4  114 1024 POSTCSI  E7,1457 =   133    3  133  681
PINIOMSK 10,3751    1477    1 1473      PMINE    35,3554     671    2  681      POSTJUMP    4655    1104   61  151 1496
PINMASK     7673 =  1476    1 1469      PMINM    35,3564     672                POSTPOLY 34,2371     543
PINSUPBT    4223 =   378    4  257  382 PMISC    20,3027     969                POSTTLI  36,2012     532    1  532
PINSUPER 40,2000 =    34    3  257  517 PMMASK   10,3730    1476    1 1465      POSTTPI  E5,1640 =    98    3   98  468
PINTEGRL 20,2701     966    1  966      POFFSET  20,2742     967                POST41   24,3403     711    3  698  712
PINTEST  43,2002 =   389                POINTAXS 31,3002     633    2  629  630 POSVEL   21,3510    1029    3 1029
PIPABIAS E3,1452 =    88    1  308      POINTER     0156 =  1416    7 1413 1416 POSVEL2  35,3134     486    1  486
PIPACHK  33,2103     428    1  428      POINTEX     1006 =    77    9   77  639 POSVEL3  35,3135     486
PIPAFLBT    4757 =    84    5  164 1426 POINTVSM E6,1756 =   118   15  118  696 POS1/2      4753 =  1204    9 1068 1226
PIPAGE      1067 =    79    5   79  838 POINT1   26,3155     887    1  874      POUT     20,2746     967
PIPASC   33,3426     452    1  440      POINT8   26,3271     889    1  599      POWDNCOD    6214 =   541    1  537
PIPASCF  E3,1453 =    88    1  308      POLISH      0117      70   38   70 1199 POWFLITE 23,2000 =    31    1 1364
PIPASCFX E3,1453      88    1   88      POLLEY      5077    1207    2 1207      POWFLIT1 23,2000 =    31    1 1370

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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011          11:40 FEB. 26,1971                  PAGE 1537

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL     DEF    H        REFERENCES       SYMBOL      DEF    H        REFERENCES       SYMBOL      DEF    H      REFERENCES

POWFLIT2 23,2000  =    31    1  303       PRELTERM 33,3203       448    2  448       PRIO31      7652     1203    4  317  996
POWRSERS    7164     1140    1  543       PREMM1   04,3124  =    226    4  210  227  PRIO32      7654     1203    2  827 1472
PPRECOMP 20,2754      967                 PREMTRXC E5,1632  =    103    5  446  453  PRIO33      7655     1203    1 1464
PRAMSET  12,3763     1305    3 1289 1303  PREMTRX1 E5,1632  =    103    1  444       PRIO34      7656     1203    3 1004 1204
PRDTTAB  01,2000  =   230    3 1414 1415  PREPTVC  24,2711       702    1  704       PRIO35      7657     1203    1 1225
PRE-HUNT 25,3013      871    1  234       PREREAD  37,2607       826    3  235  808  PRIO37      7660     1203    6  205 1474
PREBJUMP    5351     1402                 PREREAD1 37,2630       827    2  537  826  PRIO4       4755  = 1204    2  261  941
PRECHECK 24,2625      700    4  232  700  PRERRORS 43,3200      1394    3 1395       PRIO5       5047     1202    8  211 1313
PRECIBIT    4761  =    53                 PRESINE  00,3523      1187    2 1187       PRIO6       5050     1202    4  178 1394
PRECIFLG    0064  =    53    6  227 1324  PRESTAND 26,3656      1442    1 1442       PRIO7       5051     1202    8  219  563
PRECOMP  20,3372      976    2  968  971  PRESTORE    6370      1122    1 1122       PROCDBIT    4753  =   85    2  144
PRECSET  22,3236      500    4  467  683  PREVGAM  26,3051       818    2  813  814  PROCEEDE 06,2076      144
PRECX    32,3100      920    3  916  920  PRE40.6  20,2355       713    2  236  710  PROCESSW 06,3050      169
PREC100  32,2546      915    1  902       PRFMSTAQ    4776  =    776    1  774       PROCKEY  40,3311      375    1  144
PREC120  32,2554      915    1  919       PRIOBORT 10,3041      1464    2 1463 1472  PROCKEY1 40,3317      375
PREC125  32,2562      915    1  918       PRIOCHNG    5176      1210   18  242 1474  PROCTNON 06,2237      150    1  150
PREC130  32,2606      916    1  915       PRIOCH2  01,3063      1217    1 1210       PROGLARM    5716     1486    2 1486
PREC132  32,2611      916    1  918       PRIODBIT    4753  =     54    1 1469       PROG20   36,2016      552    1  225
PREC140  32,2614      916    1  916       PRIODFLG    0075  =     54                 PROG21   37,2000      456    2  225  458
PREC150  32,2617      916                 PRIODSP  10,2753      1463    2  572  585  PROG22   30,2153      561    1  225
PREC155  32,2632      916                 PRIODSPR 10,2750      1463    1 1467       PROG22A  30,2206      561    2  561  618
PREC160  32,2644      916    1  916       PRIODSPY    4762  =   1477                 PROG22B  30,2240      562    1  562
PREC162  32,2654      916    1  916       PRIOENT     5677      1486    2 1487 1489  PROG22C  30,2247      562
PREC165  32,2662      916    2  916       PRIOLARM 10,3766      1487    1  761       PROG24   13,2254      565    1  225
PREC167  32,2677      917    1  917       PRIOOCT  10,3740      1476    2 1461 1467  PROG52   14,2002      743    3  225  743
PREC168  32,2701      917    1  917       PRIOPLAY 10,3062      1465    1 1464       PRONVBIT    4762  =   55
PREC170  32,2710      917                 PRIORITY    0167        73   29  203 1466  PRONVFLG    0104  =   55
PREC172  32,2755      918    1  918       PRIOTIME    1005        77    2 1464 1473  PROUT    33,2202      431    1  538
PREC173  32,2757      918    1  918       PRIO1       4757  =   1204    1  541       PRSHRTMP    4403      386    4  347  349
PREC174  32,2767      918    1  918       PRIO10      4754  =   1204    7  264  717  PRTRCK   43,3105      279    2  279
PREC175  32,2775      918    2  915  917  PRIO12      4664      1104    4  194  704  PRT2CADR 01,3133     1218    1 1413
PREC205  32,3012      918                 PRIO13      5052      1202    6  221  808  PSIV     E4,1573  =   93    3   93 1347
PREC205M 32,3031      919    1  918       PRIO14      5053      1202    6  396 1411  PSI333   E6,1507  =  108    6  108  957
PREC206  32,3034      919    1  919       PRIO15      5054      1202    3  168 1475  PTAUNEG  17,3161     1049    1 1049
PREC207  32,3044      919    1  918       PRIO16      5055      1202   10  168  883  PTAUPOS  17,3163     1049    1 1049
PREC210  32,3063      919    1  919       PRIO2       4756  =   1204                 PTBAD    05,3012      201    3  200
PREC220  16,3022      919    1  918       PRIO20      4753  =   1204    4  444 1208  PTIGINC  E4,1423       92    1  472
PREC225  32,3076      920    1  920       PRIO21      5057      1202    2  312  826  PTMP1    E6,1541  =  108    4  108  969
PREDANG  E7,1760  =   123    2  123  879  PRIO22      7644      1202    4  246  448  PTMP2    E6,1543  =  108    3  108  969
PREDICT3 25,3342      878    1  878       PRIO24      7645      1202    2  241  761  PTMP3    E6,1545  =  108    3  108  969
PREDOT      7123     1139    2 1143 1146  PRIO25      7647      1203    1  520       PTMP4    E6,1547  =  108    3  109  969
PREDSPAL 40,3260      372    1  345       PRIO26      7650      1203    9  421  590  PTMP5    E6,1551  =  109    3  109  969
PREFINAL 25,3332      878    4  864  878  PRIO27      7651      1203    4  569  709  PTMP6    E6,1553  =  109    3  109  969
PREL     E6,1701  =   115   11  115 1091  PRIO3       5045      1202    3  507 1477  PTOACSM  13,3005     1315    2  274 1320
PRELOC78 36,2050      553    1  553       PRIO30      4346  =   1204   14  155 1485  PTOALEM  13,3060     1316    1 1320

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SYMBOL     DEF     H      REFERENCES     SYMBOL     DEF     H      REFERENCES     SYMBOL     DEF     H      REFERENCES

PTV93BIT     4765  =   66                P20S      37,2000  =   33    4  456  603 P23.20    31,3427      638    1  638
PTV93FLG     0241  =   66    5  216  588 P20S1     30,2000  =   32    2  561  583 P23.30    31,3435      638    1  638
PT1/16    26,3275     889    2  874      P20S2     23,2000  =   31    3  572  623 P23.31    31,3461      639    1  639
PULSEIMU  22,3722    1504    1  431      P20S3     34,2000  =   33    5  577  589 P23.57    31,2560      630
PULSEM    14,2712     755                P20S4     34,2000  =   33    1  595      P23.57A   31,2556      630    1  629
PUSH      00,3246    1182    1 1119      P20S5     24,2000  =   31    1  587      P23.60    31,2567      630    1  628
PUSHLOC      0166      73   28 1114 1214 P20S6     30,2000  =   32    2  609  619 P23.85    31,2612      630
PUSHUP       6164    1114    1 1110      P20S7     36,2000  =   33    1  552      P23N7071  31,3355      637    2  628  630
PUTADD    41,2330     339    3  339      P20S8     35,2000  =   33    3  600  605 P24BIT       4753  =   63    1  244
PUTCOM    41,3071     357    7  353  355 P20S9     32,2000  =   32    1  623      P24FLAG      0210  =   63    4  209  759
PUTCOM2   41,3151     358    4  357  360 P20TRACK  36,2207     555    1  219      P24MKBIT     4766  =   52    1  762
PUTDCSF2  41,3203     359    1  358      P21ALT    E7,1620  =  133    3  133  458 P24MKFLG     0052  =   52    4  245  763
PUTDECSF  41,3170     358    2  357  358 P21BASER  E7,1604  =  133    4  133  457 P24PROG   13,2000  =   29    1  564
PUTDPCOM  41,3124     357    1  358      P21BASEV  E7,1612  =  133    4  133  457 P29       30,2000      458    2  225  462
PUTMARK   07,2314     246    2  244  245 P21BIT       4755  =   51    1  202      P29BASER  E7,1604  =  134    6  459  461
PUTNORM   41,3133     358    1  357      P21CONT   37,2045     456    1  456      P29BASET  E7,1537  =  134    3  459  461
PUTSFNOR  41,3202     358    1  358      P21DSP    37,2120     457                P29BASEV  E7,1612  =  134    2  459  461
PUTXY     41,2727     355                P21FLAG      0041  =   51    2  456  457 P29BIT       4770  =   48
PUTXYZ    41,2625     353                P21GAM    E7,1624  =  133    2  293  457 P29FLAG      0016  =   48    4  457  460
PWORD     17,2631    1039    2 1039      P21ONENN  37,2162     458                P29TAG1   30,2000  =   32    2  458  461
PWORD1    E6,1452  =  107    4  107 1060 P21ORIG   E7,1603  =  133    3  133  457 P29TAG2   20,2000  =   30    1  460
PWORD2    E6,1453  =  107    4  107 1061 P21PROG1  37,2015     456    1  458      P3XORP7X  35,3137      487    1  485
PYJETS       0005  =   42    3   42 1075 P21PROG2  37,2023     456    2  458  461 P30       35,3433      644    1  225
PYTABLE   17,2703    1041    4 1040 1057 P21PRTM   37,2155     458    1  456      P30SUBS      4000  =   27    2  487  652
P00HCHK   13,3456    1324    2 1323 1324 P21TIME   E7,1537  =  133    6  134  458 P30S1     35,2000  =   33    2  643  735
P05P06    26,2000  =   31    1 1442      P21VEL    E7,1622  =  133    4  133  457 P30S1A    26,2000  =   31    1  646
P06       26,3654    1442    1  225      P21VSAVE  37,2066     457    1  456      P31       04,3303      653    1  225
P11       34,2000     536    1  448      P22DEX    E7,1753  =  134   14  134  762 P31ALMRT  04,3306      653    1  661
P11+7     34,2011     536    1  540      P22MKBIT     4756  =   53                P31ENT    04,3441      661    1  653
P11FOUR   26,2000  =   31    1  550      P22MKFLG     0061  =   53    4  245  565 P31ONWRD  04,3350      653
P11ONE    34,2000  =   33    2  536  545 P22OVER   30,3320     618    1  616      P31RECYC  04,3352      653    1  654
P11OUT    33,2225     432    1  541      P22S      31,2000  =   32    1  618      P31RT     04,3357      653    1  662
P11SCADR  34,2302     541    1  539      P22SUBRB  30,2304     562    5  562  638 P31TAG    04,2000  =   28    1  653
P11THREE  21,2000  =   30    1  550      P23       31,2444     628    1  225      P32       04,3403      661    1  225
P11TWO    33,2000  =   33    1  544      P23.00    31,2455     628                P32/P72A  04,3424      661    2  661
P11XIT    34,2277     541    1  538      P23.05    31,2466     628    1  628      P32/P72B  04,3437      661    1  663
P15AVEG   24,2631     700    1  700      P23.06    31,2471     628                P32/P72C  04,3463      662    1  682
P15INTEG  20,2343     529                P23.15    31,3362     637                P32/P72D  04,3474      662    1  662
P15JOB    33,3455     527    1  225      P23.151   31,3375     638    1  637      P32/P72E  04,3476      662    1  662
P15LOC    20,2000  =   30    1  528      P23.152   31,3400     638    1  638      P32/P72F  04,3504      662    1  662
P15LOC1   33,2000  =   33    2  527  530 P23.16    31,3410     638    1  638      P33       04,3573      667    1  225
P15LOC2   36,2000  =   33    1  532      P23.17    31,3450     638                P33/P73A  04,3576      667    2  667  668
P20FLGON     4572     652    6  466  667 P23.170   31,3447     638    1  638      P33/P73B  04,3610      667    1  669
P200PT    36,2104     554    1  553      P23.176   31,3412     638    1  638      P33/P73C  12,2035      668    2  667  668
P20R52JB  36,2211     555                P23.18    31,3433     638    1  638      P33/P73D  12,2041      668    1  668

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P33/P73E  04,3662    668  2  668       P40S/F    24,2226    693  2  737       P52K      14,2334    749  1  747
P33/P73F  04,3673    668  1  668       P40S/SV   24,2523    699  3  233  738  P53       14,3414 =  773  1  225
P34       35,2000    466  1  225       P40SET    24,2542    699  1  699       P54       14,2002 =  743  1  225
P34/P74A  35,2003    466  2  466  467  P40SNEWM  24,2534    699                P60S      26,2000 =   31  1  792
P34/P74B  35,2032    466  1  466       P40SXTY   24,2444    698  1  724       P60S1     26,2000 =   31  1  800
P34/P74C  35,2034    467  2  468  469  P40S1     16,2000 =   30  1  723       P60S2     26,2000 =   31  2  804  812
P34/P74D  35,2100    467  1  467       P40S3     30,2000 =   32  1  716       P60S3     26,2000 =   31  1  807
P34/P74E  35,2103    467                P40S5     27,2000 =   32  1  720       P60S4     16,2000 =   28  1  821
P34/74E   35,2120    468  3  467       P40TMP    E7,1672 =  127 16  128  740  P60S5     27,2000 =   32  1  819
P35       35,2206    472  1  225       P40TSK    24,2577    700                P60S6     04,2000 =   28  1  820
P35/P75A  35,2215    472  1  472       P41/DSP   24,3626    737  1  698       P60S7     06,2000 =   28
P35/P75B  35,2222    472  1  472       P41CSM    24,3563    737  1  225       P61       26,2234    792  1  225
P35BIT       4761 =   66                P41REDSP  24,3642    738  1  700       P61.1     26,2304    793  1  814
P35FLAG      0235 =   66  3  472  586  P47/DSP   24,3743    741                P61.3     26,2244    792  2  796  801
P36       22,3334    655  1  225       P47BOD    24,3736    741                P61.4     26,2247    793  1  792
P36A      22,3343    655  1  496       P47BODY   24,3730    740  3  232  741  P62       26,2321    795  1  225
P36RECYC  22,3377    656  1  656       P47CSM    24,3662    740  1  225       P62.1     26,2343    796  1 1067
P36TAG    22,2000 =   31  1  654       P50S      14,2000 =   29  1  743       P62.2     26,2327    795  1 1069
P37       36,2476    898  6  225  907  P50SEXIT  14,2273    748  1  748       P62.3     26,2402    797  2  795  877
P37E      36,2763    902  1  901       P50S1     14,2000 =   29  3  773  786  P63       26,2406    798  2  797
P37G      36,3035    903  1  902       P50S2     16,2000 =   30  2  767  770  P63.1     26,2422    798  2  797  801
P37GFRB1  36,3222    905  2  898  902  P50S3     17,2000 =   30  2  778  785  P63FLAG   E6,1727 =  116  7  796 1079
P37N      36,3040    903                P50S4     04,2000 =   27  1  776       P64       26,2432    800  1  861
P37PRCC   36,3255    906  1  905       P51       14,3414    773  2  225  773  P65       26,2440    801  1  872
P37Q      36,3064    903  1  903       P51A      14,3423    774  1  774       P65.1     26,2456    801  2  234  801
P37R      36,3071    903  1  903       P51AA     14,3425    774  2  774  776  P66       26,2473    803  1  877
P37RANGE  E6,1412    106  1  910       P51B      14,3454    775  1  774       P66END    26,2502    804  1  803
P37T      36,3075    903  1  903       P51C      14,3471    775  1  776       P67       26,2477    804  1  878
P37U      36,3160    904  1  904       P51C.1    14,3504    775  1  775       P67.1     26,2511    804  3  234  883
P37V      36,3162    904  1  904       P51C.2    14,3507    775  1  775       P67.2     26,2532    806  1  883
P37W      36,3174    905  1  904       P51D      14,3520    775  1  775       P67.2CAD  25,3626    883  1  883
P37WW     36,3216    905  1  905       P51E      14,3526    775  1  775       P67.3     26,2542    806
P370GCF   36,3246    906  5  898  904  P51F      14,3542    776  1  775       P72       04,3405    661  1  225
P370GCFR  36,3232    905  2  902  905  P51FIVE      4773 =  776                P73       04,3575    667  1  225
P40BLNKR  24,2562    699  1  700       P51G      04,3716    776  1  776       P74       35,2002    466  1  225
P40BURN   04,2532    217  1  216       P51ZERO      4772 =  776  1  774       P75       35,2212    472  1  225
P40CKLS2  24,3517    714  1  698       P52A      14,2033    744  2  744       P76ER77   13,2071    513  2  225
P40CLK    24,3623    737                P52AUTO   14,2276    748  1  744       P76LOC    13,2000 =   29  1  513
P40CNV85  24,3651    738  3  709  737  P52AUTOX  14,2305    748  1  748       P76SUB1   13,2245    515  2  514  515
P40CSM    24,2214    693  1  225       P52B      14,2035    744  1  744       P79       04,2677    219  1  225
P40GMB    24,2473    698                P52C      14,2407    750  3  744  755  P79A      04,2716    219  1  219
P40MINDB  24,3447    712                P52D      14,2170    745  2  746  748  P79LOC    04,2714    219  1  219
P40RCS    24,3441    712  1  708       P52F      14,2621    753  1  753       P79LOCRT  04,2715    219  1  219
P40S      24,2000 =   31  3  693  737  P52I      14,2611    753                P791      04,2711    219  1  219
P40S/C    24,2224    693  1  693       P52J      14,2167    745  2  744  747  P81       04,2537    217  1  225

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UN UNDEFINED            = DEFINED BY EQUALS          J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED       CD DEFINITION ASSOCIATED WITH CONFLICT               XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF   H     REFERENCES      SYMBOL      DEF   H     REFERENCES      SYMBOL      DEF   H     REFERENCES

P81CONT1  04,2540    217   1  217      Q2        E7,1711 =  123   3  123  867 RATEBNK   07,2000 =   28   1  763
P82       04,2545    217   1  225      Q21       26,3201    888   1  853      RATEDEN   16,3514    990
P82CONT1  04,2546    217   2  217      Q22       26,3203    888   1  853      RATEDRV1  10,2032    175   1  178
P82CONT2  04,2550    217               Q3        26,3171    887   1  867      RATEDRV2  10,2212    178   1  177
P83       04,2646    218   1  225      Q5        26,3173    887   1  868      RATEFILT  21,2215   1002   1 1002
P83CONT1  04,2647    218   2  218      Q6        26,3175    888   1  868      RATEINDX     0774     77   5  416 1017
P84       04,2656    218   1  225      Q611      E7,1704 =  129   4  129  606 RATELIM   16,3550    990   1  988
P84CONT1  04,2657    218   1  218      Q6111     E7,1705 =  129   4  129  607 RATENUM   16,3530    990
P85       04,2664    218   1  225      Q7        E6,1574 =  120  11  293  875 RATEPTC   E6,1772 =  119   4  119  558
P85CONT1  04,2665    218   1  218      Q7F       26,3177    888   3  852  875 RATESUB   07,2530    763   1  759
P86       04,2606    217   1  225      Q7FKDMIN  26,3167    887   1  877      RATETEMP     0771 =   77  13  635  764
P86CONT1  04,2607    217   1  217      Q7MIN     26,3343 =  889   1  873      RATEZRO   24,3104    706
P86CONT2  04,2626    218               ====================================== RATT         0000 = 1353  35  457 1329
P89CONT1  04,2671    218               R            0002 =  941   3  940      RATTI        0016 = 1353   7  457  762
====================================== R(T1)     E7,1645 =  131   9  131  937 RAXERR    E6,1573 =  117   6 1074 1079
Q            0002 =   40 333   42 1503 R(T1)/    E7,1637 =  131   7  131  922 RBDFAIL   E6,1627 =  113  10  113 1057
Q+1          6706   1131   6  143 1485 R(T2)/    E7,1655 =  131  12  131  923 RBFAIL    17,3042   1044   1 1044
Q+10000      4663   1104   1 1106      R*TL**P   23,3654   1368   2 1369      RBLAST    17,3303   1052   2 1052
Q+2          6710 = 1131   8  382 1483 R-OTHER   E3,1717     90   4  181  302 RBLASTOK  17,3331   1052   1 1052
QAXERR    E6,1572 =  117   3  117 1078 R-TO-RP   26,3370   1245   4  614 1340 RBYPASS   17,3505   1056   1 1052
QCHAN        0002 =   42   2 1198      R/APRE       0034 =  132   3  915  916 RCFAIL    17,2756   1042   1 1042
QMAJ         0300 =   73   8   73  782 RACFAIL   E6,1626 =  113  10  113 1055 RCLP      E7,1530 =  125   8  125  616
QMIN      E5,1777 =   99   7  768  788 RACT1     E5,1540 =  105  11  105  687 RCM          0002 =  941   4  940  941
QPLAC     E5,1424    102   2  451  452 RACT2     E5,1452 =  105   9  105  689 RCNORM    E5,1654 =  100   4  100 1282
QPLACE    E5,1425    102   8  258  444 RACT3     E7,1537 =  126  28  126  683 RCON      E7,1635 =  131  13  131  937
QPLACES   E5,1426    102   4  431  538 RAD       E6,1766 =  118   1  119      RCSADDR   21,2037    734   1  735
QPRET        0052 =   41  15  642 1348 RADDEL       1064 =   80   2  579  592 RCSATT    21,2140   1000   4  734 1058
QREL      E6,1702 =  115   9  115 1078 RADMOON   31,3500    639   1  637      RCSDAPON  21,2042    734   6  209  734
QRUPT        0012 =   40  21  141 1446 RADSTART  34,2713    578   1  579      RCSDAPUP  43,2517    262   2  262
QSAVED    E4,1756 =   95   4   95  486 RADTIME      1063 =   80   3   80  592 RCSFLAGS  E6,1501    107  55  182 1066
QTEMP     E7,1657 =  127   5  127  720 RADTOREV  27,2636    607   1  597      RCSINIT      4766 = 1013   1 1013
QTEMP1    E7,1730 =  128   4  716  738 RAFAIL    17,2754   1042   1 1042      RCSINITB  21,2635   1013   1 1013
QTSN45    23,3524   1362   1 1356      RAKE      04,2771    221   1  222      RCSINT    21,2432   1009   1 1010
QUADANGL     4620   1037   2 1036      RANGBIT      4760 =   66               RCSLOC    21,2136   1000   1 1000
QUADRCT   22,3013    417   4  416  720 RANGE     E4,1711 =   94  11   94  507 RCSSWIT   21,2627   1013   1 1013
QUARTER      4754 = 1204   9  297 1191 RANGER    25,2571    867               RCSUP     21,2032    734
QUICKIGN  24,3346    711               RANGERD   34,2707    578               RCS2CADR  17,3564   1058   1 1058
QUICTRIG  23,3602   1366   2  710 1366 RANGERD1  34,2742    579   1  590      RCV       E3,1534 =   89  27   89 1346
QUIKDSP   06,2132    145   1  141      RANGERD2  34,2754    579   1  589      RCVCSM    E3,1606     90   2  585  633
QUIKOFF   06,2163    146   1  145      RANGERD3  34,3406    589   2  579      RCVLEM    E3,1660     90   1  585
QUIKREAD  37,2773    831   2  828  831 RANGERD4  34,2750    579   1  579      RCYCLR61  34,3747    600   1  416
QUIKRUPT  06,2142    145   1  146      RANGFLAG     0234 =   66   3  578  596 RD        E7,1663 =  131   6  131  919
QUITBIT      4764 =   65               RAPO         0020 = 1377   1 1377      RDAPEND   16,3745    994
QUITFLAG     0221 =   64   4  276 1323 RAPREC    E7,1575 =  127   2  473  476 RDCOUS    16,2744    769   1  749
Q19       26,3333 =  888   1  866      RATEAVG   15,2157   1065   3 1070 1071 RDE       13,3767   1353   1 1340

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED          = DEFINED BY EQUALS              J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL     DEF    H       REFERENCES     SYMBOL     DEF    H       REFERENCES     SYMBOL     DEF    H       REFERENCES

RDESIRED  E5,1757 =   100    5  100 1301 REFLECT   15,3004     1083    1 1083      RENDISP7  34,3356      585    1  585
RDFAIL    17,3044    1044    1 1044      REFLSH       4753 =  1477    3 1462 1474 RENDNDD   04,2275      213    1  213
RDLUNCR   40,2655     348    1  348      REFSMBIT     4754 =    52    6  196 1440 RENDP79   04,2033      208
RDM       13,3765    1353                REFSMFLG     0057 =    52   10  485  776 RENDVDD   04,2270      213    1  212
RDOT      E7,1677 =   123   19  123  880 REFSMMAT  E3,1733       90   48   36  940 RENDWBIT     4770 =    57    1  216
RDOTREF      1307 =    84    5   84  874 REFTEST   35,3507      644                RENDWFLG     0131 =    57   11  228 1349
RDOTV     E7,1501 =   133    4  133  676 REGION6   16,3464      989                REND1     34,2636      578    2  586  589
RERPTBB      4053     140    1  139      REGODSP   10,2721     1462    2  541  713 REND1A    34,2642      578    3  578
READACCS  37,2652     828    4  540  838 REGODSPR  10,2724     1462    1  882      REND10    34,3067      581    2  584
READCDUK  22,2370     409    3  398  557 REGSLEEP  07,3312     1428    1 1428      REND10A   34,3127      581    2  581
READGYMB  15,2063    1063    3  236 1068 REGUP        6202     1114    3 1114      REND10B   34,3163      582    1  582
READGYM1  15,2076    1063    1 1063      REG1TST   16,3420      988                REND12    34,3176      582    2  581  585
READLO    40,2635     348    5  347  349 REG2TST   16,3450      989                REND12A   34,3217      582    3  582  583
READLO1   40,2646     348    1  348      REG3TST   16,3426      988                REND13    34,3232      583    1  585
READPIPS  22,3621    1501                REG4TST   16,3454      989                REND13A   34,3237      583    1  582
RECALTST  40,3412     383    2  356  375 REG5TST   16,3463      989                REND14    34,3251      584    1  580
RECAL1    40,3415     383    1  383      REINIT    21,2541     1010    3 1002 1024 REND14A   34,3275      584    1  584
RECAL3    40,3427     383                REINTBIT     4754 =    65    2 1325      REND15    34,3302      584    1  581
RECRATIO  13,3761    1353    1 1344      REINTFLG     0230 =    65    6  515 1496 REND16    34,3307      584    1  583
RECT.1    31,3026     633                REJCTBIT     4755 =    66                REND17    34,3315      584    1  583
RECT.2    31,3035     633    1  633      REJCTFLG     0231 =    66    4  247  586 REND18    34,3323      584    1  583
RECT.3    31,3040     633    1  633      REJCTR22  07,2360      247    1  247      REND2     34,2650      578    1  578
RECT.4    31,3044     633    1  633      REJECT3   07,2376      247    1  247      REND3     34,2667      578    1  586
RECT.5    31,3046     633    1  633      REJECT4   07,2422      248    1  247      REND3A    34,2666      578    1  578
RECTEST   11,3245    1343    1 1343      REJECT5   07,2413      248    1  248      REND3DS   04,2407      215    2  208  209
RECTIFY   11,3420    1346    7 1259 1345 REJEXIT   07,2433      248    2  248      REND4     34,2761      579    1  578
RECTOUT   13,3304    1321    2 1320 1322 RELDSP       4432      388   10  210  383 REND4A    30,2444      583    1  583
REDAP     21,2553    1012    1 1001      RELDSPON     4356      385    3  326 1472 REND5     30,2456      583    1  583
REDOCTR      1306      83    5  135  198 RELDSP1      4455      388    2  365  376 REND5A    30,2462      583    1  583
REDOMANC  27,2116     394    1  394      RELDSP2      4446      388    3  388      REND5B    34,2776      580    1  587
REDOMANN  27,2076     394                RELINTQ   10,3454     1472    2 1467 1471 REND5C    34,3001      580    4  586  588
REDOMASK  10,3722    1476    1 1462      RELINUS   27,2170      395    1  230      REND6     34,3017      580    1  580
REDOPOSE  37,3656     895    1  896      RELINUSX  27,2210      396    1  395      REND7     34,3021      580    1  583
REDOPRIO  10,3006    1464    1 1476      RELOADSV  11,3621     1349    1 1346      REND8     34,3044      580    1  580
REDORCS   21,2123    1000    1  205      RELRET       0144 =    71    3  388      REND9     34,3047      580    1  580
REDOR22   27,2516     588    1  231      RELTAB       4063      141    2  143  386 REND9A    34,3057      581    1  580
REDOSAT   26,2000     550    2  205  262 RELTAB11     4076      141    3  142 1204 REPCHEK   16,3106      952    1  951
REDOTVC   16,3222     961    1  205      RELVBIT      4760 =    59                REPETE    35,2464      475    1  475
REDO40.9  16,2502     730    1  230      RELVELSW     0140 =    58    3  856  859 REPFRAC   E6,1633 =    109    7  109  952
REDO5.31  37,2613     826                REM       26,2201      791    1  790      REPFRACS  16,2242      726    1  727
REDO5.5   37,2657     828    1  235      REMA      26,2204      791    1  791      REPIP1    37,3207      838    1  839
REENTRY   25,2000 =    31    2  852  861 RENDEZ    37,2000 =    33    1  569      REPIP3    37,3215      838    1  839
REENTRY1  26,2000 =    31    2  859  887 RENDISP   34,3345      585    2  582      REPLACE   17,3650     1060    2 1060
REFAZE10  25,2120     855    1  801      RENDISP2  34,3366      585    1  585      REPLACEP  17,3673     1061
REFLASH   10,2716    1462    2  708  712 RENDISP3  34,3375      586    5  580  585 REPLACER  17,3667     1061    3 1060 1061

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

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BD BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT                XX MISCELLANEOUS TROUBLE
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GAP: ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971                PAGE 1542

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL       DEF   H     REFERENCES      SYMBOL       DEF   H     REFERENCES      SYMBOL       DEF   H     REFERENCES

REPLACEY  17,3702   1061              RETRN1    26,2642    809  1  808      ROLLOGIC  16,3363    987  2  987
REPLACE1  17,3655   1060  2 1060      RETRN2    26,2632    809  2  809      ROLLON    16,3471    989  1  988
REPLACE2  17,3662   1061  2 1060      RETRN3    26,2627    809  1  808      ROLLPREP  16,3046    951
REPOSADR  37,3702    896  1  895      RETROBIT     4753 =   56              ROLLSET   16,3553    991  3  990
REP11     34,2250    540  1  232      RETROFLG     0114 =   56  3  910  913 ROLLTIME  17,3263   1052  4 1043 1045
REP11A    34,2024    536  2  232  540 REVCNT       6211   1114  3  547 1204 ROLLTM    E6,1714 =  115  6  115 1089
REP11A-1  34,2023    536  1  541      REVERS    35,2513    476  1  476      ROLLWORD  E6,1572 =  109  9  109  994
REP11A-2  34,2022    536  1  540      REV37     04,2330    213  1  213      RONE      E4,1717 =   94 17   94 1380
REP11S    34,2273    541  1  536      RHCMINP   21,3320   1024  1 1019      ROO       04,2166    211  1  138
REP11SA   34,2275    541  2  536  540 RHO       E6,1635 =  113  4  113 1013 ROOAD     04,3053    224  1  210
REW          5642   1485  4  238 1485 RHOSB     E4,1711 =   94  4   94  941 ROOTMU       0020 = 1305  3 1281 1300
REQADD    41,2066    335  1  335      RHOI      E6,1636 =  113  4  113 1013 ROOTOPDD  04,2071    209  1  209
REQCOM    41,2305    339  2  339      RHO2      E6,1637 =  113  4  113 1013 ROPECHK   43,3452   1398  1 1395
REQDATX   41,2300    339  3  353  355 RIGHT     00,2236   1159  1 1161      ROTA      26,2105    783  2  783
REQDATY   41,2302    339  3  353  355 RIGHT-    00,2332   1161  1 1158      ROTATE    07,2520    684  2  683
REQDATZ   41,2304    339  3  335  355 RIGHTGTS  33,2324    437  1  437      ROT180    27,2365    400  1  400
REQEXLOC  41,2206    337              RIGHTR    00,2031   1152  1 1160      ROUND     00,2116   1154  1 1119
REQEX1    41,3440    374  1  374      RIGHT5       4324    384  2  356  357 ROUNDSUB     7105   1138  4 1149 1160
REQMM     41,3417    373  1  373      RINDEX    E6,1517 =  112  4  112 1044 ROWDOT    30,3613    622  3  619  621
REQRET       1216     82 16  204  381 RINIT     E7,1567 =  126 12  126  717 ROWDOT1   30,3624    622  1  623
REQUESTC  41,3444    374  1  374      RLIMTEST  20,2670    966  4  966  970 ROWDOT2   30,3643    623  2  623
REREADAC  37,3222    838  3  234  235 RLS       E4,1425     92 10   36 1316 ROWDOT3   30,3645    623  1  622
RES       26,2163    791  1  790      RLTST     34,2601    548  1  544      RP-TO-R   26,3345   1243  8  459 1317
RESA      26,2200    791              RM        E7,1703 =  129  7  129  590 RPAD      22,3172    498  4  499 1386
RESCALES  34,2620    548  3  546      RMAG1        0014 = 1371  4 1374 1383 RPADTEM   E4,1713 =   94  6   94  525
RESCHNG   33,3134    447  1  236      RMANNDX   E6,1656 =  114  5  114 1024 RPADI     22,3172 = 1386
RESETVHF  43,2770    273  1  250      RMAX      E4,1402     92  1  582      RPASS1    E7,1755 =  133  4  133  683
RESETX2   12,3163   1294  1 1292      RME       04,3176    227  1 1323      RPASS2    E5,1624 =  105  7  105  688
RESIGN    35,2510    476  1  476      RMM       04,3174    227              RPASS3    E7,1553 =  126 15  126  683
RESO      E4,1532 =   93  3   93  791 RN           1027     78 17  180 1326 RPER         0016 = 1377  3  524 1377
RESQ      37,3376    841  1  840      RND/TST   42,3453    363  3  362      RPPREC    E7,1617 =  127  2  473  476
REST      10,3467   1472  1 1470      RNDCON    42,3211    349  2  351      RPQFLAG      0170 =   62  5 1319 1344
RESTAIER  33,3057    446  1  236      RNDREFDR  07,3121   1423  3  160 1442 RPQFLBIT     4752 =   62
RESTARPT  E5,1577 =  103  2  437      RNDVZBIT     4762 =   48  8  162  834 RPQOK     11,3332   1344  1 1344
RESTART   01,2000 =   27  4  230 1415 RNDVZFLG     0010 =   48 11  270 1488 RPQV      E4,1661 =   93  7   93 1345
RESTARTS  01,3467   1411  1  201      RNRAD        0046 =   40  1  590      RPRE         0030 =  132  7  915  919
RESTEST1  33,3100    446  1  235      RN1          1070 =   79  7   79 1329 RPRE,     E7,1667 =  131  5  131  919
RESTEST3  33,3111    446  1  235      ROLL/PIP  E6,1672 =  115  3  115  894 RPREXIT      0050 = 1251  3 1243 1245
RESTREG      0365     75  4  195 1469 ROLL/180  E6,1664 =  115 11  115 1081 RPRPXXXX  26,3406   1245  1 1243
RESTSLEP  10,3473   1472  1 1472      ROLLC     E6,1715 =  115 16  116 1082 RPSTART   E6,1702 =  118  2  118  543
RESTSRF   43,3062    277  1  249      ROLLDAP   16,3342    987  1  951      RPSV      E4,1670 =   93  5   93 1337
RESUME       5323   1232 48  145 1447 ROLLDUMP  15,3275   1089  1 1089      RPTORA    26,3362   1243  1 1243
RETARG    33,3415    451  1  452      ROLLFIRE  E6,1571 =  109  7  109  995 RPTORB    26,3354   1243  1 1244
RETDSPY      4763 = 1477  3 1462 1475 ROLLHOLD  E6,1717 =  116  4  116 1089 RPVAR     E4,1407     92  1  612
RETNON    06,2263    150  1  151      ROLLJETS     0006 =   42  6   42 1089 RRATE     E4,1713 =   94  8   94  508

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED           = DEFINED BY EQUALS             J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT                  XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971              PAGE 1543

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H        REFERENCES      SYMBOL       DEF     H        REFERENCES      SYMBOL       DEF     H        REFERENCES

RRATE2    E4,1715  =   94    2  295  505 RTE3       31,2000  =   32    1  922       RT53       14,2000  =   29    2  639  780
RRECT     E3,1502  =   89   14   89 1346 RTE317     36,2550     899    2  899       RUN        E5,1427     102    4  449
RRECTCSM  E3,1554      90   11   90 1317 RTE320     36,2572     899                 RUPTAGN       1137      80    4   81 1232
RRECTHIS  E3,1554  =   90    6  274 1314 RTE340     36,2604     899    1  899       RUPTREG1      0070      69   45  141 1481
RRECTLEM  E3,1626      90    3   90 1316 RTE350     36,2614     900    1  900       RUPTREG2      0071      69   13  148 1434
RRECTOTH  E3,1626  =   90    2  274  275 RTE360     36,2617     900    4  899  902 RUPTREG3      0072      69   10  426 1467
RRECT1       0022  =   89                RTE367     36,2624     900    1  900       RUPTREG4      0073      69    7   69 1445
RREL      E6,1703  =  115   10  115 1091 RTE369     36,2643     900    1  900       RUTMXTAB   42,3043     295    1  282
RSBBQ     E3,1432      88    3  181  198 RTE372     36,2665     900    1  900       RUTMXTEM      0153      71    2  282  356
RSP-RREC  E4,1746  =   95    3   95  648 RTE373     36,2667     900    1  900       RVAR       E6,1402     106    1  584
RSPHERE   13,3763    1353    2 1345      RTE374     36,2706     901    1  901       RVARMIN    E6,1404     106    2  581
RSTGTS1   33,2232     435    1  235      RTE375     36,2713     901    1  901       RVCON      13,3350    1321    1 1320
RSTRTST   20,2405     719                RTE380     36,2723     901    1  901       RVCS/RDS   27,2645     607    1  598
RSUBE     16,2635     767    1  766      RTE385     36,2744     901    1  901       RVEC       E5,1656  =  100   12  461 1305
RSUBM     16,2633     767    1  767      RTE390     36,2746     901    1  901       RVQ        00,3273    1132    1 1119
RT        E7,1473  =  122    6  122  857 RTE505     36,2765     902                 RVSW          0157  =   61   10  461 1289
RTABLE    17,3117    1046    4 1042 1056 RTE510     36,3000     902    2  902       RVSWBIT       4760  =   61
RTARG     E7,1414  =  121   11  121  905 RTE515     36,3002     902    1  902       RWORD      17,2736    1042
RTARG1    E7,1603  =  126   12  126  494 RTE625     36,3004     902                 RWORD1     E6,1450     107   12  107 1060
RTB       01,2445    1195    1 1195      RTGO       E7,1713  =  123    5  123  814 RWORD2     E6,1451  =  107    7  107 1061
RTB/BHIZ  01,2444    1195    1 1118      RTGON64    E7,1713  =  124    1  293       RXLNS      17,2764    1042    2 1042
RTBCODES  22,2000  =   30    1 1501      RTGON67    E7,1713  =  124    2  293  857 RZC        E7,1625  =  125    8  125  637
RTBCODE1  24,2000  =   31    1 1501      RTHETA     E4,1715  =   94   10   94  508 RZXLNS     17,3046    1044    2 1044
RTD18     32,2364     910    1  910      RTIG       E7,1631  =  127   12  127  724 R02        01,2000  =   27    1 1440
RTD22     32,2421     910    1  910      RTINIT     E7,1451  =  122   10  122  890 R02BOTH    01,3731    1440    8  552  807
RTE       32,2000  =   32    3  906  923 RTMU       E7,1747  =  130    5  130  689 R02ZERO    01,3745    1440    2  774 1440
RTEALRM   32,2272     907    4  900  913 RTMURTE    35,3673     939    1  926       R1            0040  = 1306   19  674 1303
RTEAST    E7,1457  =  122    3  122  305 RTNAPSE    E5,1712  =  100    3 1303       R1A        E5,1743  =  100   15  100 1303
RTECON1   35,2000  =   33    2  938  939 RTNLAMB    E5,1712  =  100    9  100 1300 R1D1          4321     384   14  242 1178
RTEDISP   32,2323     909    1  902      RTNORM     E7,1465  =  122    3  122  305 R1VEC      E5,1656  =  100    7   98 1296
RTEDVD    E7,1631  =  131   10  131  933 RTNPRM     E5,1755  =  100    3  100 1290 R2         E5,1721  =  100    3 1287
RTED1        1342      86    1  900      RTNSAVER      0145  =   72    3 1368 1369 R2D1          4322     384    7  331 1204
RTEGAM2D  E7,1633  =  131    5  131  900 RTNTR      E5,1712  =  100    1 1301       R2VEC      E5,1664  =  100   10  100 1296
RTENCKEX  E7,1547  =  131   11  131  923 RTNTT      E5,1712  =  100    3 1289       R21BIT        4753  =   50    4  202  247
RTENCK1   31,3624     922    1  904      RTORPA     26,3412    1245    1 1245       R21END     37,2320     570    3  569  570
RTENCK2   31,3634     922    1  918      RTORPB     26,3401    1245    1 1245       R21MARK       0037  =   50    8  211  581
RTENCK3   31,3652     922    1  915      RTRIAL     26,3023     815    1  812       R22        34,2625     577    2  231  554
RTENCK3A  31,3655     922                RTRN       E4,1757  =   95    3   95  483 R22ALARM   43,2616     268    2  268
RTENCK3B  31,3660     922    1  922      RTRNCADR   01,3526    1411    5 1411 1416 R22CABIT      4762  =   64    2  247  269
RTENCK3D  31,3666     923    1  922      RTRNLOC    E6,1613  =  110    2  946  947 R22CAFLG      0217  =   64    2  578  586
RTERM        0022  = 1371    5  813 1382 RTRNMU     04,3241     496    1  496       R22S1      27,2000  =   32    3  588  607
RTEVN     36,3007     902    2  902  903 RTSR1/MU   E7,1751  =  130    4  130  674 R23.END    31,2755     632
RTE1      36,2000  =   33    1  897      RTX1       E7,1745  =  130   14  130 1329 R23.05     31,3004     633
RTE2      16,2000  =   30    1  919      RTX2       E7,1746  =  130   17  130 1329 R23.1      31,3012     633    1  633
RTE299    36,2517     898                RT23       31,2000  =   32    1  628       R23.10     31,3445     638    5  638

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BD BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT                XX MISCELLANEOUS TROUBLE
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SYMBOL      DEF    H      REFERENCES      SYMBOL      DEF    H      REFERENCES      SYMBOL      DEF    H      REFERENCES

R23.2     31,3020     633   1  633      R52G      14,3316     762   2  761      R61C1     37,2366     572
R23.3     31,3101     634   1  634      R52H      14,3222     760   1  757      R61DMPTG  37,2360     572
R23.4     31,3114     634   1  634      R52HA     14,3223     760   1  760      R61END    37,2415     572   1  572
R23.5     31,3337     637   1  634      R52J      14,3241     761   3  759  761 R61TEST   27,2215     396   1  394
R23.51    31,2704     631   1  631      R52JA     14,3146     759   1  761      R62DISP   27,2427     402   2  264  402
R23.52    31,2725     632   1  632      R52K      14,3336     762   1  763      R63       35,3171     600   2  595  627
R23.53    31,2733     632   1  632      R52L      14,3276     761   1  759      R63COMP   35,3171  =  627   1  626
R23.55    31,2614     630   1  629      R52M      14,3245     761   1  757      R63COM1   35,3226     601   1  603
R23.6     31,2735     632               R52Q      14,3215     760   1  760      R63TIME   E4,1706  =   94  14   94  626
R23.7     31,2750     632   1  632      R52SYNC   14,3236     761   1  760      R66CSM    36,2454     559   2  557  560
R23.8     31,2751     632               R52VRB    14,3007     757   1  564      R67       36,2320     557   2  415  557
R23CSM    37,2263     569   1  268      R53       14,3571     780   3  628  775 R67BIT       4767  =   63   5  212  421
R23CSM1   37,2277     570   1  570      R53A      14,3575     780   1  780      R67FLAG      0205  =   63   4  270  559
R3D1         4323     384   5  331  382 R53A1     14,3612     780   1  780      R67RSTRT  36,2374     558   2  230  421
R30LOC    23,2000  =   31   1  517      R53B      14,3617     761               R67START  36,2327     557   1  557
R31       31,2000  =   32   1  507      R53C      14,3623     781   1  781      R67TIME      1355      87   4   87  557
R31CALL   31,2000     507   1  267      R53CHK    14,3161     760   2  759  764 =====================================
R31FLAG      0222  =   65   3  267  508 R53C1     14,3614     780   1  786      S(XI)        0032  = 1306   6 1281 1287
R31FLBIT     4765  =   65   1  507      R53D      14,3631     781   1  781      S+ZERO       4772  = 1393   9  273 1399
R34       31,2000  =   32   1  512      R53EXIT   E7,1457  =  121   4  121  785 S+1          4770  = 1393   9  273 1401
R34ANG    31,2057     508   1  512      R53FLAG      0011  =   48   3  757  780 S+2          4767  = 1393
R34LOS    31,2317     512   1  508      R53FLBIT     4763  =   48   1  761      S+3          6214  = 1393
R36       24,2000     504   1  276      R53JOB    14,3260     761   1  761      S+4          4766  = 1393
R36A      24,2004     505   1  506      R53OUT    14,3632     781               S+5          4773  = 1393
R36CM     24,2000  =   31   1  504      R53Z      14,3625     781               S+6          6211  = 1393
R40CHECK  24,3146     706               R54       16,2657  =  768   1  755      S+7          4774  = 1393   1 1395
R40ENABL  24,3422     712               R55       14,2710     755               S-ZERO       4771  = 1394   1 1398
R40START  24,3151     706               R55.1     14,2713     755               S-1          7702  = 1394   2 1399 1401
R51       14,2622     754   3  233  753 R55.2     14,2721     755   1  755      S-2          7701  = 1394
R51.3     14,2623     754   1  756      R55CDR    14,3002     756   2  747  755 S-3          7700  = 1394
R51.4     14,2744     755   1  754      R55RET    14,2734     755   1  755      S-4          6061  = 1394
R51A      14,2753     756   1  754      R56       17,2105     785   2  754  775 S-7          5736  = 1394   1 1395
R51B      14,2660     754   1  756      R56A      17,2111     785   1  786      SAC       E5,1773  =   99  10   99  786
R51DSP    14,2763     756   1  756      R56A1     17,2116     785   1  785      SALFA     E6,1507  =  116   6  116 1079
R51DSPA   14,2761     756   2  567  754 R56B      17,2157     786   1  786      SAMEJETS  16,3673     993
R51K      14,2757     756   2  748  755 R57       37,2167     567   2  628      SAMERMS   35,3132     486   1  486
R51KA     14,2736     755   1  756      R57A      37,2171     567   1  568      SAMPTIME     0013  =   40   5  243  385
R51ST     14,2651     754   2  754      R57B      37,2241     568   1  568      SATOUT    34,2466     546   3  546  547
R52       14,3005     757   5  555  756 R57C      37,2213     568   2  567      SATRATE   E6,1710  =  119   4  119  551
R52BNKSV  E5,1577  =   97   2  757  760 R57D      37,2255     568   1  568      SATRLRT   E6,1700  =  118   5  118  548
R52C      14,3034     757   1  760      R60ADRS   31,3524     639   1  632      SATSCALE  E6,1720  =  119   1  548
R52D      14,3037     757   4  761  763 R60CALL   31,2773     632   1  639      SATSTICK  21,2000     550   1  551
R52E      14,3170     760   2  759  760 R60CSM    27,2074     394   5  402  698 SATSTKON  43,2502     262
R52F      14,3175     760   2  761      R61CNTR   E6,1774  =  119  20  120  728 SATSW     E6,1714  =  119   9  119  547
R52FA     14,3202     760   4  760  762 R61CSM    37,2333     571   3  555  760 SAVBNK    E6,1771  =  119   3  119  572

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BD BADLY DEFINED       CD DEFINITION ASSOCIATED WITH CONFLICT                XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF    H     REFERENCES    SYMBOL      DEF    H     REFERENCES    SYMBOL      DEF    H     REFERENCES

SAVECBIT     4757  =   64              SEC2.5    24,3526     714  2  710  711 SETLOC    01,2654    1212  3 1212 1216
SAVECFLG     0214  =   64  3  628  631 SEC24.96  24,3522     714  1  700      SETMARK   10,2772    1463
SAVEDEN   27,3326    1381  1 1381      SEC29.96  24,3527     714  3  693  738 SETMAXDB  24,3217     708  3  222  704
SAVELOCR  10,3164    1467  1 1466      SELECTMU  04,3217     496  6  466  667 SETMAXER  04,3022     222  1  222
SAVELOCS  10,3157    1467  2 1463 1466 SELFADRS  43,3177    1394  2  273      SETMGA    27,2454     495  1  495
SAVENDX   15,3354    1091  1 1090      SELFBANK  01,3113    1218  1 1220      SETMIND   26,3136     859  1  856
SAVEPOS   E7,1706  =  129 13  129  602 SELFCHEC  43,2000  =   34  1 1393      SETMINDB  24,3203     708  4  222  712
SAVESTAR  15,2000     602  1  602      SELFCHK   43,3270    1395  5  205 1394 SETMOON   13,3016    1315  3 1315 1345
SAVEVEL   E7,1714  =  129  6  129  603 SELFERAS     1357      87  1   87      SETMRK    07,2015     241  2  241
SAVEVSUN  37,2460     602  1  601      SELFRET      1361  =   87  7   87 1395 SETMUER   04,3230     496  1  496
SAVQR52   E5,1576  =   97  4   97  760 SENDID    05,3706    1102  2 1097 1101 SETNADD      4313     384  2  335  358
SAX       E5,1757  =   99  3  751  752 SENDOCMD  10,2200     178  2  177  178 SETNBPOS  33,3216     449  1  427
SBAND     42,2000  =   34  1  940      SENDPULS  07,3057    1422  1 1421      SETNCADR     4305     384  7  335  384
SBANDANT  42,3504     940  2  261  941 SEPMIN    42,3344     351  2  349  350 SETNEEDL  43,2303     257  2  257
SBIT1        4770  = 1393              SEPMNRET     0144  =   71  2  351      SETNORM   10,3000    1464  1 1461
SBIT10       4757  = 1393              SEPSCRET     0144  =   71  2  351      SETOFF    06,3235     173  1  173
SBIT11       4756  = 1393  2 1399 1400 SEPSEC    42,3313     351  1  350      SETOVF       6752    1133  1 1136
SBIT12       4755  = 1393  1 1399      SEPSECNR  42,3326     351  3  348  351 SETOVF2      7121    1138  1 1134
SBIT13       4754  = 1393              SEPSEC1   42,3321     351  1  351      SETPD        7547    1149  1 1117
SBIT14       4753  = 1393              SERVCADR  24,3553     714  2  711  712 SETPRIO   10,2754    1463
SBIT15       4752  = 1393  1 1400      SERVCAD1  26,2643     809  2  806  808 SETRAD    22,3222     499  1  498
SBIT2        4767  = 1393              SERVCAD2  26,2643  =  806  1  805      SETRADX   22,3235     499  1  499
SBIT3        4766  = 1393              SERVEXIT  37,3143     834  4  714  882 SETRE     13,2654    1242  4  611 1238
SBIT4        4765  = 1393  1 1397      SERVICER  37,3010     832  2  235  829 SETREX       0051  = 1242  2 1242
SBIT5        4764  = 1393              SERVICES  37,2000  =   33  2  826  832 SETROUND  00,2272    1159  3 1159
SBIT6        4763  = 1393              SERVNOUT  25,3607     882  2  806  853 SETRXX    13,2667    1242  3 1242
SBIT7        4762  = 1393  1 1400      SERVXT    24,3614     737  4  706  740 SETSAMP   06,3047     169  1  169
SBIT8        4761  = 1393              SERVXT1   24,3603     737  5  531  727 SETSURF   43,3064     277  1  249
SBIT9        4760  = 1393  1 1397      SETBANK   13,3140    1317  4 1315 1316 SETTB6    24,3261     709  2  709
SBNK03       5050  = 1394  1 1399      SETBIT    10,2204     178  1  175      SETTIME4  06,2075     143  1  145
SCALEPOP  25,2115     855  1  853      SETCLOCK  24,3242     709              SETT5     21,2170    1001  2 1000
SCALPREP  26,3715    1443  2 1442 1443 SETCNT    06,3123     171  1  170      SETUP.9   30,3721     717  1  728
SCALSAVE     1010      77  3 1442 1443 SETCOARS  07,3070    1423  3  156 1420 SETUPDSP  10,2463    1402  1 1402
SCAXIS    E6,1750  =  118 21  118  724 SETCOAST  35,3706    1326  1 1327      SETUPDYN  24,3264     709  1  709
SCHZEROS  33,2662     443  5  431  446 SETDESMD  06,3124     171  7  170  171 SETUPER1  33,2621     442  1  442
SCNDSCL   31,3566     682  7  673  682 SETEBANK     4315     384  2  338  348 SETUPGC   33,2736     444
SCOUNT       1366  =   87  4   87 1398 SETGAMMA  16,3766    1241  2 1236 1238 SETUPTIG  24,3667     740
SCOUTEND  40,2566     347  5  346  348 SETGLOCK  06,2471     156  4  155  156 SETVAC    41,3460     374  1  374
SCPOS     14,3643     781  1  781      SETGMEX   16,3774    1241  1 1241      SETVANDI  30,2513     610  1  610
SCTVAR    32,2023     623  2  612  615 SETGWLST  33,2306     437  1  437      SETVHFLG  43,2773     273  1  250
SDISPLAY  43,2746     273  1 1401      SETIFLGS  13,2744    1314  3  228 1327 SETVPAST  33,3605     530  3  530
SECAD     22,2016     403              SETINTG   27,2462     588  6  565  633 SETWBODY  21,3002    1017  1 1018
SECMAX    E7,1453  =  126  6  126  475 SETISSW   06,2706     166  7  151 1426 SETWIN=0  30,3550     622  1  621
SECON1    42,3176     349  1  351      SETJ=2A   30,3573     622  1  622      SETWO     05,3513    1097  3 1097 1099
SECON2    42,3200     349  1  348      SETJTAG   15,2636    1081  2  230  829 SETWW50   30,2506     610  1  610

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BC BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT                 XX MISCELLANEOUS TROUBLE
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SETXTACT  43,2105    250               SIGNCK2   21,3574   1030  1 1030      SLAP1     05,2367    194  1  337
SETZOEND  06,3062    170               SIGNCK3   21,3625   1031  1 1031      SLEEPIE   33,2276    437  5  435  447
SET1/POT  14,3566    776  3  748  775 SIGNCK4   21,3662   1031  1 1031      SLOAD        6450   1125  1 1117
SEUDOPOO  04,2242    212  1  214      SIGNCK5   21,3710   1032  1 1032      SLOAD2       6024   1108  4 1125 1506
SEVEN        4774   1200 22  214 1478 SIGNFIX   40,2715    359  2  359      SLOPE     E6,1654 =  114  4  114 1030
SFAIL        1357 =   87  4   87 1395 SIGNMPAC  22,3761   1506 16  405 1383 SLOPEBIT     4766 =   50
SFCOM     42,2120    283  1  283      SIGNTEST  40,2344    331  2  330      SLOPEHI   00,2314   1160  1 1185
SFCONUM   41,3042    356  2  344  358 SIM2CADR  05,2374    194               SLOPELO   00,3006   1174  1 1186
SFINTAB   42,2437    289  1  283      SINBLANK  40,2465    333  1  332      SLOPESW      0033 =   50  3 1285 1298
SFINTABR  41,3206    359  1  359      SINCDU       1141 =   81  6   81 1369 SLOPEVAL  05,3432    958  1  956
SFOUTAB   42,2507    290  1  283      SINCDUX      1145 =   81  6  546  970 SLOPE2    21,3451   1029  2 1031 1032
SFOUTABR  41,2573    345  1  345      SINCDUY      1141 =   81  5  770 1370 SLOWBIT      4754 =   56
SFRET     41,3053    356  1  357      SINCDUZ      1143 =   81  4  545 1370 SLOWFLG      0115 =   56  3  899  929
SFRET1    41,3041    356               SINE      00,3525   1187  2 1119 1365 SMALL     00,3132   1178  1 1175
SFRUTMIX  41,3033    356  4  336  358 SINESLOC  23,3736   1369  1 1368      SMALLMP   21,2060    997  3 1003 1034
SFRUTNOR  41,3025    356  4  343  358 SINGIMLC  27,2412    400  1  398      SMALL2    00,3061   1175  1 1178
SFTEMP1      0123 =   70 20  282  361 SINI      26,3632   1251  2 1247      SMCDURES  23,3743   1370  1  598
SFTEMP2      0124 =   70  2  361      SINM      E6,1510 =  116  2  116 1071 SMODE        1362 =   87  7   87 1395
SGNAGREE  22,3636   1502  3  763 1323 SINNODI      0010 = 1251  1 1247      SMODECHK  43,3233   1395  3 1395 1398
SGNCHECK  12,2634   1285  2 1285 1286 SINO      E6,1512 =  116  3  116 1070 SMPAC+    00,3403   1184  3 1184
SGNCOM    40,2317    330  1  331      SINOCOSM  E6,1514 =  116  3  116 1071 SNAPAGN   05,3567   1098
SGNDVOVF  00,2401   1162  1 1162      SINTH        0022 =   74 21  299 1359 SNAPEND   05,3606   1099
SGNOFF       0123 =   70  3  330  331 SINTRIM   15,2626   1079  2 1071 1074 SNAPLOOP  05,3556   1098  1 1099
SGNON        0122 =   70  3  330  331 SINVEC1   27,2414    400  1  398      SNTH      E5,1731 =  100 16  100 1302
SGNRDOT   E5,1756 =  100  4  100 1301 SINVEC2   27,2416    400  1  399      SN1       00,3550   1188  1 1187
SGNRT     E6,1651 =  110  3  110  988 SIN33     14,2574    753  1  751      SN359+    22,3544    675  1  674
SGNTAB    40,2340    331  2  330  331 SIVBCOMP  33,3540    530  1  528      SOB          0042 = 1251  4 1246 1247
SGNT01    40,2733    360  1  359      SIVBOFF   33,3637    531  2  234  531 SOLD         0741     76  5  171  209
SGNTST1   40,2360    331  3  331      SIX          6211 = 1204 35  156 1420 SOLNSBIT     4766 =   57
SHAFTSF   E3,1771 =   91               SIXTY        5010 = 1394  1 1400      SOLNSW       0127 =   57  5 1299 1302
SHIFTNDX  27,2603    590  5  579  609 SIZETAB   01,2000    230  2 1413 1416 SOMEERRR  33,2652    443
SHIFTR1   22,3330    503  8  468  689 SIZETST   42,3470    363  2  362      SOMERR2   33,2655    443  2  430  447
SHOLTS       7704 =  390  1  390      SKEEP1       1371 =   87 20   87 1401 SOPT      43,3637   1401  1 1401
SHORTMP      7256   1142  9  297 1444 SKEEP2       1372 =   87 10   87 1399 SOPTION   43,3622   1400  2 1399
SHORTMP2     7262   1142               SKEEP3       1373 =   87 14   87 1400 SOPTIONS  43,3244   1395  2 1395
SHORTT    00,2017   1152  2 1116      SKEEP4       1374 =   87 14   87 1400 SOPTION1  43,3254   1395  1 1395
SHORTV    00,2121   1155  1 1116      SKEEP5       1375 =   87 10   87 1400 SOPTION2  43,3255   1395
SHOW      33,2205    432  2  428      SKEEP6       1376 =   87  6   87 1401 SOPTION3  43,3256   1395
SHOWSUM   43,2735    273  1  273      SKEEP7       1377 =   87 22  198 1400 SOPTION4  43,3257   1395
SHOWI     33,2207    432  1  432      SKIPADD   10,3204   1467  1 1467      SOPTION5  43,3260   1395
SIDETRAK  25,2716    869               SKIPSIM   05,2376    194  1  194      SOPTION6  43,3261   1395
SIDLOOP   43,3221   1394  1 1395      SKIPTPER  23,2735    525  1  525      SOPTION7  43,3262   1395
SIGHTSIX     6211 =  781  1  787      SKIPVBIT     4757 =   51  3  202  589 SOPTON10  43,3263   1395
SIGN         7611   1151  1 1117      SKIPVHF      0043 =   51  1  579      SOUPLY    33,2675    443
SIGNCK1   21,3503   1029  1 1029      SKIP75    04,3710    669  1  668      SOURCBIT     4761 =   64

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SYMBOL       DEF H        REFERENCES  SYMBOL       DEF H        REFERENCES  SYMBOL       DEF H        REFERENCES

SOURCFLG    0216 =   64  7  578  586 STADR       6323   1120  1 1119      STIKBIT     4753 =   49  2  597 1017
SCUTHCR  E5,1431    102  2  102  428 STALLOOP 14,3744    788  1  788      STIKBITS 21,2031    551  2  550
SPARE       0007 =  179 16  180  189 STAR     E5,1765 =   99 16   99  784 STIKFLAG    0020 =   48  4  211 1015
SPCOS       5060   1207  7  997 1366 STARAD   E5,1735 =   99 24   99 1361 STRTEST  34,3566    597  2  596  597
SPCOS1      5060 =  997  1 1036      STARALGN    1141     81  2   81      STOINST  05,3334    956  1  956
SPCOS2      5060 =  997  1 1036      STARCODE    1140     81 11  293  787 STOPRAT     4000 =   27  2  178  422
SPECSTS  33,2401    438  1  235      STARIND     0304 =   73 14  211  787 STOPRATE    4463    422  5  200  559
SPECTEST 01,2644   1212  1 1216      STARM       0040 =   74  4  297      STOPVEH  36,2434    559
SPITGYRO 33,3143    447              STARSAV1 E5,1610 =   98  7   98  776 STOPYZ      4474    422  1  422
SPLRET   23,2616    521  1  648      STARSAV2 E5,1616 =   98  9   98  776 STORBNDS 12,2206   1278  1 1280
SPLRET1  23,2466    519  1  521      STARSAV3 E7,1704 =  129  6  294  787 STORCMD  10,2063    176  1  177
SPNDX    E6,1506 =  112 34  112 1034 STARTAB  15,2000 =   29  2  602 1387 STORDELT 35,2522    476  2  475  476
SPNDXCHK 21,3050   1018  2 1018      STARTAUT 04,2452    215  2  215  219 STORDV   27,2072    221  1  221
SPOLYARG E6,1704 =  119 10  119  551 STARTENT 25,2000    852  1  793      STORE       6371   1122  6 1121
SPRTETIG E7,1412 =  132  2  909  912 STARTEN1 25,2063    853  2  793  853 STORE,1     6363   1122  1 1121
SPRTEX   E7,1752 =  131 12  132  920 STARTMNV 27,2137    395              STORE,2     6366   1122  1 1121
SPSCODE     4760 = 1417              STARTSB2 05,3054    202  2  200  201 STOREDTA 33,2326    437  2  437  439
SPSIN       5061   1207  8  997 1366 STARTSIM 05,2372    194              STOREL/D 25,3523    880  1  872
SPSIN1      5061 =  997  1 1036      STARTSTO    6403   1123              STOREMAX 12,2145   1277  3 1277
SPSIN2      5061 =  997  1 1036      STARTSUB 05,3046    202  3  194  202 STOREMIN 12,2217   1278  1 1278
SPSIX    31,3515    639  1  638      STARTSW  05,2371    194              STORE1      6572   1127  1 1157
SPSOFF   24,3045    704  4  209  711 STARTTGO 35,3566    735  1  693      STORHAPO 23,2707    524
SPSOFF97 24,3330    710              STATE       0074     69 26   47 1198 STORHPER 23,2721    525
SPSON    24,2674    702              STATEBIT    4764 =   53              STORIJ   14,3732    787  2  781  787
SPT         5064   1207  1 1207      STATEFLG    0067 =   53  8  588 1488 STORJUMP    6341   1121  1 1120
SPVAC       5146   1208  2  221 1466 STATEINT 13,2702   1313  3  231 1314 STORLP71 27,3643   1498  2 1498
SPVACIN     5142   1208  1 1208      STATEND  13,2031    228  1  228      STORT    34,3437    595  1  600
SPVQUIT  37,3427    890              STATEST  31,2031 =   35              STRAT    14,2534    752  1  752
SQ          0743     76  2 1207      STATEUP  13,2000    227  1 1314      STRATGY  14,2526    752
SQRT     00,3206   1181  1 1119      STATEXTP 31,2146    510  1  507      STRSAT   34,2505    547  1  543
SQRTABRT 00,3401   1184  2 1184      STATINT1 13,2711   1313  3  231 1313 STRTAUT1 04,2470    216  1  216
SQRTNEG  00,3372   1184  1 1184      STATQUO  04,2340    214  2  213  214 STRTDEC1 23,2441    519  1  519
SQRTNM2  00,3472   1186  1 1186      STATQUO1 04,2333    213  1  213      STRTGYRO 07,3324   1429  2 1427 1432
SQRTNORM 00,3477   1186  1 1186      STBYDUMP 15,2303   1072              STRTGYR2 07,3330   1429  4 1430 1434
SQRTSHFT 00,3220   1181  1 1181      STEERBIT    4756 =   51  1  703      STRULBIT    4754 =   58  3  702  703
SQRTSUB  00,3342   1184  3 1175 1189 STEERING 16,2307    727              STRULLSW    0134 =   58  1   58
SR          0021 =   40 32  333 1413 STEEROFF 25,3611    883  1  878      STSHOSUM 43,3454   1398  2  273
SRATE       0736     76  4  177  209 STEERSAT 34,2447    546  1  547      STS2ST   14,3116    759  1  758
SRDDV    00,2024   1152  1 1175      STEERSW     0042 =   51  6  530  726 SUBETA   26,3122    859  1  859
SRTEMF   E5,1657 =   98  5  632  763 STEERULL 24,2761    703              SUBETA2  26,3130    859  1  859
SRTEST   00,3453   1186  1 1135      STEP2CK  34,3452    596              SUBEXIT  E4,1760 =   95 25   96  690
SR30.1   23,2660    524  2  519  521 STEP2CKB 34,3540    597  1  597      SUBLIST     0336     74 12 1096 1099
SR52/1   13,2000 =   29  1  766      STEP3CK  34,3600    598  1  597      SUBTR    00,3677   1190  1 1191
SSP         6567   1127  1 1117      STICKCHK 21,3152   1020  3  550 1024 SUFFCHEK 12,3511   1299  4 1298 1299
STABLISH 43,2451    261  1  249      STICKOUT 21,2030    551              SUHALFA  22,2672    414  1  414

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SUHALFAP 22,2712      414   1  414      SXTSM     17,2052      778   2  754  775 S22NXXB   30,2705      612   1  612
SUPDACAL    4671     1105   2  367 1399 SXTSM1    17,2057      778   1  576      S22N7071  30,2332      563   2  562
SUPDXCHZ    5214     1220   6  378 1220 SXTSM2    17,2073      778   1  452      S22OFF=I  30,3042      614   1  610
SUPERBNK    0007  =    42  25  198 1486 SXTVAR    27,2456      588   1  581      S22RHO       0040  =  623   6  612  618
SUPERRSM    5320     1232               SYNCT4    06,2152      145   1  145      S22RL     E5,1554  =   97   2  611
SUPER011    5010     1201   2  536 1394 SYSTSPR1  E5,1422      102               S22RTNEX  E7,1703  =  129   2  129
SUPER100    4762  = 1201                SYSTSPR2  E5,1430      102               S22SAVET  30,2775      613   3  613  616
SUPER101    5014     1201   1 1204      S1           0050  =    41  52  409 1360 S22TOFF   E7,1667  =  129  14  129  763
SUPER110    5015     1201   1 1204      S10BITS      5041  = 1394   2 1396      S22TPRIM  E7,1671  =  129   3  129  614
SUPRCON  43,3171     1394   1 1400      S11.1     34,2537      547   3  530  740 S22UMRL   E7,1501  =  125   7  611  619
SURELY.9 30,3736      717   1  717      S13BITS   43,3172     1394   1 1400      S22UOFF      1053  =   79   2  614  617
SURFFBIT    4761  =    62               S2           0051  =    41  41  431 1360 S22UUT       1113  =   79   9  612  613
SURFFLAG    0177  =    62   7  227 1327 S2BVTRS   30,3124      615               S22WSUBL  E4,1406       92   1  616
SVCT3       5276     1225   2 1225      S2GETUM   30,2542      610               S22W72X   30,2733      613   1  613
SVCT3X      7703     1225   3 1225      S2INCP1   30,3130      615               S22W76X   30,2741      613   3  612  613
SVDWN1   10,2240      301   3  274 1315 S2INTSI   30,3025      614               S22W78X   30,2763      613   3  613
SVDWN2   10,2264      301   3  274 1316 S2RPTR    30,3065      614               S221X3       0030  =  623   2  618
SVMRKDAT E7,1537  =   125  29  125  763 S2RTRP    30,3057      614               S223X1       0022  =  623   3  611  619
SW/      01,2513  = 1199   1 1118      S22.1     30,2466      609   1  562      S2231NXT  31,2347      618   1  619
SW/NDX      0305  =    73   7 1068 1091 S22.981X  30,3315      617   1  617      S2231X13  31,2340      618   2  611  612
SWBIT       0131  =    70   5 1197 1199 S22ABDE   30,2417      564   2  564      S30/31.1  26,2021      646   1  644
SWBRANCH    6664     1130   1 1199      S22BOX12  30,3102      615   1  616      S32.1F1      0245  =   67   4  672  682
SWCALL      4642     1104   3  424 1459 S22BOX22  30,3204      616   1  611      S32.1F2      0246  =   67   4  672  682
SWCHCLR  35,2065      467   1  467      S22BOX32  30,3066      614   2  616      S32.1F3A     0247  =   67   8  672  682
SWCHSET  35,2043      467   1  467      S22BOX42  30,3164      616   1  615      S32.1F3B     0250  =   67   8  672  682
SWICHOVR 17,2344      946   3  262  962 S22BOX44  30,3256      617   2  616      S32/33.X  15,2050      687   4  220  670
SWINIT   05,3252      205  10  195  196 S22BX44A  30,3261      617   1  617      S32BIT1      4752  =   67
SWITCHES 01,2513     1197   1 1199      S22BX44B  30,3266      617   1  617      S32BIT2      4753  =   67
SWRETURN    4651     1104   7  224 1440 S22D         0036  =  623   3  611  612 S32BIT3A     4754  =   67
SWSAMPLE    1354       87  10  169  757 S22D=9    30,3050      614   1  610      S3229T3B     4755  =   67
SWSKIP   01,2574     1199   2 1199      S22DSPP   30,2367      564   4  563  564 S33/34.1  35,2251      473   2  467  667
SWSTORE  01,2550     1198   2 1198      S22DSPPA  30,2335      563   1  564      S34/35.1  36,2000      478   3  220  473
SWTOVBIT    4752  =    63   2  944  946 S22D6Z    30,3035      614   1  614      S34/35.2  35,2561      479   3  220  472
SWTOVER     0207  =    63   1  726      S22EORM   E7,1673  =  129   9  129  616 S34/35.3  35,2651      481   1  484
SWWORD      0130  =    70   2 1197 1198 S22F2410  30,3331      618   3  611  762 S34/35.4  35,2714      482   1  484
SXA      01,2361     1192   1 1118      S22F244   30,3223      616               S34/35.5  35,2774      484   2  469  472
SXTALARM 23,2142      300   2  300      S22F244X  30,3222      616   1  614      S3435.23  35,2577      479   1  479
SXTANG   23,2053      299   1  451      S22GIP    30,3324      618   1  617      S3435.25  35,2601      479
SXTANG1  23,2076      299   1  298      S22I=N    30,3000      613   1  614      S3435LOC  36,2000  =   33   1  478
SXTLOGIC 23,2027      297   1  297      S22LOC    E7,1750  =  134   6  134  619 S4BCOMP   33,3534      528   1  528
SXTMARK  07,2000      241   2  452  780 S22LSITE  30,2260      562   1  564      S40.1     24,2241      694
SXTMARKE 07,2000  =    28   1  241      S22NXTIN  30,2531      610   3  614      S40.1B    16,2065      723   1  694
SXTMRKA  07,2010      241   1  241      S22NXTU   30,2625      611   1  611      S40.13    16,2534      732   3  231  711
SXTNB    23,2000      297   2  512  778 S22NXTWI  30,2636      611   1  612      S40.130   16,2555      732   2  732
SXTOPTN  E5,1413  =   102               S22NXXA   30,2661      612   1  612      S40.132   16,2607      733   1  733

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S40.133   16,2617    733   2  733      TARGETV   12,3602   1300   1 1300      TCSUBTR   00,3727   1191   1 1189
S40.135   16,2627    733   1  732      TARG1/2   E5,1431 =  102   2  451      TCTSKOVR     5313 =  385
S40.14    20,2614    734   2  266 1012 TARG1BIT     4757 =   49   2  212  760 TCWAIT    41,3273    365   1  374
S40.15    17,2452    948   3  944  951 TARG1FLG     0024 =   49   6  396  761 TDEC         0744     77   9   77 1349
S40.2,3   24,2331    696   1  724      TARG2BIT     4760 =   49                TDEC1        0040 = 1353  48  228 1349
S40.2,3B  16,2157    724   1  696      TARG2FLG     0025 =   49   6  561  775 TDEC2     E5,1634 =   98   2  500
S40.6     20,2366    718   1  698      TAR1      33,3263    449   1  450      TDELTAV   E3,1520 =   89  14   89 1348
S40.8     16,2176    725   1  714      TASKOVER     5314   1232  67  151 1482 TDESIRED  E5,1672 =  100   5  100 1299
S40.BADS  24,3557    714   1  698      TAT          0014 = 1353  10  457 1329 TEMK         0742     76  10 1207
S40.81    24,3102    706   1  727      TAU       E6,1561 =  113  10  113 1052 TEMPALFA  E6,1771 =  119   2  119  895
S40.9     16,2400    729   1  717      TAU.      E4,1702 =   93  13   93 1339 TEMPBB       0064 = 1408   1 1407
S41.1     27,3032    720   2  738  740 TAUCHCK   17,3104   1044   1 1044      TEMPBBCN     0073 = 1408   6 1407 1409
S41.2     20,2463    720   2  265 1012 TAUCHECK  17,3022   1043   1 1043      TEMPBETA  E6,1772 =  119   3  119  895
S50       13,2345    766   1  766      TAUNORM   21,3756   1034   2 1034      TEMPDAP   E6,1444    107   8  107  953
S52.2     11,2247    782   2  746  749 TAU1      E6,1562 =  113   7  113 1050 TEMPFLSH     0373     75   5  211 1469
S52.2.1   11,2267    782                TAU2      E6,1563 =  113   7  113 1051 TEMPG        0061 = 1408  11  238 1410
S52.2A    11,2260    782   1  782      TAZEL1    E5,1432    102   4  449  450 TEMPG2       0071 = 1408   3 1406 1409
S52.3     14,2145    746   1  745      TBASE1       1257     83   6  238 1412 TEMPMM       1113 =   80   2  215
S52/2     11,2000 =   29   1  782      TBASE2       1261     83   2 1325      TEMPNM       0063 = 1408   3 1407 1410
S61.1     26,2546    807   2  792  795 TBASE3       1263     83                TEMPOK    06,2531    157   1  157
S61.1A    26,2605    808   1  808      TBASE4       1265     83   1   83      TEMPOR1      1135     80   9  574  614
S61.1A-1  26,2604    808   2  234  808 TBASE5       1267     83   1  540      TEMPOR2      0160 = 1476  10 1461 1471
S61.1B    26,2623    809   1  808      TBASE6       1271     83   2  709  828 TEMPP        0062 = 1408   6 1407 1409
S61.1C    26,2567    808   2  234  808 TBEFCOMP  E4,1773 =   96   2   96  586 TEMPPHS      0154 = 1416   9 1411 1416
S61.2     26,2652    812   1  793      TBITS     E6,1606 =  116   2  116 1088 TEMPPR       0070 = 1408   2 1407 1410
S61DT     E6,1774 =  119   3  234  808 TC        E3,1550 =   89  10   89 1346 TEMPP2       0072 = 1408   5 1406 1409
S62.3     10,2412    822   1  797      TCALARM2  43,3216   1394                TEMPROLL  E6,1770 =  119   3  119  895
S8BITS       4350 = 1394   1 1401      TCCSM     E3,1622     90                TEMPR60      1004     77   5  394  719
====================================== TCDANZIG  27,3544 = 1385  12  305 1380 TEMPSET   16,3123    952   1  963
T            0036 = 1306  15  461 1299 TCDH      E5,1460 =  105  13  105  686 TEMPSW       0065 = 1408   7 1406 1409
T(X)      27,3526   1385   2 1382 1383 TCDU      37,3701    896   1  894      TEMPSWCH     0157 = 1416   3 1411 1416
T-OTHER   E3,1642 =   90   3  136  181 TCFINDVC     4345    385   1  374      TEMPSW2      0066 = 1408   4 1406 1409
T-TO-ADD  E7,1465 =  128   6 1328 1330 TCGETCAD  00,3754   1481   1 1482      TEMPTIME  E5,1440    102   2  431
TABLNTH      4355 =  143   1  143      TCGOPOOH  26,3772   1444   1 1477      TEMPVAR      1116 =   80   3 1253 1254
TABPCOM   17,2653   1039   4 1039      TCLEM     E3,1674     90                TEMP2G       0155 = 1416   9 1411 1416
TABRCOM   17,2766   1042   2 1042      TCNOVAC   41,3277    365   1  374      TEMP333   E6,1510 =  108   3  108  957
TABRZCMD  17,3050   1044   2 1044      TCORR     17,2530    949   1  945      TEMREG    E6,1573 =  109  25  109  993
TABYCOM   17,2724   1041   4 1040      TCPIN     17,2030    274                TEMX         1063 =   79   5   79  839
TACHEXIT  17,2016    274   1  275      TCPLON    40,3070    368   2  368      TEMY         1064 =   79   3   79  839
TAD          7040   1136   1 1117      TCQ          6711   1131   9  173 1485 TEMZ         1065 =   79   5   79  839
TAGSUB    01,2436   1194   4 1192 1193 TCQBNK00  00,3452   1185   1 1185      TEM1         0141     71   6   71 1470
TAKEON    34,2531    547   1  547      TCQSTAL   04,3276    592   2  592      TEM1B     E7,1646 =  122   8  122  878
TAR/EREF  33,3254    449   2  450  451 TCSI      E5,1462 =  105  15  105  686 TEM2         0142     71   8   71 1503
TARGDRVE  33,3375    451   2  450  451 TCSI2     E4,1750 =   95   5  217  677 TEM3         0143     71   9   71 1365
TARGETNG  25,2125    856   1  855      TCSLEEP   00,3765   1482   1 1481      TEM4         0144     71   7   71  348

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BD BADLY DEFINED      CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H         REFERENCES      SYMBOL      DEF     H         REFERENCES      SYMBOL      DEF     H         REFERENCES

TEM5        0145       71    2   71   72 TFFELL    27,3444     1383    1 1381      THREE/8   11,3746     1352    1 1338
TEN         4355  = 1204    9  204 1143 TFFEL1    27,3446     1383    1 1381      THTDXYZ   34,3710      599    1  599
TENBNK14 27,3046      720    1  720      TFFNP        0034  = 1371    7  818 1383 THTD123   34,3716      599
TENSEC   33,3666      532    1  530      TFFQ1        0016  = 1371    5 1380 1383 TICKTEST  23,2514      520    2  517  520
TENT     32,2176      649    1  649      TFFRP/RA 27,3220      1377    1  524      TICKTFF   23,2504      519    2  519
TENTH    27,2647      607    1  598      TFFRTALF     0030  = 1371    3 1375 1382 TICKTPER  23,2475      519
TENTHSEK 21,2366     1004    1 1004      TFFSW        0167  =   61    3 1380      TICKTTE   37,3040      832
TEPHEM   E3,1706       90   19   91 1500 TFFSWBIT     4770  =   61                TIG       E7,1412  =  121   78   36  904
TEPHEM1     1130  =    80    8   80  537 TFFTEM       0044  = 1371   15  819 1384 TIG-0     24,2651      702    3  233  701
TERMEXTV    5524  =   250    3  254  256 TFFTICK  23,2537       520                TIG-5     24,2634      701    2  232  700
TERMFLSH 10,3621     1474    1 1474      TFFVSQ       0024  = 1371    2  818 1374 TIGAVEG   24,2602      700    2  234  700
TERMIBIT    4752  =    60    1  760      TFFX         0042  = 1371    8  819 1383 TIGBLNK   24,2565      700    3  233  699
TERMIFLG    0151  =    60    2  757  781 TFFXTEST 27,3352      1381    1 1381      TIGNOW    24,3451      712    2  712  737
TERMNVEC 12,3663     1301    1 1302      TFFZEROS 26,3335  = 1386    2 1380 1381 TIGON     24,3676      740    2  234  740
TERMP03  07,2040      241    1  241      TFF1/ALF     0026  = 1371    7 1375 1384 TIG76     04,2733      219    2  220  221
TERMSXT  07,2031      241    2  241  762 TFF1/4   26,3325  = 1386    4 1374 1380 TIME/RTC  E7,1523  =  122    3  122  857
TERM1TMP    0133  =    72    3 1368 1369 TFIGINIT 24,2235       693    1  735      TIMECHEK  10,3536     1473    1 1473
TERM52   14,3312      761    1  761      TGO      E7,1427  =   121   15  121  733 TIMECHK   22,3135      419    1  419
TERRLAMB E5,1761  =   100    2 1298 1299 TGOCALC  16,2244       726                TIMEDELT  05,3770     1330    5 1328 1330
TEST     01,2562     1199    1 1199      TGR26    32,2200       649    1  649      TIMEDIDL  27,3563     1497    2 1499 1500
TESTBIT  40,3373      382    3  382      TGR26CON 32,2263       650    1  649      TIMEDIDR  27,3575     1497    1  236
TESTLEAD 33,2000  =    33    1  426      THETA        0024  =    74   11  768 1356 TIMEINC   13,3670     1330    2 1330
TESTLOOP 13,3364     1323    6 1320 1350 THETA(1) E4,1740  =    95    3   95  648 TIMEMO    E4,1433       92    2   92  790
TESTMARK 07,2062      242    3  241  785 THETACON 27,3050       720    1  695      TIMEOPT   23,2424      518    3  505  518
TESTNN   41,2050      335    1  366      THETAD       1307        83   25   83 1421 TIMEOVFL  12,2355     1280    1 1279
TESTOFUF 40,3051      362    3  359  361 THETADX  E6,1572  =   113   14  113 1027 TIMERAD   12,3607     1301    2  908  917
TESTVB   41,2043      335                THETADY  E6,1573  =   113   10  113 1026 TIMESTEP  11,3237     1343    4 1324
TESTXACT 43,2076      250   18  253 1492 THETADZ  E6,1574  =   113   10  113 1027 TIMETEST  01,3535     1412    1 1415
TESTY    35,2317      473    1  473      THETAH   E7,1701  =   123    8  123  879 TIMETHET  12,3002     1289    7  461  904
TET      E3,1516  =    89   33   89 1345 THETAN   E5,1466  =   102    2  103  538 TIMETST   15,3154     1087
TETCSM   E3,1570       90    3   90 1499 THETAN1  E5,1466  =   103   13  103  446 TIMETST1  15,3177     1087    1 1087
TETLEM   E3,1642       90    3   90 1500 THETAX   E5,1460  =   102    1  102      TIMETST2  15,3213     1087    1 1087
TETOTHER E3,1642  =    90                THETAX1  E5,1460  =   103    5  103  446 TIMETST3  15,3232     1088    1 1087
TETTHIS  E3,1570  =    90    1  514      THETA165 35,3637       939    1  904      TIMETST4  15,3234     1088    1 1087
TET1        0036  =    89                THETA210 35,3641       939    1  904      TIMETST5  15,3235     1088    2 1087 1088
TEVENT      1021       78    8   78  704 THETCOMP 20,2216       460    1  461      TIMEX     35,2556      476    2  474  476
TFF      E4,1734  =    95   13   95  525 THETDONE 25,2226       857    1  860      TIME1        0025  =   40   27  140 1473
TFF/RTMU    0036  = 1371    6  522 1382 THIRD    35,3146       488    1  475      TIME2        0024  =   40   43  135 1501
TFF/TRIG 27,3052      819    4  647  814 THIRTEEN     4776  = 1178    4  836 1175 TIME2SAV     1006       77    4   77 1444
TFFALFA     0032  = 1371    6 1375 1382 THISAXIS 26,3333  =    35    1  508      TIME3        0026  =   40    4  202 1231
TFFBANK  23,2372      518    1  517      THISPREC 13,3145  =    35    4  515  716 TIME4        0027  =   40    4  143  202
TFFCALLS 23,2674      524    1  524      THISSHIP 23,2420       518    1  518      TIME5        0030  =   40   25  139 1072
TFFCONIC 27,3151     1374    1  812      THISVINT 13,2034       228    1 1329      TIME6        0031  =   40    6  992 1061
TFFCONMU 27,3152     1374    1  524      THRDCHK  10,2323       680    2  679      TIMRBIT      4756  =   60    3  531  709
TFFDELQ     0012  = 1371    2 1383 1384 THREE        6214  = 1204   54   35 1493 TIMRFLAG     0155  =   60    5  486  737

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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H      REFERENCES       SYMBOL      DEF     H      REFERENCES       SYMBOL      DEF     H      REFERENCES

TIMSCAL   15,3137      1086     1 1085      TUFFOVFL  15,3130      1085     1 1085      TRNSPSPD  22,2343       408     2  403  408
TIMSUBM      0016  =  1251     3 1248      TOFFTEST  15,3201      1087     1 1087      TRNVNREF  34,2204       539
TIMSUBO   E3,1706  =    91     1 1248      TOGETHER  20,2501       720     1  720      TRTAGXPI  15,2723      1082
TINIRECT  11,3435      1346     1 1331      TOLD         0740        76     6  171  209 TRTEMP    E5,1656  =    98     6   98  764
TINYTHET  26,3141       859     1  857      TOLDAZMT  E5,1641  =   103                 TRUE360X  12,3235      1294     1 1293
TITER     E7,1664  =   129     6  133  475 TOLDAZI   E5,1641  =   103                 TRUNBIAS     1024        78     2  568  631
TIX       01,2412      1193     1 1118      TONISSBT     4753  =    84     4  148  158 TRUNCMD   10,2140       177     1  176
TLESS26   32,2261       650     1  649      TON1      E6,1621  =   117    12  117 1088 TRUNION   E7,1754  =   134     2  630  631
TLIDT     33,3532       528     1  527      TON2      E6,1607  =   116    10  116 1088 TRUNSF    E3,1770  =    91     2   91  763
TLIFTOFF     1021  =    78     5  536  540 TON2TEST  15,3215      1087     1 1087      TRUNVAR   31,3510       639     1  631
TLIM      06,2517       157     1  148      TORQINCH  33,2635       442                 TRUN19    31,3504       639     1  631
TLIMBIT      4752  =    84     2  157  391 TORQNDX   E5,1450  =   102     5  427  442 TSIGHT    E5,1606  =    97    12   97  786
TLITMP    E7,1463  =   128     2  527  528 TORQUE    33,2074       428     1  443      TSIGHT1   16,2651       767     1  750
TLOAD        6437      1125     3  409 1204 TPAGREE      7226      1142     8  347 1502 TSK       21,2110       987     4  897  998
TM        E6,1716  =   118     6  416  600 TPASS4    E7,1655  =   127    11  127  905 TSKOVCDR     5313      1225     2  385 1235
TMANUCHK  22,3125       419                 TPOVL        6557      1127     1 1127      TSLC         7552      1149     1 1117
TMARK     E5,1442       102     5  431  446 TPERTICK  23,2544       520     1  520      TSLCLOOP  00,2201      1157     1 1157
TMAXFIRE  16,3764       996     2  992      TPIMNBIT     4766  =    66                 TSLCTEST  00,2207      1157     1 1157
TMOON     20,2104       420     1  420      TPIMNFLG     0242  =    66     5  220  587 TSLC2     00,2172      1157     1 1149
TMEXITL   05,3640      1099                 TPLEFTN   40,3034       361     2  347  361 TSSL      00,2101      1154     3 1152 1161
TMFAIL2   07,3765      1447     2 1447      TPMODE    22,3657      1502    12  581 1294 TSSR      00,2025      1152
TMFI      E6,1666  =   118     9  403  405 TPREV     E5,1763  =   100     3 1298 1299 TST,TRIM  24,2560       699     1  698
TMINDEX      0335        74     6   74 1098 TPSL1        4372       385     7  351  362 TSTA8     40,3605       392     1  393
TMINFIRE     5001  =   996     1  991      TPUSH     00,3271      1182     1 1182      TSTART82  E4,1715  =    94     6  518  648
TMIS      E6,1666  =   118    11  118  403 TR*GL**P  23,3545      1365     1 1365      TSTCON1   40,3550       391     1  390
TMODE        6446      1125                 TRACKBIT     4764  =    50    12  200 1423 TSTCON2   40,3551       391     1  390
TMP1      E6,1670  =   110     7  110  977 TRACKCHK  43,2655       270     1  270      TSTCON3   40,3552       391     1  390
TMP2      E6,1672  =   110    11  110  977 TRACKFLG     0031  =    50    14  215 1488 TSTFORDP  41,2461       343     1  342
TMP3      E6,1674  =   110     7  110  978 TRACKTRM  43,2641       270     2  249  640 TSTLTS1   40,3451       390     1  390
TMP4      E6,1676  =   110    11  110  978 TRANSM1   E4,1400  =    96     2   96  441 TSTLTS3   40,3470       390
TMP5      E6,1700  =   110     7  110  979 TRANSPOS  22,2334       408     1  403      TSTLTS4   40,3335       376     1  391
TMP6      E6,1702  =   110    11  110  980 TRANSP1   22,3731      1505     2  299      TSTORE       6423      1123     1 1123
TMRAD100  32,2304       908     2  900  910 TRANSP2   22,3745      1505     1  299      TSTPOINT  23,3731      1369
TMRESUME  05,3642      1099                 TRATE        0735        76     5  178  764 TSTRLSRM  13,2671      1242     1 1242
TNIT      E7,1473  =   126     4  126  730 TRFAILOF     5632      1485     2  273  579 TSTRT     E7,1664  =   129     2  129  472
TNITPREV  E7,1475  =   126     3  126  730 TRFAILON     5644      1485     1  589      TSTRXUT   30,3702       716     2  697  724
TNONTEST  06,2224       149     1  147      TRG*NBSM  23,3642      1367     2  597  778 TST2I=0   30,3512       621     1  622
TNUV      E3,1526  =    89    12   89 1348 TRIG1     23,3324      1356     1 1356      TTE       E7,1726  =   123     7  123  833
TOBALL    27,2105       394     1  394      TRIG2     23,3335      1356     1 1356      TTEMP     E6,1672  =   118     4  419
TOBALLC   27,2124       394                 TRIM/CMD  16,3321       962     1  961      TTE1      E7,1732  =   124     3  124  820
TOBALL1   27,2104       394     3  394  395 TRIMONLY  24,2500       698     1  699      TTE2      E7,1734  =   124     3  124  832
TOCON2       5445      1407     1 1408      TRIMSCAL  24,3541       714     2  696      TTG/0     24,3617       737     2  232  738
TOF-FF    27,2000  =    32     1 1374      TRIPA        1113  =    80     4 1253 1254 TTGPHS    24,2623       700     2  738  740
TOF-FFI   34,2000  =    33     1 1386      TRKMKCNT     0772        77     5  186  904 TTMP1     E6,1611  =   109    42  109  980
TOFF      E6,1605  =   116     7  116 1088 TRMATTCK  43,2414       260     1  260      TTMP2     E6,1613  =   109    14  109  979

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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971                PAGE 1552

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL     DEF    H         REFERENCES      SYMBOL     DEF    H         REFERENCES      SYMBOL     DEF    H         REFERENCES

TTOGO    E7,1660  =  127   10  127  709 T3RPTBB     5254  =  140    1  139      UCL         1127  =   79    3   80  580
TTPI     E7,1662  =  127   20  127  686 T3RUPT   01,3362    1231    1  139      UCLSTAR  E7,1641  =  125    7  125  631
TTPI0    E5,1464  =  105    3  663  668 T3RUPT2  01,3367    1231    1 1232      UH/      E7,1561  =  132    5  904  936
TUFITS   36,2473     560    2  558      T3TOT4   E5,1640  =   98    2  284  909 ULAGEOFF 24,2764     703    1  703
TUSED    E6,1712  =  115    7  115 1088 T4JUMP   06,2116     145    2  144      ULOS     E5,1624  =   97    7   97  481
TVCADDR  16,3331  =  963    3  961      T4RPTBB     4054     140    1  139      UM          1071  =   79   14   79  762
TVCBCK   10,2226     178    1  175      T4RUP    06,2000  =   28    2  141  142 UMPAC+   00,3167    1179    2 1179
TVCCADR  16,3331     963    2  962  963 T4RUPT   06,2000     141    2  139  140 UMPAC-   00,3161    1179    2 1179
TVCDAPHS 16,3233     961    1  961      T5IDLER  05,3230     205    2  195  199 UN       E5,1675  =  100    7  100 1302
TVCDAPON 17,2163     943    1  715      T5IDLER1 20,3746    1069    2 1066      UNAJUMP  00,2000    1119    1 1116
TVCDUMMY E6,1574  =  109    1  109      T5IDLER2 15,3372    1091    1 1091      UNA36    E4,1733  =   94    2  505
TVCEXADR 16,3335     963    1  962      T5IDLOC  05,3226     204    5  205 1091 UNI      E7,1501  =  122    6  122  857
TVCEXEC  16,3037     951    3  200  951 T5IDL24  24,3547     714    1  702      UNIT     00,3022    1175    1 1119
TVCEXFIN 16,3217     953    3  951  952 T5LOC       0112      70   25  140 1091 UNITOV   00,3150    1179    3 1177
TVCEXPHS E6,1644  =  110   11  110  962 T5PHASE  E6,1464  =  107   10  735 1058 UNITNORM 05,3743    1291    1 1291
TVCINIT1 17,2205     944    1  949      T5PHASE2 21,2674    1014    1 1001      UNITR    E3,1755      91   13   91  892
TVCINIT2 17,2227     944                T5RPTBB     4055     140                UNITV    E7,1507  =  122    2  122  856
TVCINIT3 17,2260     945                T5RUPT      4056     140    2  139  140 UNITW    E3,1711      90   10   90  890
TVCINIT4 17,2326     946    1  962      T5TEMP   E6,1502     107   36 1003 1044 UNITX    26,3333    1205    6   34 1205
TVCON2C  24,3561     715    1  703      T5TIME   E6,1634  =  113    6  113 1038 UNITY    26,3331    1205    2   34  604
TVCPHASE E6,1635  =  109   16  109  973 T5TVCDT  E6,1625  =  109    7  109  974 UNITZ    26,3327    1205    4   34  938
TVCPITCH    0054  =   41    4  719  967 T5WAIT60 21,2636    1014    1 1013      UNP36    E4,1725  =   94    4   94  505
TVCRCS   E6,1525     108    3  108  112 T6ADDR   21,2637    1014    1 1014      UNKM     E5,1616  =   97   11   97  644
TVCYAW      0053  =   40    3  719  971 T6ADR       0111      69                UNSUSPEN 40,3343     376    1  376
TVCZAP   24,3161     708    4  209  712 T6CHNSET 20,2321     529    1  231      UNVEC    E7,1545  =  133    5  688  689
TVEC        0032  = 1353    4 1341      T6ENABL  16,3742     994    5  993      UNZ2     06,2312     151    1  152
TWEEKIT     0050  = 1308    4 1286 1299 T6LOC       0110      69    4  139 1066 UPACTOFF    4415     386    4  211 1499
TWELVE      5775  = 1039    6  223 1044 T6L1     17,3636    1060    1 1060      UPBUFF      0304  =   73   37   73 1500
TWICEEPS 30,2143     462    1  460      T6L2     17,3643    1060    1 1061      UPCNTRL3 25,3151     874    1  873
TWIDBIT1    5222    1223    2  365  713 T6PROG   21,3763    1034    1 1019      UPCONTRL 25,3034     872    1  871
TWIDDLE     5223    1223   29  152 1432 T6PROGM  21,3105    1019    1 1024      UPCOUNT     0303  =   73    6   73 1494
TWO         4767  = 1204   76  224 1499 T6RESET  20,2331     529    2  231  529 UPDATADR 13,2243     515    1  515
TWODT    16,2530     731    1  723      T6RUPTOR 17,3631    1060    1 1060      UPDATBIT    4762  =   49    3  212  590
TWOPI    35,3142     488    4  475  686 T6SCALE     7652  =  996    1  991      UPDATEOK 43,3707    1493    2 1492 1493
TWOPULSE 07,3467    1432    1 1432      T6SET    20,2311     528    3  232  527 UPDATERT 25,2173     857    2  859
TX789    E7,1447  =  125    3  125 1259 T6SETUP  17,3531    1058    1 1057      UPDATEVG 16,2331     728    2  725  737
TYPE2    36,2271     557    2  556  557 T6START  17,3606    1060    1 1014      UPDATE2  27,2000  =   32    2 1331 1496
TYPE2IN  36,2255     556    1  556      ==================================      UPDATE3  42,2000  =   34    1 1493
T1       E7,1715  =  131    6  131  922 U=SCAXIS 27,2321     399    1  399      UPDATFLG    0027  =   49   13  270  760
T1BITS   E6,1622  =  117    2  117 1087 UBAR0    E7,1603  =  125    7  125  637 UPDATIME 43,2325     258    1  258
T1TOT2   E5,1546  =  105    6  105  681 UBAR1    E7,1611  =  125    2  125  634 UPDATNN  41,2316     339    3  365  380
T12      E7,1723  =  131    4  131  910 UBAR2    E7,1617  =  125    4  125  634 UPDATRET    0117  =   70    3  339  340
T2       E7,1551  =  131    7  131  923 UBX/2    E7,1563  =  122   12  122  892 UPDATVB  41,2337     339   10  332  380
T2BITS   E6,1610  =  116    2  116 1088 UBY/2    E7,1571  =  122   14  122  892 UPDATI   41,2344     340    2  339  369
T2TOT3   E7,1655  =  133    5  293  668 UBZ/2    E7,1577  =  122    3  122  892 UPONLIST 05,2211  =  179

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SYMBOL       DEF    H     REFERENCES     SYMBOL       DEF    H     REFERENCES     SYMBOL       DEF    H     REFERENCES

UPDTCALL  20,2161    421  1  421      UP1       E5,1610 =  105 13  105  689 UTSB         0030 =  604  4  604  605
UPDTMEND  43,2340    258              UP21         4353 = 1495  1 1494      UTSBP        0006 =  604  2  604
UPDTPHAS     4773 = 1495  1 1497      UP70         4772 = 1493  1 1492      UTSP46    15,2047    603  1  602
UPD8MASS  16,2225    726              UP71         4770 = 1493  1 1492      UTSP6     15,2046    603  1  602
UPEND70   27,3722   1499  1 1496      UP72         4767 = 1493  1 1492      UTSTARNO     1355 =   87  2  556  602
UPEND71   27,3626   1497  1 1496      UP73         6214 = 1493  1 1492      UTSTAR1   35,3162    600  1  598
UPEND72   27,3660   1498  1 1496      UR           0010 =  941  1  941      UTST4650  35,3242    603  1  602
UPEND73   27,3757   1500  1 1496      URH       E7,1541 =  122  2  616  820 UTSUN     35,3251    603  1  603
UPENT2    10,3755   1478  5 1461 1472 URONE     E4,1733 =   95  4  793  816 UTUX         0022 =  604  4  605
UPERROR   43,3717   1493  1 1493      URP          0016 =  941  1  941      UTUXP        0000 =  604  4  604  605
UPERROUT  27,3656   1498  3 1498 1499 URPV         0016 = 1353  8 1340 1353 UTUY         0030 =  604  5  605
UPFLAG       5547   1479 76  210 1496 URRECT    E5,1646 =  100  4  100 1281 UTUYP        0006 =  604  5  604  606
UPFNDVAC  42,3770   1496  1 1496      UR1       E5,1723 =  100 11  100 1302 UTUZ         0036 =  604  4  605  606
UPJOB     27,3545   1496  1 1496      UR1/      E7,1553 =  131  8  131  936 UTUZP        0014 =  604  4  605  606
UPKLEAN   05,2556    197  1 1499      US        E5,1616 =   98  3  630  635 UTVIAN88  35,3257    603  1  602
UPLIM     12,3334   1296  1 1296      USEADD    41,2106    335  1  335      UTX       E6,1750 =  118  9  605  606
UPLKFAIL     4756 =   85  1  391      USEFLBTS     5667   1485  1 1485      UTY       E6,1756 =  118  8  605  606
UPLOADNV  42,3746   1495  2 1494      USEMAXDT  13,3441   1323  1 1324      UTYAW     E7,1741 =  130  7  130  626
UPLOCBIT     4765 =   61  3 1446 1447 USEPIUS   13,3101   1316  1 1316      UTZ          0000 =  604  2  606
UPLOCKFL     0164 =   61              USERPRIO     0163 = 1476  3 1464 1474 UTZINIT      0044 =  604  4  605  606
UPMNSVCD  27,3147   1332  1 1331      USPRCADR     4733   1106  3 1365      UT166     23,3526 =  603  1  606
UPNEG        7515   1148  1 1148      USSTAR    E7,1647 =  125  2  631      UV1/      E7,1561 =  131  3  132  913
UPOK      07,3750   1446              USTAR        1101 =   79  5   79  615 UXA/2     E7,1541 =  122  9  122  892
UPOLDMOD     0301 =   73  5   73 1499 UT        E7,1712 =  128 13  128  724 UYA/2     E7,1547 =  122  4  122  892
UPOUT     27,3705 = 1499  7 1332 1500 UTABERR   15,2042    603  4  603      UZ           0024 = 1353  4 1340 1342
UPOUT4    42,3733   1495  3 1494 1495 UTAMG        0006 =  604  5  606  607 UZA/2     E7,1555 =  122  5  122  892
UPPART2   42,3626 = 1493  1 1493      UTAREA1   37,2425    601  1  601      U1POS     22,2242    406  1  406
UPPART3   27,3556 = 1496              UTAVEND   37,3146    834  1  834      U2        E5,1713 =  100  5  100 1301
UPPOS        7505   1148  1 1148      UTBIT        4760 =   62 12  162 1492 U2POS     22,2216    406  1  406
UPRPTBB      4052 =  140  1  139      UTCGA1    35,3405    606  1  607      U3POS     22,2266    407  1  406
UPRPT1    07,3731   1446              UTEARTH   35,3254    603  1  603      =====================================
UPRUPT    07,3710   1446  1  139      UTFLAG       0176 =   62 12  215 1488 V         E7,1673 =  123 18  123  878
UPSTATE   30,2435    583  2  554  579 UTGMLOCK  35,3425    607  1  606      V(T1)/    E7,1671 =  131  6  131  936
UPSTORE   42,3750 = 1495  1 1495      UTIGA        0032 =  604  1  607      V(T2)/    E7,1707 =  131 10  131  923
UPSUM        1116 =   80  2 1446      UTKINPUT  36,2220    555  1  554      V(21K)    32,2257    650  1  648
UPSVFLAG  E3,1501 =   89  7   36 1332 UTMGA        0034 =  604  1  606      V(24K)    32,2247    650
UPTEMP       0330     73  9 1495 1498 UTMNCNTR  37,2445    602  1  601      V(26K)    32,2265    650  1  649
UPTEST    07,3771   1447  2 1446      UTOFF     04,2421    215  1  215      V(28K)    32,2243    650
UPTMFAST  06,2701    165  1  168      UTOGA        0030 =  604  4  604  607 V(3K)     32,2245    650  1  648
UPVERB       0302 =   73  7   73 1496 UTOPT45   37,2462    604  1  601      V(32K)    32,2253    650  1  649
UPVERBSV     0331     73  2 1492 1493 UTOPT45A  35,3273    605  1  605      V(4K)     32,2255    650  1  648
UPVERIFY  42,3710   1495  3 1494 1495 UTPIT     E7,1737 =  130  7  130  626 V(400)    32,2241    650  1  649
UPVRFYNV  42,3747   1495  1 1495      UTPRFAX   36,2437    559  3  557  604 V-OTHER   E3,1725     90  4  181  302
UPWAKE    27,3550   1496              UTSA         0022 =  604  2  604  605 V/SC         7560   1150  1 1117
UPX       43,3071    278  5  257  277 UTSAP        0000 =  604  2  604      V/SCDV    00,2747   1173  3 1172

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V/SC1       7566   1150  1 1150      VBSP2LD     4354    385  4  353 1476 VEM      26,2212    791  1  790
V/SC2    00,2653   1171  1 1150      VBSP3LD     4615 =  385  2  353  714 VEMA     26,2217    791  1  791
VACOSP   10,3123   1466  1 1466      VBTERM   40,3307    375  2  337  381 VEMSCON  26,3031    815  1  813
VACFOUND 01,2613   1211  5 1211      VBTSTLTS 40,3432    390  1  337      VERB     40,2251    329  1  326
VACSTOR  07,2241    245  1  245      VBUF        0122     70 57   70 1369 VERBFAN  41,2133    336  7  335  338
VACT1    E7,1503 =  133  4  133  683 VBZERO   43,2121    252  1  249      VERBMASK    4171 = 1476  1 1461
VACT2    E5,1532 =  105  4  105  690 VB06N18     5031 =  627  1  626      VERBREG     1204     82 23  204  383
VACT3    E7,1545 =  126 18  126  690 VB06N78  31,2443    627  1  626      VERBSAVE    1244     82  3  335  372
VACT4    E7,1473 =  133  6  133  676 VB06N98  33,2217    432  1  432      VERBTAB  41,2150    336  1  336
VAC1        0401     75              VB51     07,2061    242  1  241      VERB37   04,2000 =   27  6  206  227
VAC1ADRC 05,3243    205  1  203      VB53     17,2161    786  1  785      VERB69   43,2037    249  1  249
VAC1USE     0400     75  3  203 1211 VB56CADR    4551    640  1  640      VERB94   43,3006    275  1  250
VAC2        0455     76              VB6N5    16,2727    769  1  769      VERB96   43,3030    276  1  250
VAC2USE     0454     76  2  204 1211 VB64     43,2437    261  1  249      VERIFBIT    4766 =   61  1 1495
VAC3        0531     76              VC/0     E4,1755 =   96  3  283  530 VERIFLAG    0165 =   61
VAC3USE     0530     76  2  204 1211 VCNTR    E6,1634 =  109  4  109  951 VESO     E4,1540 =   93  3   93  791
VAC4        0605     76              VCRCS    35,3623    938  1  903      VFINAL   26,3301    889  1  862
VAC4USE     0604     76  2  204 1211 VCSPS    35,3621    938  1  903      VFINAL1  26,3303    889  1  861
VAC5        0661     76  9   76  224 VCV      E3,1542 =   89 21   89 1346 VFLAG       0062 =   53  4  751  753
VAC5LOC  20,2000 =   30  1  223      VCVCSM   E3,1614     97  1  634      VFLAGBIT    4757 =   53
VAC5STOR 20,2000    223  3  198 1488 VCVLEM   E3,1666     90              VG       E7,1457 =  126  7  126  728
VAC5USE     0660     76  2  204 1211 VDEF     00,3231   1182  1 1113      VGAMCALC 26,3054    818  2  647  813
VAD         6720   1132  1 1117      VDT/180  E6,1567 =  117  8 1084 1089 VGBODY   E7,1664 =  127  6  127  738
VALMIS   33,2106    428  1  442      VD1         4351    385  8  204 1204 VGCOMP   16,2360    728  2  717  728
VAPREC   E7,1567 =  127  2  473  476 VEARTH   E5,1735 =   99  6   99  786 VGDISP   E7,1762 =  124  8  291  910
VARALARM    5770   1489  4  167 1440 VECAGREE 00,3007   1174  2 1171 1175 VGPREV   E7,1720 =  128  5  717  730
VARDELAY    5260   1223  5  150 1420 VECANG1  27,2420    400  1  399      VGTEMP   E7,1645 =  127  4  717  731
VARGAINS 16,3065    951              VECANG2  27,2422    400  1  397      VGTIG    E7,1720 =  128 13  128  723
VARIANCE E7,1525 =  125 13  125 1253 VECLEAR  27,2230    398  1  398      VGTLI    E7,1724 =  124  5  182  530
VARK     E6,1632 =  109  4  109  976 VECMODE  22,3635   1501              VHFCNT      0771     77  9   77  904
VARST0   E6,1511 =  108  7  108  957 VECOEM   E4,1436 =   92  5   93  791 VHFGOOD  27,2576    590  1  590
VARST5   E6,1516 =  108  1  957      VECOFANG 22,2716    414  2  414      VHFRANGE    1113 =   79  4  579  590
VARSUBL  31,3505    639  2  631      VECPOINT 27,2225    398  3  394  601 VHFRBIT     4760 =   64
VARSUBL3 31,3506    639              VECPT    27,2000 =   32  1  397      VHFREAD  27,2536    589  2  140
VATT        0006 = 1353 26  457 1329 VECPTRET 27,2352    399  1  400      VHFRFLAG    0215 =   64  4  208  578
VATT1       0024 = 1353  5  457  515 VECQTEMP E6,1710 =  117  2  398  400 VHFTIME     1007 =   77  5  185  589
VBARS    E7,1665 =  123  8  123  870 VECSHIFT 22,3320    502  4  655  688 VHHDOT   34,2304    541  1  541
VBCOARK  43,2133    253  1  249      VECTAB   E4,1615 =   93  8   93 1351 VINIT    E7,1575 =  126 11  126  717
VBFANDIR 41,2145    336  1  336      VEHOPT   24,2064    506  1  517      VINTFBIT    4766 =   53
VBPROC   40,3301    374  4  337  375 VEHRET      0734     76  4  506  519 VINTFLAG    0071 =   53 17  227 1348
VBRELDSP 40,3325    376  1  326      VEHUPBIT    4761 =   49              VIO      E7,1724 =  123  6  122  813
VBRESEQ  40,3323    375  1  337      VEHUPFLG    0026 =   49 11  271 1259 VIPRIME  E7,1611 =  126 12  126  730
VBRQEXEC 41,3433    374  1  337      VEL      E7,1515 =  122  4  122  856 VL       E7,1756 =  123 13  293  872
VBRQWAIT 41,3462    374  1  337      VEL/C    E7,1451 =  121  9  121  787 VLAUN    E5,1520 =  103  5  440  441
VBSP1LD     4353 =  385  2  353  355 VELSC    33,3430    452  1  440      VLAUNS   E5,1472 =  102

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VLMIN     26,3205     888   1  864      VPRED     E7,1756 =  124  11  123  909 V04N06        4537     488   2  906 1465
VLOAD        6454    1125   1 1117      VPROJ        7361    1146   1 1117      V04N12    43,3131     279   1  279
VLOAD*       6056 = 1204   1 1124      VQUIT     26,3215     888   2  864  878 V04N46    42,2055     266   1  265
VLOADCOD     4752 = 1204   1 1124      VRCALC    04,3744     820   2  812  820 V05N00M1  10,3731    1476   1 1470
VLTEST    25,3056     872               VRCONT    26,3261     889   1  862      V05N09        5023    1201   7  467 1487
VMAGI     E7,1722 =  123  11  123  895 VRECT     E3,1510 =   89  10   89 1346 V05N30E   33,3252     449   1  449
VMAX      E4,1403      92   1  582      VRECTCSM  E3,1562      90   2  528  653 V05N70    31,3512     639   2  562  608
VMIN      26,3325 =  888   1  859      VRECTLEM  E3,1634      90               V05N7022  31,3512 =  562   1  562
VMODE        6470    1125   3 1146 1501 VRECT1       0030 =   89               V05N71    31,3513     639   2  562  630
VMOON     E5,1751 =   99   7   99  767 VREF         1311 =   84   4  873  874 V05N7122  31,3513 =  562   1  562
VN           1035      78  18  180 1326 VREFER    25,3634     884   6  878  879 V06N11        4603     669   1  665
VNBIT        4767 =   56   1 1473      VRIGHT2   00,2242    1159   1 1159      V06N13        4604     669   1  667
VNCADR       5545    1459   1 1459      VROTATEX     7354    1145   3 1155 1177 V06N14    33,3536     528   1  528
VNCON     43,2765     273   1  273      VROUND       7107    1138   6 1145 1146 V06N16N   24,2063     508
VNDSPCON  40,2244     329   1  369      VRPREV    E7,1465 =  126   3  126  730 V06N16X   23,2446     519   1  518
VNFLAG       0111 =   56   3 1462 1474 VSHRRND   00,2073    1153   4 1155 1191 V06N18        5031    1202   3  304  627
VNFLASH      5535    1459  39  206  793 VSHR2     00,2060    1153   1 1153      V06N22        5025    1202   6  402 1202
VNFLASHR     5540    1459   6  458  792 VSQ       00,3244    1182   1 1119      V06N33        5026    1202   6  513  906
VNFLSH    10,2732    1462   1 1459      VSQ/4API  E6,1616 =  116   5  116 1084 V06N34        5027    1202   3  458  744
VNFLSHR   10,2735    1463   1 1459      VSQMIN       4355 = 1092   2 1083 1084 V06N34LP  30,2151     462   1  461
VNGODSP      5542    1459   1 1459      VSQSUB    00,3316    1183   3 1175 1182 V06N34UT      5027 =  560   1  556
VNLD0CDU  43,2226     255   1  255      VSQUARE   E7,1621 =  122   6  122  881 V06N37        4532     488   3  466  663
VNLODCDU  43,2163     254   2  254  260 VSSL      00,2145    1156   3 1155 1161 V06N40    24,3514     714   8  698  713
VNLODDT   43,2341     258   1  258      VSSR      00,2127    1155   1 1159      V06N41        5032    1202   1  449
VNLODGYR  43,2256     256   1  256      VSTORE       6412    1123               V06N42    35,3553     645   1  644
VNOW      E7,1722 =  124   5  295  530 VSU          6716    1132   1 1117      V06N43    37,2164     458   1  458
VNPLANV      5035 =  787   1  787      VSUN      E5,1743 =   99   9   99  786 V06N43LP  30,2152     462   2  458  462
VNRCADR      5546    1459   1 1459      VS1       E7,1671 =  123   5  123  873 V06N458   30,2257     562   1  561
VNRET     10,3607    1474   1 1473      VTARGET   E5,1704 =  100   4  100 1300 V06N47    42,2054     266   1  265
VNSTORE   E7,1753 =  132   3  132  903 VTARGTAG  E5,1703 =  100   5  100 1300 V06N49        5030    1202   4  585 1394
VN0629    43,3165     453   1  453      VTEMP        1063 =   79   2   79   80 V06N49EE      5030 =  623   1  616
VN1          1076 =   79   4   79 1329 VTIG      E7,1637 =  127  10  127  716 V06N51    42,3625     941   1  941
VN1645    35,3027     485   9  469  905 VTPRIME   E7,1617 =  126   8  126  494 V06N55        4533     488   3  466  663
VN1645AD  35,3136     486   1  486      VV/SC        7563    1150               V06N58        4534     488   1  468
VN1645R   35,3107     486   1  486      VVEC      E5,1745 =  100  17  100 1305 V06N59    35,3157     488
VONE      E4,1725 =   94  12   94 1374 VVXSC        7340    1145               V06N60        5033    1202   2  793  906
VONE'     E4,1761 =   96   4   96 1380 VXM          7273    1143   1 1117      V06N61        5034    1202   3  792  906
VPASS1    E7,1511 =  133   3  662  683 VXM/MXV      7276    1144   1 1143      V06N62    34,2617     548   1  541
VPASS2    E5,1616 =  105   5  105  688 VXSC         7335    1145   1 1117      V06N64    26,2426     798   1  790
VPASS3    E7,1561 =  126  13  126  683 VXV          7414    1147   1 1117      V06N66    26,2510     804   1  804
VPASS36   E4,1717 =   94   3   94  505 VZC       E7,1633 =  125   4  125  634 V06N74    26,2437     800   1  800
VPASS4    E7,1637 =  127   2  468  479 V01N25    10,3720    1476   2 1465 1466 V06N75        4605     669   2  662  668
VPAST     E7,1461 =  128   3  128  530 V01N70    14,3003     756   1  756      V06N78UT  36,2470     560   1  553
VPOVL        6542    1127               V01N70UT  36,2471     560   1  556      V06N79UT  36,2472     560   1  553
VPPREC    E7,1611 =  127   2  473  476 V01N71    14,3635     781   1  781      V06N81        4535     488   4  484  906

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V06N82    04,3545      663    1  663        V2T115    32,3255      927    2  927        V53N45    37,2331      570    1  570
V06N84    13,2237      515    1  513        V2T120    32,3266      927    1  927        V57CALL   43,3102      279    1  249
V06N85B   24,3511      714    2  709   738  V2T125    32,3277      927    2  927        V59FLAG      0116  =   56    2  568
V06N87NB  37,2257      568    1  568        V2T130    32,3305      928    1  927        V59FLBIT     4755  =   56    1  244
V06N88       5035     1202    3  560   787  V2T135    32,3316      928    2  928        V59NB     37,2260      566    1  566
V06N88UT     5035  =   560    1  556        V2T140    32,3321      928    4  926   928  V6N33RTE     5026  =  906    2  898   904
V06N89       5036     1202    2  623   746  V2T145    32,3327      928    3  927   928  V6N34        5027  =  456    1  456
V06N89*      5036  =   746    1  745        V2T150    32,3334      928    1  928        V6N39RTE  36,3257      906    1  902
V06N89B      5036  =   623    2  563   617  V2T155    32,3346      928    1  928        V6N60RTE     5033  =  906    2  898   902
V06N90       5037     1202    1  685        V2T160    32,3353      928    1  928        V6N61RTE     5034  =  906    1  902
V06N92    14,3265      761    1  760        V2T165    32,3361      929    2  929        V6N81RTE     4535  =  906    1  902
V06N93       5040     1202    2  451   755  V2T175    32,3401      929    1  928        V6N99INP  40,3654      640
V06N94B   17,2162      786    1  785        V2T177    32,3413      929    1  929        V60       43,2273      257    1  249
V06N95    33,3537      528    1  528        V2T179    32,3416      929    1  929        V61       43,2301      257    1  249
V06N95B   24,3513      714    1  700        V2T185    32,3423      929    1  928        V62       43,2304      257    1  249
V06N96    24,2103      506    1  505        V2T195    32,3445      930    1  930        V63       43,2307      257    1  249
V06N99A   40,3770      642    1  640        V2T200    32,3453      930    1  930        V67       43,3054      276    1  249
V06N99DS  40,3642      640    1  640        V2T205    32,3456      930    2  930        V67CALL   40,3636      640    1  277
V06N9933  40,3650      640    1  640        V2T300    32,3460      930    6  929        V67COMEX  40,3704      641    1  640
V0648     42,2053      266    1  266        V37       04,2007      208    2  276   373  V67DEC2   40,3773      642    1  640
V0694     37,2332      570    1  569        V37BAD    04,2127      210    1  214        V67EXITX  40,3702      641    2  640
V1           0325  =    73   18   73   876  V37FLAG      0162  =   61    5  510   834  V67WMID   40,3677      641    1  640
V1LEAD    25,2433      863    1  863        V37FLBIT     4763  =   61    3  210  1488  V67WORB   40,3672      640    1  640
V1N70DSP  36,2227      556    1  556        V37KLEAN  05,2550      196    1  212        V67WW     40,3706      641    1  640
V1STO2S   22,3644     1502    6  399  1359  V37NONO   04,2375      214    2  208   210  V67XXX    40,3753      641    1  641
V16N20    14,2275      748    1  747        V37N99    04,2006      206    1  206        V70UPDAT  43,3656     1492    1  249
V16N40    24,3515      714    1  708        V37QCAD   04,3052      224    1  213        V71UPDAT  43,3660     1492    1  249
V16N44    23,2371      518    2  518   521  V37XEQ    04,2736      221                  V72UPDAT  43,3662     1492    1  249
V16N45       4536      488    2  485   645  V37XEQ+3  04,2741      221    1  224        V73UPDAT  43,3664     1492    4  249  1492
V16N53    31,2136      509    1  507        V37XEQC   04,2762      221                  V74       43,2706  =  271
V16N54    31,2135      509    1  507        V4N06RTE     4537  =  906    1  903        V82CALL   23,2330      517    1  267
V16N63    26,2425      798    1  793        V41K      14,3565      775    1  774        V82EMBIT     4754  =   63
V16N67    26,2544      806    1  804        V5LOOP1   20,2003      223    1  223        V82EMFLG     0211  =   63    5  522   524
V16N69    26,2472      802    1  801        V5LOOP2   20,2036      223    1  224        V82FLAGS  E4,1733  =   93    6   95   520
V16N85B   24,3512      714    2  712   738  V5N09RTE     5023  =  907    1  907        V82GOFF1  23,2373      518    1  517
V16N95    36,2015      532    1  532        V5OUT1    20,2025      223    1  223        V82GOFLP  23,2343      517    1  518
V1683     24,3516      714    1  741        V5OUT2    20,2052      224    1  224        V82GON    23,2551      521    1  517
V2(T1)7   E7,1677  =   131    7  131   936  V50N00    10,3721     1476    1 1471        V82GON1   23,2567      521    2  521   522
V2TERROR  32,3112      925    1  925        V50N18BT     4752  =   52                  V82GON2   23,2602      521    1  522
V2T1X     32,3462      930    2  928   932  V50N18FL     0055  =   52    5  210   597  V82GON3   23,2622      521    1  521
V2T100    32,3102      925    2  900   919  V50N25    07,2060      242    1  242        V82PERF   43,2557      267    1  250
V2T101    32,3115      925    1  925        V50N25P   31,3514      639    1  629        V82REDSP  23,2561      521    1  521
V2T102    32,3213      926    1  926        V50PASTE  10,3427     1471    1 1471        V82STALL  23,2354      517    1  518
V2T105    32,3220      926    1  926        V51N45    37,2261      568                  V83       31,2026      507    1  509
V2T110    32,3225      927    1  926        V52       43,3037      276    1  249        V83CALL   31,2031      507    2   35   507

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED            = DEFINED BY EQUALS              J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT                  XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF

SYMBOL      DEF     H     REFERENCES      SYMBOL      DEF     H     REFERENCES      SYMBOL      DEF     H     REFERENCES

V83PERF   43,2564    267  3  219  267 WAKECAD   00,3766   1482  1 1481      WPLATO    E5,1474 =  102
V85PERF   43,2574    267  1  250      WAKECADR  10,3725   1476  3 1466      WRDTIME   E4,1771 =   96  2   96  506
V86PERF   43,2621    269  1  250      WAKEPLAY  10,3253   1468  1 1473      WRENDPOS  E4,1400     92  3  486  640
V89CALL   31,2377    626  1  272      WAKEP62   26,2375    797  2  233 1078 WRENDVEL  E4,1401     92  1  640
V89PERF   43,2722    272  1  250      WAKER     00,3760   1481  1 1482      WRTN17    21,3265   1022  1 1021
V89RECL   31,2421    626  2  626      WAKESTAL  13,3565   1325  2 1324 1325 WRTN22    21,3223   1021
V89TAG    31,2000 =   32  1  626      WAKETEST  01,3035   1216  1 1216      WTABORT   01,3342   1229  1 1227
V90PERF   43,3022    276  1  250      WANGI     E5,1446 =  102              WTEMP     E6,1513 =  112 13  112 1031
V94ENTER  31,2474    629  1  639      WANGO     E5,1444 =  102              WTGTSMPL  33,2321    437  1  437
V94FLAG      0213 =   64  3  275  630 WANGT     E5,1450 =  102  1  102      WTLISTNT  33,2303    437  1  235
V94FLBIT     4756 =   64  1  275      WASCMC    34,2357    543              WTLST2    01,3347   1230  8 1228 1229
V94NTR    31,3532    639  1  231      WASINIT   34,2356    543              WTLST4    01,3237   1227  1 1230
V96ONBIT     4766 =   63              WASIU     34,2355    543              WTLST5    01,3267   1228  1 1226
V96ONFLG     0204 =   63  2  276 1314 WATLST0-     5247   1223  4 1223 1234 WTLTCADR  01,3463   1235  3 1412 1415
V97E      24,3320    710              WBODY     E6,1525 =  112 18  112 1029 WTOPTION     1331     84  7  170  195
V97EJOB   24,3322    710  1  234      WBODY1    E6,1527 =  112  7  136 1027 WWOPT     E4,1715 =   94  4  295  641
V97E40.6  24,3334    710              WBODY2    E6,1531 =  112  7  112 1027 WWPOS     E4,1711 =   94 10  295  642
V97NOC    10,3746   1477  1 1471      WCALC     22,2745    416  1  416      WWVEL     E4,1713 =   94  7  295  641
V97P      24,3407    711  1  710      WDAGAIN   41,3357    370  1  370      =====================================
V97PJOB   24,3411    711  1  233      WDCNT        0137 =   71  4  368  370 X            0024 = 1306 22 1278 1293
V97T      24,3363    711  1  710      WDRET        0115 =   70  7  368  370 X(T1)     E7,1721 =  131 23  131  936
V97TJOB   24,3365    711  1  236      WEARTH    26,3650   1251  1 1249      X(T2)     E7,1725 =  132 12  899  925
V97TRCS   24,3374    711              WEIGHT/G  E6,1475    107  6  695  957 X(T2)PRE  E7,1723 =  132  3  915  919
V99E      24,3434    712              WHICHALF  15,2754   1083              XACTOQ    43,2432    261
V99EJOB   24,3440    712              WHIMPER      7720   1487  3 1488 1489 XAD       01,2375   1193  1 1118
V99FLASH  24,3352    711              WHOCARES  E7,1777 =  134 10  134 1466 XAD2      01,2400   1193  2 1193
V99P      24,3471    713  1  712      WHOLECON  42,3444    363  3  362      XCHNYLOC  10,3446   1471  1 1468
V99P/TIG  24,3506    713  2  713      WITCHONE  10,3431   1471  3 1464 1468 XCHQADD   10,3752   1477  1 1468
V99PSTE      4755 = 1477  1 1471      WIXA         1107 =   79  6   79 1258 XCHSLEEP  10,3217   1468  1 1477
V99T      24,3376    711  1  712      WIXB         1110 =   79  4   79 1258 XCHTOEND  10,3445   1471  3 1464 1468
V99TJOB   24,3402    711              WL        21,3447   1028  2 1032      XCHX      01,2367   1193  1 1118
===================================== WL-H/SLP     5006 = 1028  2 1030 1031 XCOMMON   12,3131   1295  1 1295
W         E5,1400 =   97 62   97 1348 WLH       21,3443   1028  1 1030      XD/360    E6,1615 =  116  5  116 1085
WAITADR      0063 =   69  3 1223 1227 WLH/SLOP  21,3442   1028  1 1030      XDC       E5,1713 =   99 12   99 1361
WAITBANK     0062 =   69  1 1226      WLMH      21,3445   1028  1 1031      XDELVBIT     4761 =   51
WAITBB       5254   1223  3  140 1232 WLOOP     12,3056   1292  1 1292      XDELVFLG     0045 =   51  8  494  905
WAITEXIT     0061 =   69  5 1223 1481 WMATEND   11,3650   1349  1 1347      XDIFF     12,2230   1278
WAITF2       4000 =   27  3 1222 1233 WMATRXNG  43,2731    272  1  250      XDSPBIT      4770 =   56  2 1459 1460
WAITLIST     5233   1223 29  150 1427 WMIDPOS   E6,1400    106  2  633  641 XDSPFLAG     0112 =   56
WAITMASK     5045 = 1477  1 1467      WMIDVEL   E6,1401    106  1  641      XI           0030 = 1306  7 1279 1298
WAITONE   27,2523    589  2  578      WORBPOS   E4,1404     92  2  610  640 XKEP      E3,1552 =   89  3   89 1346
WAITONE1  27,2525    589  2  588  589 WORBVEL   E4,1405     92  1  640      XKEPCSM   E3,1624     90
WAITTEMP     0064 =   69  3 1230      WORKW        0000 =  623  2  621      XKEPLEM   E3,1676     90
WAIT1/2   16,3362    987              WOZERO    05,3536   1098  2 1097 1102 XKEPNEW   E4,1676 =   95  3   95 1334
WAIT2     01,3213   1226  2 1223      WPLATI    E5,1570 =  103              XLNMASK   17,2623   1039  2 1038

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT                  XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971                PAGE 1558

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF    H        REFERENCES      SYMBOL      DEF    H        REFERENCES      SYMBOL      DEF    H        REFERENCES

XLNNDX    17,2647     1039    8 1040 1057 YAWANG        0024 =  941    2  940  941 YTAUPOS   17,3227     1051    1 1051
XLNINDX   17,2760     1042    4 1043 1056 YAWCAP     20,3042     970    1  981      YTMP1     E6,1555 =  109    3  109  973
XMAX         0012 = 1306    9 1277 1280 YAWLIM     15,2624    1079    2 1076      YTMP2     E6,1557 =  109    3  109  973
XMIN         0014 = 1306    6 1278 1281 YAWTIME    17,3217    1051    2 1054      YTMP3     E6,1561 =  109    3  109  973
XMIN/360  15,3377     1092    1 1084      YAWT5      20,3620     981    1  966      YTMP4     E6,1563 =  109    3  109  973
XNB       E5,1713 =   99   25  299 1505 YBIAS      24,3543     714    1  696      YTMP5     E6,1565 =  109    3  109  973
XNBADR    33,2221      432    1  427      YBLASTOK   17,3255    1051    1 1051      YTMP6     E6,1567 =  109    3  109  973
XNBEB     22,3727     1505    1 1505      YBYPASS    17,3525    1057    1 1051      YUNIT     04,3755     1206    1   34
XNB1      E5,1554 =   97   15   97 1505 YCDUDOTS   20,3051     970                YV           0754 =   70   11   77 1349
XNB1EB    22,3730     1505    1 1505      YCDUYPST   E6,1640 =  109    4  109  974 YWORD     17,2665     1040
XNDX1     E6,1513 =  112    7  112 1054 YCDUZPST   E6,1641 =  109    4  109  974 YWORD1    E6,1454 =  107    4  107 1060
XNDX2     E6,1514 =  112    6  112 1057 YCMD       E6,1624 =  109    7  109  973 YWORD2    E6,1455 =  107    4  107 1061
XOLDBUF   E6,1536 =  120    4  120  831 YCOPY      20,3170     973    2  963  972 YZTABLE   17,3140     1046    4 1043 1056
XPIPBUF   E6,1533 =  120    4  120  831 YCOPYCYC   20,3166     972                ======================================
XPREV     E3,1552 =   89    2 1278 1282 YCSM       E3,1755 =   91    3   91  685 Z            0005 =   40   15  282 1487
XPRODUCT  16,2306      727                YDAPEND    20,3167     972                ZBLAST    17,3711     1061    1 1060
XREG         1206       82   10  283  357 YDC        E5,1721 =   99    6   99 1361 ZBLAST1   17,3714     1061    1 1060
XREGLP       1211       82    3  329  357 YDELOFF    E6,1607 =  109    7  109  971 ZBLAST2   17,3717     1061    1 1060
XRNGERR   E7,1675 =  123    1  293      YDOTC      E3,1757 =   91    2   91  294 ZDC       E5,1727 =   99    6   99 1361
XROT      27,2403      400    1  400      YDOTL      E3,1761 =   91    1  294      ZERINFLT  23,2263      306
XS/360    15,3401     1092    2 1084 1092 YDOTLIM    15,2622    1079    2 1076      ZERO         4772     1200  288  143 1506
XSCREF       0306 =   74    6  697  724 YERORLIM   20,3113     971                ZERDANS   10,3375     1184    2 1184
XSM       E5,1671 =   99   32   99 1358 YERRB      E6,1577 =  109    4  109  973 ZERODNLK  13,2306      565    1  565
XSMADR    33,2222      432    1  444      YFORWARD   20,3114     971                ZERODP    04,3761 = 1206
XSMD         0306 =   74   12   36  782 YINDEX     E6,1521 =  112    3  112 1041 ZERDER    21,3025     1017    1 1018
XSQC(XI)     0034 = 1306    5 1261 1287 YINTEGRL   20,3065     970                ZERDEROR  20,2203      423    1  415
XSTORE    01,2343     1192    3 1192      YJETCODE   15,2631    1080    2 1074 1076 ZEROICDU     5511     1417    4  151 1419
XSU       01,2406     1193    1 1118      YJETS      17,2723    1041    3 1041 1061 ZEROING   33,2134      430    3  427  444
XTMP1        0006 =  623    3  622  623 YK1K2      32,2237     650    1  649      ZEROING1  33,2136      430    1  430
XTRANS    E6,1631 =  113    4  113 1039 YMANNDX    E6,1660 =  114    4  118 1024 ZEROJET   21,2642     1014    5  262 1014
XTILIM    32,3741      937    2  926      YMISC      20,3213     973                ZERONDX   E5,1655 = 1003    1 1003
XTILIMX   32,3773      937    1  937      YNB        E5,1721 =   99    7  299 1358 ZERONDX1  E5,1655 = 1003    5  427  444
XTILIM2   32,3765      937    1  937      YNB1       E5,1562 =   97    4   97  299 ZEROO     26,3335 = 1260
XTILIM3   32,3767      937    1  937      YNDX       E6,1515 =  112   10  112 1055 ZERORTE   26,3327 =  938    5  910  937
XTILIM5   32,3771      937    1  937      YOFFSET    20,3126     971                ZEROTS    21,2560     1012    1 1012
XUNIT     04,3757     1206    7   34 1340 YOLDBUF    E6,1537 =  120    3  120  828 ZEROVEC   04,3761     1206   23   34 1352
XXXALT    E7,1455 =  126    4  126  498 YOUT       20,3132     971                ZEROVECS  26,3335     1205   38   34 1260
X1           0046 =   41   88  442 1504 YPIPBUF    E6,1534 =  120    3  120  828 ZI        E5,1706 =  101   24 1252 1261
X1CON     32,2267      650    1  648      YPRECOMP   20,3140     971                ZIXA         1111 =   79    5   79 1258
X2           0047 =   41   38  457 1375 YREG          1207      82    3  354  362 ZIXB         1112 =   79    5   79 1258
X789      E3,1700       90    9  614 1259 YREGLP        1212      82    2   82  362 ZMEASBIT     4757 =   47
======================================== YSCREF        0314 =   74    5  697  724 ZMEASURE     0005 =   47    3  633  634
YACLIM    20,3131      971                YSM        E5,1677 =   99    8   99 1358 ZNB       E5,1727 =   99    7  299 1358
YACTOFF   E6,1424      106    8  181  953 YSMD          0314 =   74    6   74  748 ZNB=S1    23,2145      300    1  299
YACTTMP   E6,1657 =  110    4  110  953 YTAUNEG    17,3225    1051    1 1051      ZNB1      E5,1570 =   97    5   97  300

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BD BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT                  XX MISCELLANEOUS TROUBLE
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GAP: ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971              PAGE 1559

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL     DEF     H        REFERENCES       SYMBOL     DEF     H        REFERENCES       SYMBOL     DEF     H        REFERENCES

ZNOX      E6,1516  =  112    9  112 1056 1/ERRLIM     4766  =  981    1  974       1P5SPT1   01,2017  =  717
ZOLDBUF   E6,1540  =  120    1  829      1/GMAX    26,3333  =  889    1  880       1P7SPT1   01,2022  =  395
ZONE         1327      84    4  171  176 1/GYRO    06,3513     314    3  314  316  1REV      12,2141    1277    1 1277
ZOPALARM  06,3073     170                1/KA1     26,3305     889    1  861       1RTEB1    26,3333  =  938    7  916  926
ZOPFIN1   06,3101     170    3  170  171 1/KB1     26,3211     888    1  874       1RTEB13   35,3571     938    2  899  903
ZOPFIN2   06,3102     170                1/K44     26,3277     889    1  862       1RTEB17   35,3573     938    3  600  927
ZOPTCNT      1332      84    4  170  171 1/MU         0016  = 1305    4 1277 1290  1RTEB2    26,3325  =  938    6  674  913
ZOPTCS       4766  =   85    2  170      1/PIPA    06,3276     308    2  439  832  1RTEB25   35,3575     938    2  937  939
ZOPTDES   06,3053     169                1/PIPADT     1277      83   10   83  838  1RTEB28   35,3577     938    4  901  932
ZPIPBUF   E6,1535  =  120    3  120  829 1/PIPAGT  33,3211     448    1  444       1RTEB3    34,3766  =  938    2  916  918
ZPRIME       0026  =   74    7 1354 1355 1/PIPAI   06,3306     308    1  308       1RTEB4    34,3770  =  938    1  916
ZREG         1210      82    3  335  362 1/ROOTMU     0022  = 1305    5 1277 1287  1SEC         5016    1201   13  365 1481
ZREGLP       1213      82    2   82  362 1/RTLIM   20,3621     981    1  966       1SECDELY  00,3730    1481    4  485  522
ZROCLOCK  34,2015     536                1/RTMU    34,3756    1388    1  812       1SECX        5016  =  432
ZRUPTFIN     4757  =   85    2  172  175 1/RTMUE   23,2451     519    2  522  814  1SECXT    E5,1644  =  103
ZRUPT        0015  =   40                1/RTMUM   23,2447     519    1  522       1SECXT1   E5,1644  =  103    2  437  444
ZSCREF       0322  =   74    8  697  724 1/SQRT3   35,3271     603    1  603       1SEC20    16,2623  =  733
ZSM       E5,1705  =   99    7   99 1358 1/SQR3    14,3730     787    1  787       1SHOTCHK  16,3075     951
ZSMD         0322  =   74    7   74  748 1/TMXFIR     4766  =  996    1  992       1SHOTOK   16,3115     952    2  951
ZTOGSC    06,3132     171    1  169      1/WIE     23,2253     305    2  305       1STOR2ND  10,3407    1471    1 1470
ZTOMAN    06,3071     170    1  170      1/WLOOP   12,3214    1294    1 1294       1STO2S    22,3640    1502    3  300  452
ZUNIT     04,3753    1206    4   34 1343 1/10FPS   05,3305  =  685    1  683       1TO2SUB   22,3661    1502    4 1502
ZV           0762  =   77    9   77 1349 1/12TH    26,3150     887    1  859       10DEGS-   23,2321     307    1  297
Z123      36,3272    1252    1 1253      1/16A1    15,3375  = 1092    1 1082       10RTE     35,3605     938    3  915  927
======================================== 1/16TH    34,3770  =  887    2  865  873  10SEC     20,2330     529    1  528
0.5SEC    37,2772     831                1/2SECX      5011  =  448    1  444       10SECS    26,2647     809    1  809
0.6SECTS  21,2041     734    1  734      1/200     34,3755     600    1  599       1008-14   16,2623     733    3  733
0EBANK    43,3273    1396                1/24TH    26,3253     888    1  870       100MSTS      7661  =  551    2  550
======================================== 1/3RD     26,3151     887    2  870       100SEC    20,2353     529    1  529
1.0818    31,3502     639    1  635      1/6TH     14,3004     756    1  754       11,12        5050  =  178    1  178
1.1RTEB1  35,3611     938    1  934      1BITDP    27,2424     400    3  647  860  11,14,9   06,2037     143    1  143
1.11SPOT  01,2025     230    7  415  834 1B1       04,3757  = 1251    1 1241       110SPIN   40,3247     371    4  330  369
1.13SPOT  01,2030     230    2  558  834 1DAPCAS   20,3306     975                  114ALM    07,2216     245
1.2SPOT   01,2052  =  230    2  230  231 1DPB2     15,3411  =  671    1  672       1200      36,3765    1260    1 1258
1.3SPOT   01,2014     230    2  230  829 1DPB28    15,3431  =  671    2  673  678  120MRUPT  06,2041     143    1  145
1.5SPOT   01,2017     230    1  717      1DSQR3    31,3530     639    1  639       120MS        5775  =  168
1.7SPOT   01,2022     230    1  395      1P11SPT2  01,2025  =  415                  13-11,1   40,3635     393
1.8SEC    14,3311     761    1  761      1P11SPT3  01,2025  =  554                  13,14,15     7673    1203    7  175 1476
1-CSTH    E5,1735  =  100    4  100 1297 1P11SPT4  01,2025  =  555                  130DEG    35,2204     469    1  466
1-E(-AT)  20,3622     981    2  968  972 1P11SPT5  01,2025  =  559                  130DEGLO  04,3377     654    1  663
1/ACTSAT  20,3615     981    1  975      1P11SPT6  01,2025  =  572                  14,12,7      7646    1203    2  250 1461
1/ATTLIM  17,2527     949    1  945      1P11SPT7  01,2025  =  834                  15/16     11,3756    1352    1 1340
1/C       16,2641     767    2  602  767 1P11SPT8  01,2025  =  834                  15ADRERS  01,2424    1194    7 1192 1196
1/CHECK   06,3507     314    1  312      1P13SPT1  01,2030  =  558                  15BITADR     6221    1115    1 1121
1/CONACC  E6,1631  =  109    5  109  991 1P3SPT1   01,2014  =  829                  170DECML     4352  =  448

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED             = DEFINED BY EQUALS              J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED      CD DEFINITION ASSOCIATED WITH CONFLICT                XX MISCELLANEOUS TROUBLE
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GAP: ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-111      11:40 FEB. 26,1971                  PAGE 1560

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF    H       REFERENCES     SYMBOL      DEF    H       REFERENCES     SYMBOL      DEF    H       REFERENCES

17T020    43,3575    1400                 2SATSTCK     4540     551   1   55        3AXISFLG     0124  =   57    9  394  698
18SEC     24,3523     714   1  698        2SEC(22)  37,3372     841   1  841        3CASFLTR  20,3534      979
180/8ATT  15,3375    1092   4 1083 1092   2SECS        5017    1201   6  540 1424   30SECS    05,3754     1330    1 1330
19.77DEG  37,2262     568   1  568        2T/TCDU      5064  = 1092   1 1081        3DAPCAS   20,3344      976    1  975
19DECML      4351  =  448   1  438        2VEXHUST  16,2631     733   2  726  732   3D0Z      15,2430     1076    1 1076
====================================      2048SEC   35,3573  =  600   1  600        3MINCON   23,3136      587    1  587
2.11SPOT  01,2044     231   1  275        20BIAS    40,2562     346   2  346        3P11SPT1  01,2071  =  536
2.13SPOT  01,2047     231   1  588        20DEG-    23,2326     307   1  300        3P13SPT1  01,2074  =  536
2.2SPOT   01,2052  =  231   1  230        20DEGS    06,3671     317   1  171        3P15SPT1  01,2077  =  528
2.3SPOT   01,2033     231   2  230 1314   200DEGS-  23,2324     307   1  300        3P2SPT1   01,2052  =  529
2.4SECDP  14,3270     761   1  758        20DEGSMN  14,3274     761   1  759        3P3SPT1   01,2060  =  701
2.5SPOT   01,2036     231   4  212 1313   20J       37,3400     841   1  840        3P3SPT2   01,2060  =  711
2.7SPOT   01,2041     231   1  554        20KFT/S   26,3011     814   1  813        3P5SPT1   01,2063  =  704
2/3       11,3770  = 1352   1 1340        20MRUPT      7663  =  145   3  143  145   3P5SPT2   01,2063  =  706
2BLANK    40,2473     333   6  330  382   200B+19   33,3670     532   1  530        3P7SPT1   01,2066  =  537
2CASFLTR  20,3451     977                 200CS     16,2522     731   3  723  730   3ZEROS    26,3335  =  887    6  853  877
2C1HS     26,3273     889   3  863  876   200MS        4124  =  174   2  170  172   308DMSK   06,2764      168    1  147
2D/SDZ    15,2456    1076   2 1074        208DEGLU  04,3401     654   1  663        30KFT     23,2455  =  815    1  813
2DAPCAS   20,3320     975                 21/22REG     0115  =   70   3  326  392   30480RTE  35,3617      938    1  910
2DZERO    04,3761  = 1240                 217ALARM  14,3766     788   4  747  788   328NM     35,3160      600    1  596
2EBANK    43,3307    1396   1 1397        22DSPBIT     4754  =   51                 33DEC        5003     1201    1  214
2HS       26,3263     889   2  875  880   22DSPFLG     0040  =   50   2  611  615   330PTMON  06,3010      169
2HSGMXSQ  26,3265     889   1  880        22SUBSCL  E7,1743  =  134   9  134  637   33RDMSK      5055  =  168    2  153
2INTOUT   40,2616     347   1  345        25DECML      4125  =  437   2  437        34DEC        4260      381    2  215  381
2J        37,3402     841   1  840        25NM      26,3223     888   1  868        35DEGANG  36,2466      560    1  553
2JETT        5020  = 1092   2 1085 1086   25THOUS   04,3375     654   1  654        35KFT/S   26,3007      814    1  813
2J3RE/J2  13,3747    1353   2 1341        26P50S    26,2000  =   31   1  783        360CHECK  12,3165     1294    2 1292
2K           4756  = 1204   3 1112 1216   27T030    43,3603    1400                 360LAMB   12,3524     1299    1 1296
2NDPERF      4754  = 1477   3 1469 1471   270DEG    23,2322     307   1  300        360SW        0206  =   63    3 1292 1294
2NORETRN  22,3157     420   2  419        290KFT    26,3005     814   1  812        360SWBIT     4770  =   63
2PHSCHNG     5362    1406  35  270 1068   ====================================      37BLANK   36,3225      905    1  902
2PI/M     17,2534     949   1  948        3.1SEC    04,3054     224   1  209        38TRDEG   14,3266      761    2  759  761
2PISC     15,3427    1288   5  653 1295   3.11SPOT  01,2071     232   1  536        3990DEC   33,2223  =  432
2P11SPT1  01,2044  =  275                 3.13SPOT  01,2074     232   1  536        ====================================
2P13SPT1  01,2047  =  588                 3.15SPOT  01,2077     232   1  528        4.11SPOT  01,2135      233    1  711
2P13SPT2  01,2030  =  834                 3.2SPOT   01,2052     231   3  230  529   4.13SPOT  01,2140      233    1  711
2P3SPT1   01,2033  = 1314                 3.3SPOT   01,2060     231   3  230  711   4.15SPOT  01,2143      233    1  449
2P5SPT1   01,2036  =  212                 3.5SPOT   01,2063     231   2  704  706   4.17SPOT  01,2146      233    1  259
2P5SPT2   01,2036  =  213                 3.7SPOT   01,2066     231   1  537        4.2SPOT   01,2102      232    2  230  700
2P5SPT3   01,2036  =  555                 3/32      11,3754    1352   1 1340        4.21SPOT  01,2151      233    1  699
2P5SPT4   01,2036  = 1313                 3/4       11,3760    1352   5   34 1351   4.23SPOT  01,2154      233    2  699  738
2P7SPT1   01,2041  =  554                 3/4LOWDP  11,3760  =   34                 4.25SPOT  01,2157      233
2REDOSAT  43,2515     262   1  262        3/5       11,3744    1352   1 1340        4.27SPOT  01,2162      233    1  702
2ROUND    40,3044     361   4  359  361   3/64      11,3752    1352   1 1340        4.3SPOT   01,2124      232    2  230  702
2RTE81    26,3343  =  938   5  915  937   3AXISBIT     4763  =   57                 4.31SPOT  01,2165      233    1  755

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED           = DEFINED BY EQUALS               J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT          XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H       REFERENCES      SYMBOL      DEF     H       REFERENCES      SYMBOL      DEF     H       REFERENCES

4.33SPOT 01,2170      233     1 1077        4P7SPT1  01,2132  =  701                  5P3SPT2  01,2250  =  706
4.35SPOT 01,2173      233     1  704        4SEC     33,3664     532    1  532        5P3SPT3  01,2250  =  717
4.37SPOT 01,2176      233     1  700        4SECS        5020   1201    3  151 1092   5P3SPT4  01,2250  =  725
4.4SPOT  01,2110      232     1  700        400KFT   26,3025     815    2  814        5P3SPT5  01,2250  =  728
4.41SPOT 01,2201      234     1  883        ====================================== 5P3SPT6  01,2250  =  728
4.43SPOT 01,2204      234     1  808        5.11SPOT 01,2261     235    1  438        5P3SPT7  01,2250  =  740
4.45SPOT 01,2207      234     1  808        5.13SPOT 01,2264     235    1  437        5P3SPT8  01,2250  =  801
4.47SPOT 01,2212      234     1  869        5.15SPOT 01,2267     235    1  446        5P3SPT9  01,2250  =  832
4.5SPOT  01,2127      232     1  703        5.17SPOT 01,2272     235    1  808        5P31SPT1 01,2311  =  829
4.51SPOT 01,2215      234     1  538        5.2SPOT  01,2234     234    3  230  827   5P33SPT1 01,2314  =  447
4.53SPOT 01,2220      234     1  710        5.21SPOT 01,2275     235    1  439        5P4SPT1  01,2242  =  829
4.55SPOT 01,2223      234     1  801        5.23SPOT 01,2300     235    1  438        5P5SPT1  01,2253  =  828
4.57SPOT 01,2226      234     1  740        5.25SPOT 01,2303     235    1  446        5P7SPT1  01,2256  =  435
4.6SPOT  01,2116      232     1  700        5.27SPOT 01,2306     235    1  446        5P7SPT2  01,2256  =  447
4.61SPOT 01,2231      234     1  531        5.3SPOT  01,2250     235   17  230  883   5SEC     24,3525     714    3  698  701
4.7SPOT  01,2132      232     1  701        5.31SPOT 01,2311     236    1  829        5SECDP   24,3524     714    1  699
4D/SDZ   15,2446     1076                   5.33SPOT 01,2314     236    1  447        5SECOND  16,2625  =  733
4D/SLIM  15,2621     1079     2 1076        5.4SPOT  01,2242     234    1  829        500B-14  16,2625     733    2  733
4JETT    15,3376     1092     2 1086        5.5SPOT  01,2253     235    1  828        500SEC   25,2111     854    1  854
4P11SPT1 01,2135  =  711                    5.6SECS  05,3772    1331    1 1330        504AZ        0022  = 1251   3 1249
4P13SPT1 01,2140  =  711                    5.7SPOT  01,2256     235    2  435  447   504F         0006  = 1251   5 1247 1248
4P15SPT1 01,2143  =  449                    5/128    11,3766    1352    1 1341        504LM    E4,1411      92    3 1243 1343
4P17SPT1 01,2146  =  259                    5/8      13,3755    1353    6 1317 1342   504LPL       0016  = 1251
4P2SPT1  01,2102  =  700                    5BLANK   40,2431     332    6  332  382   504RM    13,2700    1242    1 1242
4P21SPT1 01,2151  =  699                    5BLANK1  40,2452     332                  504RPR       0000  = 1251   4 1243 1245
4P23SPT1 01,2154  =  699                    5810     01,2473    1196                  5400     36,3763    1260    1 1256
4P23SPT2 01,2154  =  738                    5DEGREES 16,2637     767    1  767        59.99SEC 42,3452     363    1  362
4P27SPT1 01,2162  =  702                    5P11SPT1 01,2261  =  438                  59MIN    42,3451     363    1  362
4P3SPT1  01,2124  =  702                    5P13SPT1 01,2264  =  437                  ======================================
4P31SPT1 01,2165  =  755                    5P15SPT1 01,2267  =  446                  6.11SPOT 01,2336     236    1 1068
4P33SPT1 01,2170  = 1077                    5P17SPT1 01,2272  =  808                  6.2SPOT  01,2317     236    3  230  711
4P35SPT1 01,2173  =  704                    5P2SPT1  01,2234  =  540                  6.3SPOT  01,2325     236    5  230  738
4P37SPT1 01,2176  =  700                    5P2SPT2  01,2234  =  827                  6.5SPOT  01,2330     236    1 1497
4P4SPT1  01,2110  =  700                    5P21SPT1 01,2275  =  439                  6.7SPOT  01,2333     236    1  711
4P41SPT1 01,2201  =  883                    5P23SPT1 01,2300  =  438                  6DD      36,3764    1260    1 1258
4P43SPT1 01,2204  =  808                    5P25SPT1 01,2303  =  446                  6P11SPT1 01,2336  = 1068
4P45SPT1 01,2207  =  808                    5P27SPT1 01,2306  =  446                  6P2SPT1  01,2317  =  699
4P47SPT1 01,2212  =  869                    5P3SPT1  01,2250  =  541                  6P2SPT2  01,2317  =  711
4P5SPT1  01,2127  =  703                    5P3SPT10 01,2250  =  833                  6P3SPT1  01,2325  =  645
4P51SPT1 01,2215  =  538                    5P3SPT11 01,2250  =  833                  6P3SPT2  01,2325  =  703
4P53SPT1 01,2220  =  710                    5P3SPT12 01,2250  =  833                  6P3SPT3  01,2325  =  736
4P55SPT1 01,2223  =  801                    5P3SPT13 01,2250  =  834                  6P3SPT4  01,2325  =  528
4P57SPT1 01,2226  =  740                    5P3SPT14 01,2250  =  855                  6P5SPT1  01,2330  = 1497
4P6SPT1  01,2116  =  700                    5P3SPT15 01,2250  =  883                  6P7SPT1  01,2333  =  711
4P61SPT1 01,2231  =  531                    5P3SPT16 01,2250  =  531                  60GENRET E6,1773  =  119    7  119  858

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED          = DEFINED BY EQUALS               J DEFINED BY JOKER OR ERASE ANYWHERE     MD MULTIPLY DEFINED
BD BADLY DEFINED      CD DEFINITION ASSOCIATED WITH CONFLICT          XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL     DEF    H       REFERENCES     SYMBOL     DEF    H       REFERENCES     SYMBOL     DEF    H       REFERENCES

60MIN    05,3266      671    6  662  668 ==================================== 9DWN          0014  =  623    4  621  622
60SECDP  26,2650      809    1  578      9716      11,3764     1352    1 1340      9DWN=N+3 30,3555     622    1  621
600MS    07,3665     1439    1 1422      9,6,4     05,3250      205    1  199      9DWNEXEP 30,3530     621    1  621
600SEC   37,2160      458    4  458  682 9DWAAA    30,3504      621    1  621      9DWP          0010  =  623    7  619  621
600SECS  13,2730     1314    3  231 1314 9DWAAB    30,3505      621                9DWSETI2 30,3422     620    1  620
======================================== 9DWAAC    30,3525      621    1  621      9DWSETJ2 30,3441     620    1  620
7.9SEC       5025 =  1202    2  151 1419 9DWEPCAL  30,3377      619    2  620      9DWSETWX 30,3552     622    1  621
7712     11,3762     1352    1 1340      9DWEXITX  30,3577      622    1  621      9DWTESTJ 30,3426     620    1  620
74K          7675 =   141                9DWEXXXA  30,3607      622    1  622      9DWTO6DW 30,3363     619    2  618
77DECML  33,2701      443    1  435      9DWFIG6   30,3445      620    1  620      9DWXX         1053  =   79    2  619  622
======================================== 9DWI          0012  =  623   11  619  622 9DW26D   32,2017     623    4  620  622
8KK      E7,1745  =   134    9  134  614 9DWI=J    30,3374      619    2  620      9X9LOC1  E5,1444  =   97    1  105
8NN      E7,1747  =   134    8  134  616 9DWI=JA   30,3463      620    2  622      9X9LOC2  E5,1532  =   97    1  105
8192AUG  07,3516     1432    1 1432      9DWID     32,2021      623    4  620  622 90MSCALR 04,3301     592    1  592
89TEST   40,2064      327    2  326      9DWJ          0016  =  623   12  619  622 90SECS   06,3670     317    2  150

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED         = DEFINED BY EQUALS              J DEFINED BY JOKER OR ERASE ANYWHERE     MD MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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UNREFERENCED SYMBOL LISTING, INCLUDING DEFINITION, HEALTH, & PAGE OF DEFINITION.

SYMBOL      DEF    H PAGE      SYMBOL      DEF    H PAGE      SYMBOL      DEF    H PAGE      SYMBOL      DEF    H PAGE

-MUOT(M) 37,3370      841      C*MM*N1  23,3634     1367      DECNEG23    4616     1025      DL203    E6,1424  =  184
======================         CADRMARK    0372       75      DECTWO   35,3152      488      DL204       0025  =  184
ABORT       7706  = 1489       CAGEBIT     4756  =    84      DEC15       4777  =   887      DL205    E5,1761  =  184
ABORT2      5735     1488      CALCUT   16,2115      723      DEC57       4351  =   432      DL206    E5,1763  =  184
ABVAL    00,3200     1180      CALC2BIT    4767  =    52      DELBARP  20,2766      968      DL301    E7,1703  =  186
ACOSABRT 00,3720     1191      CAL53A   14,2335      749      DELBARY  20,3152      971      DL3015      0772  =  186
ACROLL   17,2747     1042      CAL53RET 14,2405      749      DELOGAC  16,3405      988      DL302    E5,1462  =  186
ACYCHECK 17,3055     1044      CURVE    06,2012      142      DELRCONE 32,2073      648      DL303    E4,1713  =  186
ADDRESS     6052     1110      CDUINC   22,3675     1503      DEX2        0144  =    72      DL304       0025  =  186
ADERCOMP 33,3127      447      CDULIMIT E5,1453  =   102      DFRNT    40,3227      371      DL305    E7,1402  =  186
ADRS+1   43,3557     1400      CG.CORR  16,3137      952      DIMOBIT     4770  =    54      DL306    E7,1760  =  186
ADVTKBIT    4757  =    62      CGTRACK  16,2231      726      DISP14   33,3503      526      DL401    E6,1701  =  188
ALCGKK   33,2444      440      CHAN76      0076  =    42      DISP45   35,3520      645      DL402    E6,1702  =  188
ALKCG    33,2447      440      CHKCTR   37,3003      831      DL101    E6,1424  =   181      DL403    E6,1703  =  188
ALLOOP3  33,2352      438      CHKFAIL1    5705     1486      DL102    E6,1624  =   181      DL404       0301  =  188
AMOONBIT    4767  =    48      CHKLIST  05,3463     1097      DL103       0025  =   181      DL405       0302  =  188
APSESBIT    4764  =    63      CHKSAB   16,2662      768      DL104    E6,1624  =   182      DL406       0303  =  188
ASTNV99P 24,3476      713      CLOKNOW  33,3522      528      DL105       1340  =   182      DL407    E6,1714  =  188
ATERSET  34,2470      546      CM/ATUP  37,3571      894      DL1055   E7,1722  =   182      DL408    E7,1677  =  188
ATTCHFLG    0166  =    61      CM/DAP2C 20,3705     1068      DL1056   E7,1724  =   182      DL409    E7,1701  =  188
ATTDISPR 33,3713      544      CM/DUMPR 15,3337     1090      DL106       0035  =   182      DL410    E7,1402  =  188
AUTOCCNT 21,3304     1024      CM/POSE3 37,3664      895      DL107    E6,1533  =   182      DL411    E6,1666  =  188
AVEMCBIT    4770  =    65      CM/TR10  37,3443      890      DL108    E6,1533  =   182      DL412       0025  =  188
AVFLBIT     4764  =    51      CMDAPARM    0135  =    58      DL109       0033  =   182      DL413       0776  =  188
======================         CMENTR07 05,2101  =   183      DL110    E6,1477  =   182      DL414    E6,1570  =  188
BDZCHECK 17,2773     1042      CMOONBIT    4755  =    62      DL111    E6,1500  =   182      DL415    E6,1571  =  188
BEE17    15,3402     1288      CMTR1    37,3572      894      DL112    E6,1501  =   182      DL416    E6,1572  =  188
BESTTRIM 24,3075      705      CMTR2    37,3643      895      DL113    E6,1573  =   182      DL417    E6,1573  =  188
BHIZ     01,2447     1195      CNTRCHK  43,3420     1397      DL114    E6,1574  =   182      DL418    E6,1574  =  188
BITS3&4     5775  = 1439       COARFINE 14,2362      749      DL115       0776  =   182      DL419    E6,1701  =  188
BITS4,5     5001  = 1002       COFMAXGO 22,2170      405      DL116    E6,1573  =   182      DL420    E6,1702  =  188
BITS5-6     5010  =   536      COGAFBIT    4765  =    65      DL117    E6,1574  =   182      DL421    E6,1703  =  188
BITS7&8  06,2775      168      COMPMAT  13,2126      514      DL118       0375  =   182      DL422    E6,1473  =  188
BIT7-8   04,3050      224      COMPTBIT    4761  =    57      DL119       0037  =   182      DL423    E6,1466  =  188
BLANKCHK 10,3356     1470      COMPUTER    0122  =    57      DL120       0040  =   182      DL424    E6,1715  =  188
BLNKR1      4770  = 1477       COPY40.9 16,2465      730      DL121       0041  =   182      DL425       1340  =  188
BLNKR2      4767  = 1477       CORFOUND 01,2631     1212      DL122    E6,1473  =   182      DL426       0375  =  188
BLNKR3      4766  = 1477       COUNTPL  E5,1552  =   102      DL123    E6,1466  =   182      DL501       0025  =  190
BMAGX       0042  =    40      CSISBIT     4763  =    67      DL124    E6,1570  =   182      DMENFBIT    4760  =   57
BMAGY       0043  =    40      CULTBIT     4762  =    53      DL125    E6,1571  =   182      DMPINCP2 30,3171      616
BMAGZ       0044  =    40      CYCLSHFT 43,3427     1398      DL126    E6,1525  =   182      DMPINTEG 30,2544      610
BNKCHK   43,3650     1401      ======================         DL127       1307  =   182      DNLSTADR    0332  =   74
BNKOPTN  43,3247     1395      DAPT5    20,3617      981      DL128       1334  =   182      DOALARM     5205  = 1489
BSTDB8   01,2462     1195      DCDUINCR 21,2372     1005      DL201       0303  =   184      DOBRATE? 15,2115     1063
======================         DEC-12   04,3771     1206      DL202    E4,1744  =   184      DODNADR  05,3455     1097

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GAP: ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971                PAGE 1564

UNREFERENCED SYMBOL LISTING, INCLUDING DEFINITION, HEALTH, & PAGE OF DEFINITION.

SYMBOL      DEF   H PAGE      SYMBOL      DEF   H PAGE      SYMBOL      DEF   H PAGE      SYMBOL      DEF   H PAGE

DCDNCHAN 05,3523    1097      ENDPINBF    4463  =  388      GAINCHNG 16,3067     951      ICDRK2   43,2151     254
DCSPSOFF 24,3024     704      ENDPINS1 40,3636  =  393      GAMDIFSW    0136  =   58      IDAD3TEM    0152      71
DCTLXBR  01,2421    1193      ENDRDLO  40,2656     348      GAMDV32  32,3550     933      IDLEBIT     4763  =   49
DCTVCRCS 24,3027     704      ENDROLL  10,2306     422      GAMDV40  32,3563     933      IMPULCHK 24,2702     702
DRIFTT   E5,1452  =  102      ENDRQDAT 41,2313     339      GAMDV45  32,3570     933      IMUBACK  33,2005     427
DRIVEDAC 21,2537    1010      ENDRQWT  41,3465     374      GDTSETUP 20,2413     719      IMUZERO3 07,2706    1419
DSKYFLAG    0113  =   56      ENDSLECT 17,3727  = 1061      GENMARK  10,3250    1466      INCORBIT    4756  =   56
DSPLV    41,3374     370      ENDSPF   41,3350     367      GENPL    E5,1444  =  102      INFINBIT    4762  =   62
DSP0633  35,3437     644      ENDSPMIN 42,3360     351      GEOCOMPS E5,1643  =  103      INRLBIT     4764  =   59
DUMPCNIC 27,3217    1375      ENDSPOCT 40,3257     372      GEOSAVED E5,1631  =  103      INTFLAG     0227  =   65
DUMPFISH 26,3047     816      ENDSYS-4 E4,1641  =   96      GETANGLE 25,2217     857      INTOTHIS 13,2176     514
DUMPP61  26,2276     793      ENDSYS-5 E5,1657  =  103      GODSP    10,2702    1462      INTVEC   E5,1476  =  103
DUMPRPRA 27,3255    1377      ENDS40.6 20,2457     720      GODSPR1  10,2711    1462      INTYBIT     4765  =   53
DUMPTFF1 27,3340    1381      ENDTVCIN 17,2343     946      GODSP2   10,2703    1462      INTZ     E5,1504  =  102
DUMPTFF2 27,3435    1382      ENDVPUSH    6507    1126      GOGOMARK 10,2634    1460      INVC107  32,2475     913
DUMPTRIG 27,3070     820      ENDV97E  24,3362     711      GONEBIT     4757  =   58      IRIGCOMP 06,3344     310
DUMPVGAM 26,3076     818      ENDV97P  24,3426     712      GOPERFRS 10,3151    1467      IRIGX    06,3346     310
DURATION 16,3351     987      ENDV99P  24,3510     713      GOPERFS  10,3071    1465      IRIGY    06,3362     310
DVTHRUSH    4775  =  835      ENDV99PI 24,3504     713      GROUPKIL 04,2255     212      IRIGZ    06,3376     310
DXTEST   05,3340     956      END2DEC  40,3145     369      GTSOPNDZ E5,1655  =  103      ISSUP    06,2320     151
D6OR9BIT    4767  =   54      ENGONFLG    0123  =   57      GTSWTLST E5,1645  =  103      ISSWOFF  06,2721     166
======================        ENTPASHI 41,2010     334      GUESSBIT    4767  =   50      ISWRETRN    4727    1106
E/BKCALL 13,2036     424      ERADFBIT    4754  =   49      GYMDIFSW    0150  =   60      ITR0        6337    1120
E/CALL   13,2055     425      ERMINUS  40,3615     392      GONBYBIT    4761  =   61      ITR1        6326    1120
E/JOBWAK 12,2000     426      ETPIBIT     4762  =   51      ======================      ITR10       6111    1111
E/SWITCH 13,2053     424      EXDAPOFF 43,2526     262      HABIT       4762  =   67      ITR11       6151    1112
EARTCNTR 13,2363     766      EXECPHS  16,3225     961      HALFNFLT 23,2265     306      ITR12       6103    1111
EARTHL   26,3617    1250      EXTENTST 16,3657     992      HBCFADR  17,2522     949      ITR14       6206    1114
EGFLGBIT    4761  =   59      ======================      HBD11/2  E6,1430     106      ITR15       6072    1111
EIGHT       4765  = 1204      FAILDSP  24,3313     710      HBD12    E6,1431     106      ITR7        6230    1115
END-E7   E7,1777  =  134      FAZA1    36,3524    1257      HBD21/2  E6,1435     106      ITSWBIT     4753  =   60
ENDALM      4201     372      FAZB1    36,3602    1257      HBD22    E6,1436     106      ======================
ENDBLFF     4305  =  382      FDAIDSP1 21,2422    1007      HBD31/2  E6,1442     107      JSWCHBIT    4753  =   47
ENDCOPY  37,3072     833      FIGTIME  35,2333     474      HBD32    E6,1443     107      ======================
ENDDCM   22,2522  =  411      FIG2EXIT 30,2476     609      HBN11/2  E6,1426     106      KEYCALL  07,2142     243
ENDDPDEC 40,2673     352      FINEK2   43,2246     256      HBN12    E6,1427     106      KILLJETS 16,3752     995
ENDGTSAL 33,3043     446      FIRELOOK 16,3647     992      HBN20    E6,1432     106      KNOWNBIT    4761  =   59
ENDIDLE  10,3516    1472      FIRSTBIT    4762  =   51      HBN21/2  E6,1433     106      KRESUME2 21,3177    1021
ENDIGN   24,2772     703      FIXCLPAS 40,2277     330      HBN22    E6,1434     106      ======================
ENDJETS  17,3556    1058      FLAGEND  35,3025     484      HBN30    E6,1437     107      LARMENT     5703    1466
ENDLAMB  16,2423     729      FREECHK  21,2205    1002      HBN31/2  E6,1440     107      LASTGTS  33,3050     446
ENDMASSP 05,3403     957      FREEFBIT    4766  =   48      HBN32    E6,1441     107      LASTMASP E6,1522  =  108
ENDMONDO 41,3336     366      FREETAU  21,3112    1020      HDSUPFLG    0232  =   66      LASTTIME 01,3453    1235
ENDMRC   17,2204     944      FZRTEBIT    4764  =   48      HINDBIT     4763  =   59      LEMNO    05,3321     956
ENDNVSB1 41,3555     380      ======================      ======================      LEMTEST  05,3315     956

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SYMBOL        DEF  H PAGE       SYMBOL        DEF  H PAGE       SYMBOL        DEF  H PAGE       SYMBOL        DEF  H PAGE

LGCLNGTM  01,3431    1234       NEEDLEUP  16,3063     951       OCT55000  40,3634     393       PIPASCFZ  E3,1457      88
LMOONBIT     4756  =   62       NEG7         5736  =  224       OLDAZ1    E5,1637  =  103       PIPUSE1   07,3220    1426
LOCHECK   16,2217     725       NETZERO      6070    1111       OMEGACLC  16,2323     727       PITCHANG     0026  =  941
LODPMAX1  04,3774    1206       NEWIBIT      4754  =   62       OMEGAXB   E6,1533  =  108       PMINM     35,3564     672
LOTEMIN      0124  =   70       NEWLMBIT     4753  =   62       OMEGAXC   E6,1525  =  108       PMISC     20,3027     969
LOUNITX   04,3757  =   34       NEWTBIT      4757  =   56       ONCEMORE  33,2612     442       POFFSET   20,2742     967
LOUNITY   04,3755  =   34       NEXBNKSS  33,3336     450       OPDEGIN2  40,2766     360       POOBIT       4760  =   53
LOUNITZ   04,3753  =   34       NEXTBNKS  33,3322     450       OPFAILON  06,3232     173       POOH      04,2216     211
LRUPT        0011  =   40       NO.13-15  16,3705     993       OPMD2BIT     4765  =   85       POSTPOLY  34,2371     543
LSDISP    14,2115     745       NO.16-14  16,3726     993       OPT2      10,2046     176       POSVEL3   35,3135     486
LUNABIT      4755  =   52       NOMONLST  05,2113  =  179       ORBWFBIT     4763  =   53       POUT      20,2746     967
L350      25,3536     881       NORESET   07,3347    1429       ORDERBIT     4763  =   63       PPRECOMP  20,2754     967
======================          NORFBIT      4756  =   47       OUT       13,2227     515       PREBJUMP     5351    1402
MANEUBIT     4764  =   66       NORFINAL  13,3405    1323       OVERNOUT  25,3575     881       PRECIBIT     4761  =   53
MANUSTAL  22,3131     419       NORMTEST  00,3507    1186       ======================          PREC150   32,2617     916
MARKFORM  10,2602    1460       NOSAM     14,3664     787       PACLIM    20,2745     967       PREC155   32,2632     916
MAXTST    16,3627     992       NOSWBIT      4762  =   59       PARAM30   35,3505     644       PREC170   32,2710     917
MAXVTIM2  15,3062    1085       NRMIDBIT     4754  =   54       PARTRACK  43,3103     279       PREC205   32,3012     918
MCLEANJR  17,2355     946       NRMIDFLG     0076  =   54       PBIASY    E3,1454      88       PRIODFLG     0075  =   54
METHOD2   22,2210     406       NRMNVBIT     4761  =   55       PBIASZ    E3,1456      88       PRIODSPY     4762  = 1477
MGLVFBIT     4767  =   57       NRMNVFLG     0103  =   55       PCDUDOTS  20,2653     966       PRIO2        4756  = 1204
MGLVFLAG     0130  =   57       NRUPTBIT     4765  =   55       PCOPYCYC  20,3002     968       PROCEEDE  06,2076     144
MIDAVBIT     4767  =   65       NRUPTFLG     0107  =   55       PDAPEND   20,3003     968       PROCESSW  06,3050     169
MIDFLBIT     4754  =   47       NUFAZ+10     4140     238       PERFCHEK  10,3361    1470       PROCKEY1  40,3317     375
MID1FBIT     4766  =   65       NUVLEM    E3,1652      90       PERFERAS  33,2607     442       PROG22C   30,2247     562
MINLIMAP  16,3537     990       NVSUBCOM     4212     378       PERORLIM  20,2727     967       PRONVBIT     4762  =   55
MINTST    16,3622     992       NVSUBUSY  10,3476    1472       PFORWARD  20,2730     967       PRONVFLG     0104  =   55
MKOVFLAG     0110  =   55       NWAITBIT     4757  =   55       PHASE2       1160      81       PTV93BIT     4765  =   66
MKRQST       4752  = 1477       NWAITFLG     0101  =   54       PHASE3       1162      81       PULSEM    14,2712     755
MKVB5C    07,2054     242       NWNGL17D  22,3073     418       PHASE4       1164      81       PUTXY     41,2727     355
MKVRET    07,2050     242       NXXTBNN   33,2717     444       PHASE6       1170      81       PUTXYZ    41,2625     353
MONIT1    41,3226     364       N45NORM   35,3075     486       PHSBB1    E3,1437      88       P15INTEG  20,2343     529
MOONBIT      4755  =   47       ======================          PHSBB2    E3,1441      88       P20R52JB  36,2211     555
MRKIDBIT     4752  =   54       OCT00010     4765  =  221       PHSBB3    E3,1443      88       P21DSP    37,2120     457
MRKIDFLG     0074  =   54       OCT00060  21,3061    1018       PHSBB4    E3,1445      88       P21ONENN  37,2162     458
MRKNVFLG     0102  =   55       OCT00300  21,3062    1018       PHSBB5    E3,1447      88       P22MKBIT     4756  =   53
MRUPTFLG     0106  =   55       OCT01120  04,3051     224       PHSBB6    E3,1451      88       P23.00    31,2455     628
MU(P)        0032  = 1353       OCT10000     4754  =  201       PHSCHK2   16,3302     962       P23.06    31,2471     628
MULTEXIT     5722    1486       OCT10001     7617  = 1204       PHSNAME2  E3,1440      88       P23.15    31,3362     637
MUM       13,3735  = 1353       OCT140       5015  = 1204       PHSNAME3  E3,1442      88       P23.17    31,3450     638
MWAITBIT     4756  =   54       OCT25        4353  = 1204       PHSNAME4  E3,1444      88       P23.57    31,2560     630
MWAITFLG     0100  =   54       OCT27/24     4615  =  714       PHSNAME6  E3,1450      88       P23.85    31,2612     630
======================          OCT30000     4346  =  201       PINBRBIT     4763  =   55       P29BIT       4770  =   48
NDCMPTST  41,2435     343       OCT30002     6440  = 1204       PINTEST   43,2002  =  389       P31ONWRD  04,3350     653
NDRMSBIT     4757  =   60       OCT54        5005  =  143       PIPASCFY  E3,1455      88       P34/P74E  35,2103     467

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SYMBOL        DEF H PAGE    SYMBOL        DEF H PAGE    SYMBOL        DEF H PAGE    SYMBOL        DEF H PAGE

P35BIT       4761 =   66    REPLACEY  17,3702   1061    SBIT13       4754 = 1393    STATEST   31,2031 =   35
P37N      36,3040    903    REQEXLOC  41,2206    337    SBIT14       4753 = 1393    STBYDUMP  15,2303   1072
P40CLK    24,3623    737    RESA      26,2200    791    SBIT2        4767 = 1393    STEERING  16,2307    727
P40GMB    24,2473    698    RETROBIT     4753 =   56    SBIT3        4766 = 1393    STEERULL  24,2761    703
P40MINDB  24,3447    712    RMM       04,3174    227    SBIT5        4764 = 1393    STEP2CK   34,3452    596
P40SNEWM  24,2534    699    ROLLPREP  16,3046    951    SBIT6        4763 = 1393    STICKOUT  21,2030    551
P40TSK    24,2577    700    RPAD1     22,3172 = 1386    SBIT8        4761 = 1393    STOPVEH   36,2434    559
P47/DSP   24,3743    741    RPQFLBIT     4752 =   62    SECAD     22,2016    403    STORHAPO  23,2707    524
P47BOD    24,3736    741    RRECT1       0022 =   89    SETCLOCK  24,3242    709    STORHPER  23,2721    525
P51FIVE      4773 =  776    RSTRTST   20,2405    719    SETMARK   10,2772   1463    STRATGY   14,2526    752
P521      14,2611    753    RTENCK3A  31,3655    922    SETPRIO   10,2754   1463    SUPERRSM     5320   1232
P60S7     06,2000 =   28    RTE299    36,2517    898    SETUPGC   33,2736    444    SUPER100     4762 = 1201
P67.3     26,2542    306    RTE320    36,2572    899    SETUPTIG  24,3667    740    SURFFBIT     4761 =   62
P82CONT2  04,2550    217    RTE505    36,2765    902    SETXTACT  43,2105    250    SXTOPTN   E5,1413 =  102
P86CONT2  04,2626    218    RTE625    36,3004    902    SETZGEND  06,3062    170    SYSTSPR1  E5,1422    102
P89CONT1  04,2671    218    RVSWBIT      4760 =   61    SFRET1    41,3041    356    SYSTSPR2  E5,1430    102
========================    RWORD     17,2736   1042    SHAFTSF   E3,1771 =   91    S28VTRS   30,3124    615
QUICKIGN  24,3346    711    R23,END   31,2755    632    SHORTMP2     7262   1142    S2GETUM   30,2542    610
QUITBIT      4764 =   65    R23.05    31,3004    633    SIDETRAK  25,2716    869    S2INCP1   30,3130    615
========================    R23.6     31,2735    632    SIM2CADR  05,2374    194    S2INTSI   30,3025    614
RANGBIT      4760 =   66    R23.8     31,2751    632    SLOPEBIT     4766 =   50    S2RPTR    30,3065    614
RANGER    25,2571    867    R40CHECK  24,3146    706    SLOWBIT      4754 =   56    S2RTRP    30,3057    614
RANGERD   34,2707    578    R40ENABL  24,3422    712    SNAPAGN   05,3567   1098    S22F244   30,3223    616
RATEDEN   16,3514    990    R40START  24,3151    706    SNAPEND   05,3606   1099    S32BIT1      4752 =   67
RATENUM   16,3530    990    R53B      14,3617    781    SOLNSBIT     4766 =   57    S32BIT2      4753 =   67
RATEZRO   24,3104    706    R53OUT    14,3632    781    SOMEERRR  33,2652    443    S32BIT3A     4754 =   67
RCSUP     21,2032    734    R53Z      14,3625    781    SOPTION2  43,3255   1395    S32BIT3B     4755 =   67
RDAPEND   16,3745    994    R55       14,2710    755    SOPTION3  43,3256   1395    S3435.25  35,2601    479
RDM       13,3765   1353    R55.1     14,2713    755    SOPTION4  43,3257   1395    S40.1     24,2241    694
READPIPS  22,3621   1501    R61CI     37,2366    572    SOPTION5  43,3260   1395    S52.2.1   11,2267    782
RECAL3    40,3427    383    R61DMPTG  37,2360    572    SOPTION6  43,3261   1395    ========================
RECT.1    31,3026    633    ========================    SOPTION7  43,3262   1395    TARG2BIT     4760 =   49
REDOMANN  27,2076    394    S+2          4767 = 1393    SOPTON10  43,3263   1395    TBASE3       1263     83
REDO5.31  37,2613    826    S+3          6214 = 1393    SOUPLY    33,2675    443    TCALARM2  43,3216   1394
REFTEST   35,3507    644    S+4          4766 = 1393    SOURCBIT     4761 =   64    TCCSM     E3,1622     90
REGION6   16,3464    989    S+5          4773 = 1393    SPITGYRO  33,3143    447    TCLEM     E3,1674     90
REG1TST   16,3420    988    S+6          6211 = 1393    SPSCODE      4760 = 1417    TCPIN     17,2030    274
REG2TST   16,3450    989    S-2          7701 = 1394    SPSOFF97  24,3330    710    TCTSKOVR     5313 =  385
REG3TST   16,3426    988    S-3          7700 = 1394    SPSON     24,2674    702    TESTV8    41,2043    335
REG4TST   16,3454    989    S-4          6061 = 1394    SPVQUIT   37,3427    890    TETOTHER  E3,1642 =   90
REG5TST   16,3463    989    SAMEJETS  16,3673    993    STARTMNV  27,2137    395    TET1         0036 =   89
REJCTBIT     4755 =   66    SATSTKON  43,2502    262    STARTSIM  05,2372    194    TFFSWBIT     4770 =   61
RELVBIT      4760 =   59    SAVECBIT     4757 =   64    STARTSTO     6403   1123    TFFTICK   23,2537    520
RENDP79   04,2033    208    SBIT1        4770 = 1393    STARTSW   05,2371    194    TGOCALC   16,2244    726
REPLACEP  17,3673   1061    SBIT10       4757 = 1393    STATEBIT     4764 =   53    THT0123   34,3716    599

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SYMBOL      DEF    H PAGE      SYMBOL      DEF    H PAGE      SYMBOL      DEF    H PAGE      SYMBOL      DEF    H PAGE

TICKTPER 23,2475      519      VINTFBIT     4766  =   53      ======================      13-11,1   40,3635      393
TICKTTE  37,3040      832      VLAUNS   E5,1472  =  102      YACLIM   20,3131      971      17DECML      4352  =  448
TIMETST  15,3154     1087      VLTEST   25,3056      872      YCDUDGTS 20,3051      970      17TO20   43,3575     1400
TMANUCHK 22,3125      419      VPDVL        6542     1127      YCOPYCYC 20,3166      972      ======================
TMEXITL  05,3640     1099      VRECTLEM E3,1634       90      YDAPEND  20,3167      972      2CASFLTR 20,3451      977
TMODE        6446     1125      VRECT1       0030  =   89      YERORLIM 20,3113      971      2DAPCAS  20,3320      975
TMRESUME 05,3642     1099      VSTORE       6412     1123      YFORWARD 20,3114      971      2DZERO   04,3761  = 1240
TOBALLC  27,2124      394      VV/SC        7563     1150      YINTEGRL 20,3065      970      2P11SPT1 01,2044  =  275
TCLDAZMT E5,1641  =  103      VVXSC        7340     1145      YMISC    20,3213      973      2P13SPT1 01,2047  =  588
TCLDAZ1  E5,1641  =  103      V06N16N  24,2063      506      YOFFSET  20,3126      971      2P13SPT2 01,2030  =  834
TCRQINCH 33,2635      442      V06N59   35,3157      488      YOUT     20,3132      971      2P3SPT1  01,2033  = 1314
TPIMNBIT     4766  =   66      V37XEQ   04,2736      221      YPRECOMP 20,3140      971      2P5SPT1  01,2036  =  212
TRNVNREF 34,2204      539      V37XEQC  04,2762      221      YWORD    17,2665     1040      2P5SPT2  01,2036  =  213
TRTAGXPI 15,2723     1082      V50N18BT     4752  =   52      ======================      2P5SPT3  01,2036  =  555
TSSR     00,2025     1152      V51N45   37,2261      568      ZERINFLT 23,2263      306      2P5SPT4  01,2036  = 1313
TSTLTS3  40,3470      390      V6N99INP 40,3654      640      ZERODP   04,3761  = 1206      2P7SPT1  01,2041  =  554
TSTPOINT 23,3731     1369      V74      43,2706  =  271      ZEROO    26,3335  = 1260      22DSPBIT     4754  =   51
TVCINIT2 17,2227      944      V82EMBIT     4754  =   64      ZMEASBIT     4757  =   47      27TO30   43,3603     1400
TVCINIT3 17,2260      945      V96ONBIT     4766  =   63      ZOPALARM 06,3073      170      ======================
T5RPTBE      4055      140      V97E     24,3320      710      ZOPFIN2  06,3102      170      374LOWDP 11,3760  =   34
T6ADR        0111       69      V97E40.6 24,3334      710      ZOPTDES  06,3053      169      3AXISBIT     4763  =   57
======================      V97TRCS  24,3374      711      ZROCLOCK 34,2015      536      3CASFLTR 20,3534      979
UPDNLIST 05,2211  =  179      V99E     24,3434      712      ZRUPT        0015  =   40      3P11SPT1 01,2071  =  536
UPDTMEND 43,2340      258      V99EJOB  24,3440      712      ======================      3P13SPT1 01,2074  =  536
UPDBMASS 16,2225      726      V99FLASH 24,3352      711      0.5SEC   37,2772      831      3P15SPT1 01,2077  =  528
UPLOCKFL     0164  =   61      V99TJOB  24,3402      711      0EBANK   43,3273     1396      3P2SPT1  01,2052  =  529
UPOK     07,3750     1446      ======================      ======================      3P3SPT1  01,2060  =  701
UPPART3  27,3556  = 1496      WAIT1/2  16,3362      987      1DAPCAS  20,3306      975      3P3SPT2  01,2060  =  711
UPRPT1   07,3731     1446      WANGI    E5,1446  =  102      1P11SPT2 01,2025  =  415      3P5SPT1  01,2063  =  704
UPWAKE   27,3550     1496      WANGO    E5,1444  =  102      1P11SPT3 01,2025  =  554      3P5SPT2  01,2063  =  706
======================      WASCMC   34,2357      543      1P11SPT4 01,2025  =  555      3P7SPT1  01,2066  =  537
V(24K)   32,2247      650      WASINIT  34,2356      543      1P11SPT5 01,2025  =  559      330PTMON 06,3010      169
V(28K)   32,2243      650      WASIU    34,2355      543      1P11SPT6 01,2025  =  572      360SWBIT     4770  =   63
VAC1         0401       75      WHICHALF 15,2754     1083      1P11SPT7 01,2025  =  834      3990DEC  33,2223  =  432
VAC2         0455       76      WPLATI   E5,1570  =  103      1P11SPT8 01,2025  =  834      ======================
VAC3         0531       76      WPLATO   E5,1474  =  102      1P13SPT1 01,2030  =  558      4.25SPOT 01,2157      233
VAC4         0605       76      WRTN22   21,3223     1021      1P3SPT1  01,2014  =  829      4D/SDZ   15,2446     1076
VARGAINS 16,3065      951      ======================      1P5SPT1  01,2017  =  717      4P11SPT1 01,2135  =  711
VARSUBL3 31,3506      639      XACTOQ   43,2432      261      1P7SPT1  01,2022  =  395      4P13SPT1 01,2140  =  711
VCVLEM   E3,1666       90      XDELVBIT     4761  =   51      1SECX        5016  =  432      4P15SPT1 01,2143  =  449
VECMODE  22,3635     1501      XDIFF    12,2230     1278      1SECXT   E5,1644  =  103      4P17SPT1 01,2146  =  259
VEHUPBIT     4761  =   49      XDSPFLAG     0112  =   56      1SEC2D   16,2623  =  733      4P2SPT1  01,2102  =  700
VERIFLAG     0165  =   61      XKEPCSM  E3,1624       90      1SHUTCHK 16,3075      951      4P21SPT1 01,2151  =  699
VFLAGBIT     4757  =   53      XKEPLEM  E3,1676       90      114ALM   07,2216      245      4P23SPT1 01,2154  =  699
VHFRBIT      4760  =   64      XPRODUCT 16,2306      727      120MS        5775  =  168      4P23SPT2 01,2154  =  738

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED          = DEFINED BY EQUALS            J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED      CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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UNREFERENCED SYMBOL LISTING, INCLUDING DEFINITION, HEALTH, & PAGE OF DEFINITION.

SYMBOL     DEF    H PAGE      SYMBOL     DEF    H PAGE      SYMBOL     DEF    H PAGE      SYMBOL     DEF    H PAGE

4P27SPT1 01,2162  =  702      4P7SPT1  01,2132  =  701      5P3SPT13 01,2250  =  834      5P7SPT2  01,2256  =  447
4P3SPT1  01,2124  =  702      ========================      5P3SPT14 01,2250  =  855      5SECOND  16,2625  =  733
4P31SPT1 01,2165  =  755      5BLANK1  40,2452     332      5P3SPT15 01,2250  =  883      504LPL      0016  = 1251
4P33SPT1 01,2170  = 1077      5B10     01,2473    1196      5P3SPT16 01,2250  =  531      ========================
4P35SPT1 01,2173  =  704      5P11SPT1 01,2261  =  438      5P3SPT2  01,2250  =  706      6P11SPT1 01,2336  = 1068
4P37SPT1 01,2176  =  700      5P13SPT1 01,2264  =  437      5P3SPT3  01,2250  =  717      6P2SPT1  01,2317  =  699
4P4SPT1  01,2110  =  700      5P15SPT1 01,2267  =  446      5P3SPT4  01,2250  =  725      6P2SPT2  01,2317  =  711
4P41SPT1 01,2201  =  883      5P17SPT1 01,2272  =  808      5P3SPT5  01,2250  =  728      6P3SPT1  01,2325  =  645
4P43SPT1 01,2204  =  808      5P2SPT1  01,2234  =  540      5P3SPT6  01,2250  =  726      6P3SPT2  01,2325  =  703
4P45SPT1 01,2207  =  808      5P2SPT2  01,2234  =  827      5P3SPT7  01,2250  =  740      6P3SPT3  01,2325  =  738
4P47SPT1 01,2212  =  869      5P21SPT1 01,2275  =  439      5P3SPT8  01,2250  =  801      6P3SPT4  01,2325  =  528
4P5SPT1  01,2127  =  703      5P23SPT1 01,2300  =  438      5P3SPT9  01,2250  =  832      6P5SPT1  01,2330  = 1497
4P51SPT1 01,2215  =  538      5P25SPT1 01,2303  =  446      5P31SPT1 01,2311  =  829      6P7SPT1  01,2333  =  711
4P53SPT1 01,2220  =  710      5P27SPT1 01,2306  =  446      5P33SPT1 01,2314  =  447      ========================
4P55SPT1 01,2223  =  801      5P3SPT1  01,2250  =  541      5P4SPT1  01,2242  =  829      74K         7675  =  141
4P57SPT1 01,2226  =  740      5P3SPT10 01,2250  =  833      5P5SPT1  01,2253  =  828      ========================
4P6SPT1  01,2116  =  700      5P3SPT11 01,2250  =  833      5P7SPT1  01,2256  =  435      9DWAAB   30,3505     621
4P61SPT1 01,2231  =  531      5P3SPT12 01,2250  =  833

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED          = DEFINED BY EQUALS             J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011       11:40 FEB. 26,1971                  PAGE 1569

ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

  DEF  PAGE  SYMBOL          DEF  PAGE  SYMBOL          DEF  PAGE  SYMBOL          DEF  PAGE  SYMBOL          DEF  PAGE  SYMBOL

  0000   40  A               0010 1241  GAMRP           0016 1371  CDELF/2         0026   40  TIME3           0034 1306  XSOC(XI)
  0000  604  UTSAP           0010 1251  CVECTR          0016 1371  TFFQ1           0026   49  VEHUPFLG        0034 1371  TFFNP
  0000  604  UTUXP           0010 1251  DVECTR          0016 1377  RPER            0026   74  PDA             0035   40  CDUT
  0000  604  UTZ             0010 1251  SINNODI         0017   40  BRUPT           0026   74  ZPRIME          0035   42  DNTM2
  0000  623  WORKW           0010 1306  ALPHA           0017   48  NJETSFLG        0026  123  GAMMAL1         0035   50  AVEGFLAG
  0000 1251  504RPR          0010 1307  COGAMIN         0020   40  CYR             0026  941  PITCHANG        0035  182  DL106
  0000 1353  RATT            0010 1307  MIN             0020   48  STIKFLAG        0026 1307  ITERCTR         0036   40  CDUS
  0001   40  L               0011   40  LRUPT           0020   74  COSTH           0026 1371  TFF1/ALF        0036   50  DRIFTFLG
  0001   42  LCHAN           0011   42  DSALMOUT        0020  767  CSUN            0027   40  TIME4           0036   89  TET1
  0001   47  JSWITCH         0011   48  R53FLAG         0020 1305  ROOTMU          0027   49  UPDATFLG        0036  604  UTUZ
  0002   40  Q               0012   40  QRUPT           0020 1371  NRTERM          0030   40  TIME5           0036  623  S22D
  0002   42  QCHAN           0012   42  CHAN12          0020 1377  RAPO            0030   42  CHAN30          0036 1306  T
  0002   47  MIDFLAG         0012   48  F2RTE           0021   40  SR              0030   49  IDLEFAIL        0036 1307  DEP
  0002  941  R               0012  623  9DWI            0021   49  ERADFLAG        0030   89  VRECT1          0036 1371  TFF/RTMU
  0002  941  RCM             0012 1306  XMAX            0022   40  CYL             0030  132  RPRE            0037   40  PIPAX
  0003   40  EBANK           0012 1371  TFFDELQ         0022   49  NODOP01         0030  604  UTOGA           0037   50  R21MARK
  0003   42  HISCALAR        0013   40  SAMPTIME        0022   74  SINTH           0030  604  UTSB            0037  182  DL119
  0003   47  MOONFLAG        0013   42  CHAN13          0022   89  RRECT1          0030  604  UTUY            0040   40  PIPAY
  0004   40  FBANK           0013   48  CYC61FLG        0022  604  UTSA            0030  623  S221X3          0040   50  22DSPFLG
  0004   42  LOSCALAR        0014   42  CHAN14          0022  604  UTUX            0030 1306  XI              0040   74  STARM
  0004   47  NORFHOR         0014   48  FREEFLAG        0022  623  S223X1          0030 1307  COSF            0040  182  DL120
  0005   40  Z               0014  604  UTUZP           0022  767  CMOON           0030 1371  TFFRTALF        0040  623  S22RHO
  0005   42  CHAN5           0014  623  9DWN            0022 1251  504AZ           0031   40  TIME6           0040 1251  COB
  0005   42  PYJETS          0014 1306  XMIN            0022 1305  1/ROOTMU        0031   42  CHAN31          0040 1306  R1
  0005   47  ZMEASURE        0014 1307  DCOGA           0022 1353  COSPHI/2        0031   50  TRACKFLG        0040 1353  TDEC1
  0006   40  BBANK           0014 1307  DELINDEP        0022 1371  RTERM           0032   40  CDUX            0040 1371  NRMAG
  0006   42  CHAN6           0014 1353  TAT             0023   40  EDOP            0032   42  CHAN32          0041   40  PIPAZ
  0006   42  ROLLJETS        0014 1371  RMAG1           0023   49  ENG2FLAG        0032   50  MARKFLG         0041   51  P21FLAG
  0006   47  NEEDLFLG        0015   40  ZRUPT           0024   40  TIME2           0032  132  P/RPRE          0041  182  DL121
  0006  604  UTAMG           0015   42  MNKEYIN         0024   49  TARG1FLG        0032  467  DELELO          0042   40  BMAGX
  0006  604  UTSBP           0015   48  AMOONFLG        0024   74  THETA           0032  604  UTIGA           0042   41  LVSQUARE
  0006  604  UTUYP           0016   40  BANKRUPT        0024  941  YAWANG          0032 1251  BVECTR          0042   51  STEERSW
  0006  623  XTMP1           0016   42  NAVKEYIN        0024 1251  AVECTR          0032 1306  S(XI)           0042 1251  SOB
  0006 1251  504F            0016   48  P29FLAG         0024 1251  MMATRIX         0032 1353  MU(P)           0042 1306  KEPC1
  0006 1353  VATT            0016  623  9DWJ            0024 1306  X               0032 1353  TVEC            0042 1371  TFFX
  0006 1408  BB              0016  753  CSS             0024 1353  UZ              0032 1371  TFFALFA         0043   40  BMAGY
  0007   42  SUPERBNK        0016  767  CEARTH          0024 1353  VATT1           0033   40  CDUY            0043   51  SKIPVHF
  0007   47  IMUSE           0016  941  URP             0024 1371  TFFVSQ          0033   42  CHAN33          0044   40  BMAGZ
  0007  179  ERASZERO        0016 1251  TIMSUBM         0025   40  TIME1           0033   50  SLOPESW         0044   41  LV
  0007  179  SPARE           0016 1251  504LPL          0025   49  TARG2FLG        0033  182  DL109           0044   51  IMPULSW
  0010   40  ARUPT           0016 1305  1/MU            0025  181  DL103           0034   40  CDUZ            0044  604  UTZINIT
  0010   42  OUT0            0016 1307  COGAMAX         0025  184  DL204           0034   42  DNTM1           0044 1261  NORMZ1
  0010   48  RNDVZFLG        0016 1307  MAX             0025  186  DL304           0034   50  GUESSW          0044 1306  KEPC2
  0010  623  9DWP            0016 1353  RATT1           0025  188  DL412           0034  132  R/APRE          0044 1371  TFFTEM
  0010  941  UR              0016 1353  URPV            0025  190  DL501           0034  604  UTMGA           0045   40  INLINK
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

  DEF  PAGE  SYMBOL       DEF  PAGE  SYMBOL       DEF  PAGE  SYMBOL       DEF  PAGE  SYMBOL       DEF  PAGE  SYMBOL

  0045   51  XDELVFLG     0063   69  WAITADR      0102   55  MRKNVFLG     0122   70  SGNON        0140   71  POLYCNT
  0046   40  RNRAD        0063 1408  TEMPNM       0102   58  FLAGWRD6     0122   70  VBUF         0141   59  EGSW
  0046   41  X1           0064   53  PRECIFLG     0102  852  CM/FLAGS     0123   57  ENGONFLG     0141   59  KNOWNFLG
  0046   51  ETPIFLAG     0064   69  ITEMP4       0103   55  NRMNVFLG     0123   70  HITEMIN      0141   71  DSREL
  0046   51  FIRSTFLG     0064   69  LOCCTR       0103   60  FLAGWRD7     0123   70  NVTEMP       0141   71  POLYRET
  0047   40  GYROCMD      0064   69  WAITTEMP     0104   55  PRONVFLG     0123   70  SFTEMP1      0141   71  TEM1
  0047   41  X2           0064 1408  TEMPBB       0104   61  FLAGWRD8     0123   70  SGNOFF       0142   59  NOSWITCH
  0047   51  FINALFLG     0065   53  CULTFLAG     0105   55  PINBRFLG     0124   57  3AXISFLG     0142   71  DEXDEX
  0047  227  NO.MMS       0065   69  ITEMP5       0105   63  FLAGWRD9     0124   70  CODE         0142   71  DSMAG
  0050   40  CDUXCMD      0065   69  NEWLOC       0106   55  MRUPTFLG     0124   70  LOTEMIN      0142   71  TEM2
  0050   41  S1           0065 1408  TEMPSW       0106   65  FLGWRD10     0124   70  SFTEMP2      0143   59  HIND
  0050   52  AVFLAG       0066   53  ORBWFLAG     0107   55  NRUPTFLG     0125   57  GRRBKFLG     0143   71  COUNT
  0050 1251  RPREXIT      0066   69  ITEMP6       0107   67  FLGWRD11     0125   70  MIXTEMP      0143   71  TEM3
  0050 1308  TWEEKIT      0066 1408  TEMPSW2      0110   55  MKOVFLAG     0127   57  SOLNSW       0143   72  DEXI
  0051   40  CDUYCMD      0067   53  STATEFLG     0110   69  T6LOC        0130   57  MGLVFLAG     0143   72  DEX1
  0051   41  S2           0067   69  NEWJOB       0111   56  VNFLAG       0130   70  BUF          0144   59  INRLSW
  0051   52  PFRATFLG     0070   53  INTYPFLG     0111   69  T6ADR        0130   70  INDEXLOC     0144   71  DSPWDRET
  0051 1242  SETREX       0070   69  RUPTREG1     0112   56  XDSPFLAG     0130   70  SWWORD       0144   71  RELRET
  0051 1251  EARTHMXX     0070 1408  TEMPPR       0112   70  T5LOC        0131   57  RENDWFLG     0144   71  SEPMNRET
  0052   40  CDUZCMD      0071   53  VINTFLAG     0113   56  DSKYFLAG     0131   70  SWBIT        0144   71  SEPSCRET
  0052   41  QPRET        0071   69  RUPTREG2     0114   56  RETROFLG     0132   58  DAPBIT1      0144   71  TEM4
  0052   52  P24MKFLG     0071 1408  TEMPG2       0114   70  DSEXIT       0133   58  DAPBIT2      0144   72  DEX2
  0053   40  CDUTCMD      0072   53  D6OR9FLG     0114   70  EXITEM       0133   70  BUF2         0145   59  LATSW
  0053   40  TVCYAW       0072   69  RUPTREG3     0114   70  INTB15+      0133   72  TERM1TMP     0145   71  NOUNADD
  0053   52  CALCMAN2     0072 1408  TEMPP2       0115   56  SLOWFLG      0134   58  ENTRYDSP     0145   71  TEM5
  0054   41  CDUSCMD      0073   54  DIMOFLAG     0115   70  DECRET       0134   58  STRULLSW     0145   72  RTNSAVER
  0054   41  TVCPITCH     0073   69  DSRUPTEM     0115   70  INTBIT15     0135   58  CMDAPARM     0146   59  .05GSW
  0054   52  NODOFLAG     0073   69  KEYTEMP1     0115   70  WDRET        0135   70  MPTEMP       0146   71  NNADTEM
  0055   52  V50N18FL     0073   69  RUPTREG4     0115   70  21/22REG     0136   58  GAMDIFSW     0147   60  CM/DSTBY
  0056   52  GLOKFAIL     0073 1408  TEMPBBCN     0116   56  V59FLAG      0136   71  DOTINC       0147   71  NNTYPTEM
  0057   52  REFSMFLG     0074   47  FLAGWRD0     0116   70  ADDRWD       0136   71  DVSIGN       0150   60  GYMDIFSW
  0060   52  LUNAFLAG     0074   54  MRKIDFLG     0117   56  INCORFLG     0136   71  ENTEXIT      0150   71  IDADITEM
  0061   53  P22MKFLG     0074   69  STATE        0117   70  CHAR         0136   71  ENTRET       0151   60  TERMIFLG
  0061   69  EXECTEM1     0075   48  FLAGWRD1     0117   70  DECOUNT      0136   71  ESCAPE       0151   71  IDAD2TEM
  0061   69  ITEMP1       0075   54  PRIODFLG     0117   70  ERCNT        0137   58  GONEPAST     0152   60  ITSWICH
  0061   69  WAITEXIT     0076   42  CHAN76       0117   70  POLISH       0137   71  DOTRET       0152   71  IDAD3TEM
  0061 1408  TEMPG        0076   50  FLAGWRD2     0117   70  UPDATRET     0137   71  DVNORMCT     0153   60  IGNFLAG
  0062   53  VFLAG        0076   54  NRMIDFLG     0120   56  NEWIFLAG     0137   71  ESCAPE2      0153   71  RUTMXTEM
  0062   69  EXECTEM2     0077   42  CHAN77       0120   70  FIXLOC       0137   71  INREL        0154   60  ASTNFLAG
  0062   69  ITEMP2       0077   52  FLAGWRD3     0121   56  DMENFLG      0137   71  WDCNT        0154   73  MPAC
  0062   69  WAITBANK     0077   54  PDSPFLAG     0121   70  OVFIND       0140   58  RELVELSW     0154 1416  TEMPPHS
  0062 1408  TEMPP        0100   54  FLAGWRD4     0122   57  COMPUTER     0140   71  DSPMMTEM     0154 1476  FACEREG
  0063   53  POOFLAG      0100   54  MWAITFLG     0122   70  DECTEM       0140   71  MATINC       0155   60  TIMRFLAG
  0063   69  ITEMP3       0101   54  NWAITFLG     0122   70  DISTEM       0140   71  MAXDVSW      0155 1416  TEMP2G
  0063   69  NEWPRIO      0101   56  FLAGWRD5     0122   70  NOUNTEM      0140   71  MIXBR        0155 1476  PLAYTEM1
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

  DEF  PAGE  SYMBOL         DEF  PAGE  SYMBOL         DEF  PAGE  SYMBOL         DEF  PAGE  SYMBOL         DEF  PAGE  SYMBOL

 0156    60  NORMSW        0213    64  V94FLAG       0304    73  STARIND       0454    76  VAC2USE       1016    78  N26/PRI
 0156  1416  POINTER       0214    64  SAVECFLG      0304    73  UPBUFF        0455    76  VAC2          1017    78  N26/2CAD
 0157    61  RVSW          0215    64  VHFRFLAG      0305    73  SW/NDX        0530    76  VAC3USE       1021    78  TEVENT
 0157  1416  TEMPSWCH      0216    64  SOURCFLG      0306    74  XSCREF        0531    76  VAC3          1021    78  TLIFTOFF
 0157  1476  COPMPAC       0217    64  R22CAFLG      0306    74  XSMD          0604    76  VAC4USE       1023    78  NORMEX
 0157  1476  PLAYTEM3      0220    64  N22ORN17      0314    74  YSCREF        0605    76  VAC4          1024    78  TRUNBIAS
 0160    61  GONEBY        0221    64  QUITFLAG      0314    74  YSMD          0660    76  VAC5USE       1025    78  EPSILONT
 0160  1476  PLAYTEM4      0222    65  R31FLAG       0322    74  ZSCREF        0661    76  VAC5          1027    78  RN
 0160  1476  TEMPOR2       0223    65  MID1FLAG      0322    74  ZSMD          0705    76  GOLOC         1035    78  VN
 0162    61  V37FLAG       0224    65  MIDAVFLG      0324    73  ENDBUF        0734    76  VEHRET        1043    78  PIPTIME
 0162   347  MPAC+6        0225    65  AVEMIDSW      0325    73  V1            0735    76  TRATE         1045    78  GDT/2
 0162  1476  GENMASK       0226    65  PCMANFLG      0327    73  AD            0736    76  SRATE         1045    79  CSMPOS
 0163    73  MODE          0227    65  INTFLAG       0330    73  UPTEMP        0737    76  NO.PASS       1053    79  GOBL/2
 0163  1476  USERPRIO      0230    65  REINTFLG      0330    74  PACTEMP       0740    76  TOLD          1053    79  LEMPOS
 0164    61  UPLOCKFL      0231    66  REJCTFLG      0331    73  UPVERBSV      0741    76  SOLD          1053    79  S22UOFF
 0164    73  LOC           0232    66  HDSUPFLG      0332    74  DNLSTADR      0742    76  TEMK          1053    79  9DWXX
 0164  1476  COPINDEX      0233    66  BURNFLAG      0332    74  DNLSTCOD      0743    76  SQ            1061    79  AVEGEXIT
 0165    61  VERIFLAG      0234    66  RANGFLAG      0333    74  CTLIST        0744    77  TDEC          1061    79  AVGEXIT
 0165    73  BANKSET       0235    66  P35FLAG       0334    74  DNTMGOTO      0746    77  LANDLAT       1061    79  MARKTIME
 0165  1476  MPAC2SAV      0236    66  AUTOSEQ       0335    74  DNECADR       0746    77  LAT           1063    79  TEMX
 0166    61  ATTCHFLG      0240    66  MANEUFLG      0335    74  DUMPLOC       0750    77  LONG          1063    79  VTEMP
 0166    73  PUSHLOC       0241    66  PTV93FLG      0335    74  TMINDEX       0752    77  ALT           1063    80  RADTIME
 0167    61  TFFSW         0242    66  TPIMNFLG      0336    74  SUBLIST       0754    77  YV            1064    79  TEMY
 0167    73  PRIORITY      0243    66  FULTKFLG      0337    74  DNTMBUFF      0762    77  ZV            1064    80  RADDEL
 0170    62  RPCFLAG       0244    67  PCFLAG        0353    74  MKNDX         0770    77  COLREG        1065    79  TEMZ
 0171    62  NEWLMFLG      0245    67  S32.1F1       0354    74  MKT2T1        0771    77  RATETEMP      1066    79  PIPCTR
 0172    62  NEWIFLG       0246    67  S32.1F2       0356    74  MKCDUY        0771    77  VHFCNT        1067    79  PIPAGE
 0173    34  MOONTHIS      0247    67  S32.1F3A      0357    74  MKCDUS        0772    77  TRKMKCNT      1070    79  RN1
 0173    62  CMOONFLG      0250    67  S32.1F3B      0360    74  MKCDUZ        0772   186  DL3015        1071    79  UM
 0174    35  MOONOTH       0254    67  AZIMFLAG      0361    75  MKCDUT        0773    77  IRETURN1      1076    79  VN1
 0174    62  LMOONFLG      0255    67  HAFLAG        0362    75  MKCDUX        0774    77  RATEINDX      1077    79  MARKDATA
 0175    62  ADVTRK        0256    67  CSISFLAG      0363    75  ADPOLD        0775    77  OPTION1       1101    79  USTAR
 0176    62  UTFLAG        0300    73  COMPNUMB      0365    75  RESTREG       0776    77  OPTION2       1104    79  PIPTIME1
 0177    62  SURFFLAG      0300    73  QMAJ          0366    75  NVWORD        0776   182  DL115         1106    79  GDT1/2
 0200    62  INFINFLG      0301    73  MARKINDX      0367    75  MARKNV        0776   188  DL413         1107    79  WIXA
 0201    62  ORDERSW       0301    73  UPOLDMOD      0370    75  NVSAVE        0777    77  NVWORD1       1110    79  WIXB
 0202    63  APSESW        0301   188  DL404         0371    75  CADRFLSH      1000    77  DELAYLOC      1111    79  ZIXA
 0203    63  COGAFLAG      0302    73  BESTI         0372    75  CADRMARK      1004    77  TEMPR60       1112    79  ZIXB
 0204    63  V96ONFLG      0302    73  UPVERB        0373    75  TEMPFLSH      1005    77  PRIOTIME      1113    79  DELTAX
 0205    63  R67FLAG       0302   188  DL405         0374    75  C31FLWRD      1006    77  POINTEX       1113    79  S22UUT
 0206    63  360SW         0303    73  BESTJ         0375    75  FAILREG       1006    77  TIME2SAV      1113    79  VHFRANGE
 0207    63  SWTOVER       0303    73  UPCOUNT       0375   182  DL116         1007    77  VHFTIME       1113    80  TEMPMM
 0210    63  P24FLAG       0303   184  DL201         0375   188  DL426         1010    77  SCALSAVE      1113    80  TRIPA
 0211    63  V82EMFLG      0303   188  DL406         0400    75  VAC1USE       1012    77  AUTPOINT      1114    79  GOBL1/2
 0212    64  MAXDBFLG      0304    73  CMTMTIME      0401    75  VAC1          1013    78  CPHIX         1114    80  EBUF2
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

  DEF  PAGE  SYMBOL       DEF  PAGE  SYMBOL       DEF  PAGE  SYMBOL       DEF  PAGE  SYMBOL       DEF  PAGE  SYMBOL

  1116   80  TEMPVAR      1206   82  XREG         1273   83  DSPFLG       1345   86  HORIZALT  E3,1455   88  PIPASCFY
  1116   80  UPSUM        1207   82  YREG         1273   83  EBANKSAV     1347   86  ALTVAR    E3,1456   88  PBIASZ
  1122   79  ENTRYVN      1210   82  ZREG         1274   83  MARKFLAG     1350   86  EMDOT     E3,1457   88  PIPASCFZ
  1126   80  LIFTTEMP     1211   82  XREGLP       1275   83  EBANKTEM     1351   86  OPTNTYPE  E3,1460   88  NBDX
  1127   79  UCL          1212   82  HITEMOUT     1276   83  MARK2PAC     1352   86  AZIMANGL  E3,1461   88  NBDY
  1130   80  TEPHEM1      1212   82  YREGLP       1277   83  OLDBT1       1354   87  SWSAMPLE  E3,1462   88  NBDZ
  1131   80  PASSCNT      1213   82  LOTEMOUT     1277   83  1/PIPADT     1355   87  R67TIME   E3,1463   89  ADIAX
  1133   80  PGNCSALT     1213   82  ZREGLP       1300   83  LONGCADR     1355   87  OTSTARNO  E3,1464   89  ADIAY
  1135   80  PADLONG      1214   82  MODREG       1302   83  LONGBASE     1356   87  AUTTEMP   E3,1465   89  ADIAZ
  1135   80  TEMPOR1      1215   82  DSPLOCK      1304   83  LONGTIME     1357   87  SELFERAS  E3,1466   89  ADSRAX
  1137   80  RUPTAGN      1216   82  REQRET       1306   83  REDOCTR      1357   87  SFAIL     E3,1467   89  ADSRAY
  1137   81  KEYTEMP2     1217   82  LOADSTAT     1307   83  CPHI         1360   87  ERESTORE  E3,1470   89  ADSRAZ
  1140   81  STARCODE     1220   82  CLPASS       1307   83  THETAD       1361   87  SELFRET   E3,1471   89  COMMAND
  1141   81  SINCDU       1221   82  NOUT         1307   84  RDOTREF      1362   87  SMODE     E3,1471   89  GCOMP
  1141   81  SINCDUY      1222   82  NOUNCADR     1307  182  DL127        1363   87  ALMCADR   E3,1474   89  CDUIND
  1141   81  STARALGN     1223   82  MONSAVE      1310   84  CTHETA       1365   87  ERCOUNT   E3,1477   89  GCOMPSW
  1143   81  SINCDUZ      1224   82  MONSAVE1     1311   84  CPSI         1366   87  SCOUNT    E3,1500   89  DIFEQCNT
  1145   81  SINCDUX      1225   82  MONSAVE2     1311   84  VREF         1371   87  SKEEP1    E3,1501   89  UPSVFLAG
  1147   81  COSCDU       1226   82  DSPTAB       1312   84  DESOPTT      1372   87  SKEEP2    E3,1502   89  RRECT
  1147   81  COSCDUY      1242   82  NVQTEM       1313   84  DESOPTS      1373   87  SKEEP3    E3,1510   89  VRECT
  1151   81  COSCDUZ      1243   82  NVBNKTEM     1314   84  DELV         1374   87  SKEEP4    E3,1516   89  TET
  1153   81  COSCDUX      1244   82  VERBSAVE     1314   84  DELVX        1375   87  SKEEP5    E3,1520   89  TDELTAV
  1155   81  -PHASE1      1245   82  CADRSTOR     1316   84  DELVY        1376   87  SKEEP6    E3,1526   89  TNUV
  1156   81  PHASE1       1246   82  DSPLIST      1320   84  DELVZ        1377   87  SKEEP7    E3,1534   89  RCV
  1157   81  -PHASE2      1247   82  EXTVBACT     1322   84  DSRUPTSW  E3,1400   88  LST1      E3,1542   89  VCV
  1160   81  PHASE2       1250   82  DSPTEM1      1323   84  OPTIND    E3,1410   88  LST2      E3,1550   89  TC
  1161   81  -PHASE3      1250   82  NORMTEM1     1324   84  LGYRO     E3,1432   88  RSBBQ     E3,1552   89  XKEP
  1162   81  PHASE3       1253   82  DSPTEM2      1325   84  COMMANDO  E3,1434   88  LONGEXIT  E3,1552   89  XPREV
  1163   81  -PHASE4      1254   82  DSPTEMX      1327   84  ZONE      E3,1436   88  PHSNAME1  E3,1554   90  RRECTCSM
  1164   81  PHASE4       1255   82  OPTIONX      1330   84  DESOPMOD  E3,1437   88  PHSBB1    E3,1554   90  RRECTHIS
  1165   81  -PHASE5      1256   83  OPTIONEV     1331   84  WTOPTION  E3,1440   88  PHSNAME2  E3,1562   90  VRECTCSM
  1166   81  PHASE5       1257   83  TBASE1       1332   84  ZOPTCNT   E3,1441   88  PHSBB2    E3,1570   90  TETCSM
  1167   81  -PHASE6      1260   83  PHSPRDT1     1333   84  IMODES30  E3,1442   88  PHSNAME3  E3,1570   90  TETTHIS
  1170   81  PHASE6       1261   83  TBASE2       1334   85  IMODES33  E3,1443   88  PHSBB3    E3,1572   90  DELTACSM
  1171   81  CDUSPOT      1262   83  PHSPRDT2     1334  182  DL126     E3,1444   88  PHSNAME4  E3,1600   90  NUVCSM
  1171   81  CDUSPOTY     1263   83  TBASE3       1335   85  IMUCADR   E3,1445   88  PHSBB4    E3,1606   90  RCVCSM
  1173   81  CDUSPOTZ     1264   83  MMTEMP       1335   85  MODECADR  E3,1446   88  PHSNAME5  E3,1614   90  VCVCSM
  1175   81  CDUSPOTX     1264   83  PHSPRDT3     1336   85  OPTCADR   E3,1447   88  PHSBB5    E3,1622   90  TCCSM
  1177   81  MINDEX       1265   83  BASETEMP     1337   85  OPTMODES  E3,1450   88  PHSNAME6  E3,1624   90  XKEPCSM
  1200   81  MMNUMBER     1265   83  TBASE4       1340   86  HOLDFLAG  E3,1451   88  PHSBB6    E3,1626   90  RRECTLEM
  1201   82  DSPCNT       1266   83  PHSPRDT4     1340  182  DL105     E3,1452   88  PBIASX    E3,1626   90  RRECTOTH
  1202   82  DSPCOUNT     1267   83  TBASE5       1340  188  DL425     E3,1452   88  PIPABIAS  E3,1634   90  VRECTLEM
  1203   82  DECBRNCH     1270   83  PHSPRDT5     1341   86  CDUCHKWD  E3,1453   88  PIPASCF   E3,1642   90  T-OTHER
  1204   82  VERBREG      1271   83  TBASE6       1342   86  RTED1     E3,1453   88  PIPASCFX  E3,1642   90  TETLEM
  1205   82  NOUNREG      1272   83  PHSPRDT6     1344   86  DVTHRESH  E3,1454   88  PBIASY    E3,1642   90  TETOTHER
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

   DEF   PAGE  SYMBOL        DEF   PAGE  SYMBOL        DEF   PAGE  SYMBOL        DEF   PAGE  SYMBOL        DEF   PAGE  SYMBOL

E3,1644   90  DELTALEM   E4,1540   93  VESO       E4,1725   94  UNP36      E5,1423  102  POSITON    E5,1514  103  DRIFTI
E3,1652   90  NUVLEM     E4,1546   93  OMEGAES    E4,1725   94  VONE       E5,1424  102  QPLAC      E5,1520  103  VLAUN
E3,1660   90  RCVLEM     E4,1550   93  PBODY      E4,1733   94  BASETIME   E5,1425  102  QPLACE     E5,1522  103  ACCWD
E3,1666   90  VCVLEM     E4,1551   93  ALPHAV     E4,1733   94  UNA36      E5,1426  102  QPLACES    E5,1530  103  POSNV
E3,1674   90  TCLEM      E4,1557   93  BETAV      E4,1733   95  URONE      E5,1427  102  RUN        E5,1532   97  9X9LOC2
E3,1676   90  XKEPLEM    E4,1565   93  PHIV       E4,1733   95  V82FLAGS   E5,1430  102  SYSTSPR2   E5,1532  103  DPIPAY
E3,1700   90  X789       E4,1573   93  PSIV       E4,1734   95  TFF        E5,1431  102  SOUTHDR    E5,1532  105  VACT2
E3,1706   90  TEPHEM     E4,1601   93  FV         E4,1736   95  -TPER      E5,1431  102  TARG1/2    E5,1536  103  DPIPAZ
E3,1706   91  TIMSUBO    E4,1607   93  BETAM      E4,1740   95  THETA(1)   E5,1432  102  TAZEL1     E5,1540  103  ALTIM
E3,1711   90  -AYO       E4,1611   93  H          E4,1742   95  HAPOX      E5,1440  102  TEMPTIME   E5,1540  105  RACT1
E3,1711   90  UNITW      E4,1613   93  IRETURN    E4,1744   95  HPERX      E5,1442  102  TMARK      E5,1541  103  ALTIMS
E3,1713   90  AXC        E4,1614   93  NORMGAM    E4,1744  184  DL202      E5,1444   97  9X9LOC1    E5,1542  103  ALDK
E3,1717   90  R-OTHER    E4,1615   93  VECTAB     E4,1746   95  AOPTIME    E5,1444  102  AINLA      E5,1546  105  T1TOT2
E3,1725   90  V-OTHER    E4,1623   93  BASEOTP    E4,1746   95  RSP-RREC   E5,1444  102  GENPL      E5,1550  105  COUNTSMK
E3,1733   90  REFSMMAT   E4,1637   93  BASEOTV    E4,1750   95  LANDLONG   E5,1444  102  WANGO      E5,1551  105  N90RET
E3,1755   91  UNITR      E4,1637   93  ERADM      E4,1750   95  TCSI2      E5,1444  105  DELVEET1   E5,1552  102  COUNTPL
E3,1755   91  YCSM       E4,1641   93  INCORPEX   E4,1752   95  LANDALT    E5,1446  102  WANGI      E5,1552  105  BURNTMP1
E3,1757   91  YDOTC      E4,1641   96  ENDSYS-4   E4,1754   95  KT         E5,1450  102  TORQNDX    E5,1554   97  S22RL
E3,1761   91  YDOTL      E4,1653   93  BASETHP    E4,1754   96  DTF        E5,1450  102  WANGT      E5,1554   97  XNB1
E3,1763   91  EIMP1SEC   E4,1661   93  BASETHV    E4,1754   96  HAPO       E5,1452  102  DRIFTT     E5,1560  103  DELM
E3,1764   91  EFIMP01    E4,1661   93  RPQV       E4,1754   96  NOMTPI     E5,1452  105  RACT2      E5,1560  105  BURNTMP2
E3,1765   91  EFIMP16    E4,1667   93  KEPRTN     E4,1755   96  VC/O       E5,1453  102  CDULIMIT   E5,1562   97  YNB1
E3,1766   91  E3J22R2M   E4,1667   93  ORIGEX     E4,1756   95  ANEXIT     E5,1454  102  ALX1S      E5,1566  105  BURNTMP3
E3,1767   91  E32C31RM   E4,1670   93  RPSV       E4,1756   95  QSAVED     E5,1455  102  CMPX1      E5,1570   97  EMATRIX
E3,1770   91  TRUNSF     E4,1676   93  XKEPNEW    E4,1756   96  HPER       E5,1456  102  ALK        E5,1570   97  ZNB1
E3,1771   91  SHAFTSF    E4,1700   93  ALPHAM     E4,1757   95  RTRN       E5,1460  102  THETAX     E5,1570  103  WPLAT1
E4,1400   92  ERASPIP    E4,1702   93  TAU.       E4,1760   95  SUBEXIT    E5,1460  103  THETAX1    E5,1574  105  BURNTMP4
E4,1400   92  WRENDPOS   E4,1704   93  DT/2       E4,1761   96  VONE'      E5,1460  105  TCDH       E5,1576   97  SAVQR52
E4,1400   96  TRANSM1    E4,1706   94  R63TIME    E4,1767   96  HAMDELH    E5,1462  105  TCSI       E5,1577   97  R52BNKSV
E4,1401   92  WRENDVEL   E4,1710   94  EGRESS     E4,1771   96  WRDTIME    E5,1462  186  DL302      E5,1577  103  RESTARPT
E4,1402   92  RMAX       E4,1711   94  HPERMIN    E4,1772   96  MINBLKTM   E5,1464  105  TTPIO      E5,1600   97  AUTOY
E4,1403   92  VMAX       E4,1711   94  RANGE      E4,1773   96  TBEFCOMP   E5,1466  102  THETAN     E5,1600   97  PLANVEC
E4,1404   92  WORBPOS    E4,1711   94  RHOSB      E4,1774   96  BRNBLKTM   E5,1466  103  THETAN1    E5,1602   97  CMYDOT
E4,1405   92  WORBVEL    E4,1711   94  WWPOS      E4,1775   96  MAXWTIME   E5,1472  102  VLAUNS     E5,1604   97  LMYDOT
E4,1406   92  S22WSUBL   E4,1713   94  GAMMASB    E4,1776   96  FINCMPTM   E5,1474  102  WPLATO     E5,1606   97  TSIGHT
E4,1407   92  RPVAR      E4,1713   94  RPADTEM    E4,1777   96  INTVAR     E5,1474  103  FILDELV    E5,1610   97  DVLOS
E4,1411   92  504LM      E4,1713   94  RRATE      E5,1400   97  W          E5,1474  103  FILDELV1   E5,1610   98  STARSAV1
E4,1417   92  EMSALT     E4,1713   94  WWVEL      E5,1400  102  AZIMUTH    E5,1476  103  INTVEC     E5,1610  105  UP1
E4,1421   92  ATIGINC    E4,1713  186  DL303      E5,1402  102  LATITUDE   E5,1476  103  INTVEC1    E5,1616   97  UNRM
E4,1422   96  ALFDK      E4,1715   94  RRATE2     E5,1404  102  ERVECTOR   E5,1500  102  INTY       E5,1616   98  STARSAV2
E4,1423   92  PTIGINC    E4,1715   94  RTHETA     E5,1412  102  LENGTHOT   E5,1502  102  ANGZ       E5,1616   98  US
E4,1425   92  RLS        E4,1715   94  TSTART82   E5,1413  102  LOSVEC     E5,1504  102  INTZ       E5,1616  105  VPASS2
E4,1433   92  TIMEMO     E4,1715   94  WWOPT      E5,1413  102  SXTOPTN    E5,1506  102  ANGY       E5,1624   97  ULOS
E4,1436   92  VECOEM     E4,1717   94  RONE       E5,1421  102  NOXCTR     E5,1510  102  ANGX       E5,1624  105  RPASS2
E4,1532   93  RESO       E4,1717   94  VPASS36    E5,1422  102  SYSTSPR1   E5,1512  103  DRIFTO     E5,1631  103  GEOSAVED
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E5,1631  103  GEOSAVE1   E5,1664  100  R2VEC      E5,1761  100  TERRLAMB   E6,1450  107  RWORD1     E6,1511  116  COSM
E5,1632   97  ACTCENT    E5,1664  101  HOLDW      E5,1761  184  DL205      E6,1451  107  RWORD2     E6,1512  112  KMPTEMP
E5,1632  103  PREMTRXC   E5,1671   99  XSM        E5,1763   99  MGC        E6,1452  107  PWORD1     E6,1512  116  SINO
E5,1632  103  PREMTRX1   E5,1672  100  TDESIRED   E5,1763  100  DEPREV     E6,1453  107  PWORD2     E6,1513  112  WTEMP
E5,1632  105  DIFFALT    E5,1674  100  GEOMSGN    E5,1763  100  TPREV      E6,1454  107  YWORD1     E6,1513  112  XNDX1
E5,1633  103  LAUNCHAZ   E5,1675  100  UN         E5,1763  184  DL206      E6,1455  107  YWORD2     E6,1513  116  COSO
E5,1633  103  LUNCHAZ1   E5,1677   99  YSM        E5,1765   99  STAR       E6,1456  107  BLAST      E6,1514  112  XNDX2
E5,1634   98  DELVTPI    E5,1703  100  VTARGTAG   E5,1773   99  SAC        E6,1460  107  BLAST1     E6,1514  116  SINOCOSM
E5,1634   98  TDEC2      E5,1704  100  VTARGET    E5,1775   99  PAC        E6,1462  107  BLAST2     E6,1515  112  DELTEMPX
E5,1635  103  NEWAZMTH   E5,1705   99  ZSM        E5,1777   99  QMIN       E6,1464  107  T5PHASE    E6,1515  112  EDOT
E5,1635  103  NEWAZ1     E5,1706  101  ZI         E6,1400  106  WMIDPOS    E6,1465  107  DAPDATR1   E6,1515  112  YNDX
E5,1636   98  DELVTPF    E5,1712  100  RTNAPSE    E6,1401  106  WMIDVEL    E6,1466  107  DAPDATR2   E6,1515  116  COSOCOSM
E5,1637  103  OLDAZMTH   E5,1712  100  RTNLAMB    E6,1402  106  RVAR       E6,1466  182  DL123      E6,1516  108  VARST5
E5,1637  103  OLDAZ1     E5,1712  100  RTNTR      E6,1404  106  RVARMIN    E6,1466  188  DL423      E6,1516  112  ZNDX
E5,1640   98  POSTTPI    E5,1712  100  RTNTT      E6,1407  106  LADPAD     E6,1467  107  IXX        E6,1517  112  AERR
E5,1640   98  T3TOT4     E5,1713   99  XDC        E6,1410  106  LODPAD     E6,1470  107  IAVG       E6,1517  112  DELTEMPY
E5,1641  103  TOLDAZMT   E5,1713   99  XNB        E6,1411  106  ALFAPAD    E6,1471  107  IAVG/TLX   E6,1517  112  RINDEX
E5,1641  103  TOLDAZ1    E5,1713  100  J2         E6,1412  106  P37RANGE   E6,1472  107  LEMMASS    E6,1520  112  EDOTVEL
E5,1642   97  END-W      E5,1721   99  YDC        E6,1413  106  ETDECAY    E6,1473  107  CSMMASS    E6,1520  112  PINDEX
E5,1642  100  DELX       E5,1721   99  YNB        E6,1414  106  EKPRIME    E6,1473  182  DL122      E6,1521  112  DELTEMPZ
E5,1642  101  OMEGAM1    E5,1721  100  MAGVEC2    E6,1416  106  EKTLX/I    E6,1473  188  DL422      E6,1521  112  YINDEX
E5,1643  103  GEOCOMPS   E5,1721  100  R2         E6,1421  106  EREPFRAC   E6,1475  107  WEIGHT/G   E6,1522  108  LASTMASP
E5,1643  103  GEOCOMP1   E5,1723  100  UR1        E6,1423  106  PACTOFF    E6,1476  107  AK         E6,1522  112  AERRVEL
E5,1644  100  DELT       E5,1727   99  ZDC        E6,1424  106  YACTOFF    E6,1476  117  PAXERR     E6,1522  112  NRJETS
E5,1644  103  1SECXT     E5,1727   99  ZNB        E6,1424  181  DL101      E6,1477  107  AK1        E6,1523  112  ADBVEL
E5,1644  103  1SECXT1    E5,1731  100  SNTH       E6,1424  184  DL203      E6,1477  182  DL110      E6,1523  112  NPJETS
E5,1645  103  GTSWTLST   E5,1733  100  CSTH       E6,1425  106  HBN10      E6,1500  107  AK2        E6,1524  112  NYJETS
E5,1645  103  GTSWTLT1   E5,1735   99  CULTRIX    E6,1426  106  HBN11/2    E6,1500  182  DL111      E6,1525  108  OMEGAC
E5,1646  100  URRECT     E5,1735   99  STARAD     E6,1427  106  HBN12      E6,1501  107  RCSFLAGS   E6,1525  108  OMEGAXC
E5,1646  103  ERECTIME   E5,1735   99  VEARTH     E6,1430  106  HBD11/2    E6,1501  182  DL112      E6,1525  108  TVCRCS
E5,1646  103  ERECTIM1   E5,1735  100  1-CSTH     E6,1431  106  HBD12      E6,1502  107  T5TEMP     E6,1525  112  WBODY
E5,1647  103  ERCOMP     E5,1737  100  CSTH-RHO   E6,1432  106  HBN20      E6,1503  108  EDRIVEX    E6,1525  120  ASPS(TM)
E5,1647  103  ERCOMP1    E5,1741  100  P          E6,1433  106  HBN21/2    E6,1504  108  EDRIVEY    E6,1525  182  DL126
E5,1650  101  OMEGAM2    E5,1743   99  VSUN       E6,1434  106  HBN22      E6,1505  108  EDRIVEZ    E6,1527  108  OMEGAYC
E5,1654  100  RCNORM     E5,1743  100  R1A        E6,1435  106  HBD21/2    E6,1506  108  INTTEMP    E6,1527  112  WBODY1
E5,1655  103  GTSOPNDZ   E5,1745  100  VVEC       E6,1436  106  HBD22      E6,1506  108  PHI333     E6,1531  108  OMEGAZC
E5,1655  103  ZERONDX    E5,1751   99  VMOON      E6,1437  107  HBN30      E6,1506  112  SPNDX      E6,1531  112  WBODY2
E5,1655  103  ZERONDX1   E5,1753  100  ECC        E6,1440  107  HBN31/2    E6,1506  116  CALFA      E6,1533  108  OMEGAB
E5,1656   98  TRTEMP     E5,1755  100  RTNPRM     E6,1441  107  HBN32      E6,1507  108  PSI333     E6,1533  108  OMEGAXB
E5,1656  100  RVEC       E5,1756  100  SGNRDOT    E6,1442  107  HBD31/2    E6,1507  112  DPNDX      E6,1533  110  OGARATE
E5,1656  100  R1VEC      E5,1757   99  DGC        E6,1443  107  HBD32      E6,1507  116  SALFA      E6,1533  112  ADOT
E5,1656  101  OMEGAM3    E5,1757   99  SAX        E6,1444  107  MRKRTMP    E6,1510  108  TEMP333    E6,1533  120  XPIPBUF
E5,1656  103  PERFDLAY   E5,1757  100  RDESIRED   E6,1444  107  TEMPDAP    E6,1510  112  KMPAC      E6,1533  182  DL107
E5,1657   98  SRTEMP     E5,1761   99  IGC        E6,1446  107  CNTR       E6,1510  116  SINM       E6,1533  182  DL108
E5,1657  103  ENDSYS-5   E5,1761  100  DELDEP     E6,1447  107  OGAD       E6,1511  108  VARST0     E6,1534  120  YPIPBUF
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

   DEF    PAGE  SYMBOL        DEF    PAGE  SYMBOL        DEF    PAGE  SYMBOL        DEF    PAGE  SYMBOL        DEF    PAGE  SYMBOL

E6,1535   108   OMEGAYB    E6,1571   188   DL415      E6,1617   109   DAP2       E6,1643   109   MCDUZDOT   E6,1670   115   AIG/PIP
E6,1535   112   ADOT1      E6,1572   109   ROLLWORD   E6,1617   113   ATTKALMN   E6,1643   114   AMGB7      E6,1671   115   AMG/PIP
E6,1535   120   ZPIPBUF    E6,1572   113   THETADX    E6,1617   116   JNDX       E6,1644   110   TVCEXPHS   E6,1671   118   NEXTIME
E6,1536   120   XOLDBUF    E6,1572   117   QAXERR     E6,1620   113   KMJ        E6,1644   114   AMGB8      E6,1672   110   TMP2
E6,1537   108   OMEGAZB    E6,1572   188   DL416      E6,1620   116   JNDX1      E6,1645   110   OGANOW     E6,1672   115   ROLL/PIP
E6,1537   112   ADOT2      E6,1573   109   TEMREG     E6,1621   109   DAP3       E6,1645   114   CAPSI      E6,1672   118   TTEMP
E6,1537   120   YOLDBUF    E6,1573   113   THETADY    E6,1621   113   KMJ1       E6,1646   110   OGAPAST    E6,1673   115   ALFA/PIP
E6,1540   120   ZOLDBUF    E6,1573   117   RAXERR     E6,1621   117   TON1       E6,1646   114   CDUXD      E6,1673   118   POLYLOC
E6,1541   108   PTMP1      E6,1573   182   DL113      E6,1622   113   KMJ2       E6,1647   110   OGA        E6,1674   110   TMP3
E6,1541   112   MERRORX    E6,1573   182   DL116      E6,1622   117   T1BITS     E6,1647   110   OGAERR     E6,1674   115   BETA/PIP
E6,1543   108   PTMP2      E6,1573   188   DL417      E6,1623   109   PCMD       E6,1650   110   DELOGART   E6,1674   118   BIASTEMP
E6,1543   112   MERRORY    E6,1574   109   TVCDUMMY   E6,1623   113   J/M        E6,1650   114   CDUYD      E6,1675   115   -DELAOG
E6,1545   108   PTMP3      E6,1574   113   THETADZ    E6,1623   117   CM/SAVE    E6,1651   110   SGNRT      E6,1676   110   TMP4
E6,1545   112   MERRORZ    E6,1574   120   Q7         E6,1624   109   YCMD       E6,1652   110   DELOGA     E6,1676   115   -DELAIG
E6,1547   108   PTMP4      E6,1574   182   DL114      E6,1624   113   J/M1       E6,1652   114   CDUZD      E6,1677   115   -DELAMG
E6,1547   112   DFT        E6,1574   182   DL117      E6,1624   117   JETEM2     E6,1653   110   I          E6,1700   110   TMP5
E6,1550   112   DFT1       E6,1574   188   DL418      E6,1624   181   DL102      E6,1654   110   IOGARATE   E6,1700   115   CMDAPMOD
E6,1551   109   PTMP5      E6,1575   109   PERRB      E6,1624   182   DL104      E6,1654   114   SLOPE      E6,1700   118   SATRLRT
E6,1551   112   DFT2       E6,1575   113   DELCDUX    E6,1625   109   T5TVCDT    E6,1655   110   PACTTMP    E6,1701   115   PREL
E6,1552   112   DRHO       E6,1577   109   YERRB      E6,1625   113   J/M2       E6,1655   114   ADB        E6,1701   188   DL401
E6,1553   109   PTMP6      E6,1577   113   DELCDUY    E6,1626   109   KPRIMEDT   E6,1656   114   RMANNDX    E6,1701   188   DL419
E6,1554   112   DRHO1      E6,1601   109   DELPBAR    E6,1626   113   RACFAIL    E6,1657   110   YACTTMP    E6,1702   110   TMP6
E6,1555   109   YTMP1      E6,1601   113   DELCDUZ    E6,1627   113   RBDFAIL    E6,1657   114   PMANNDX    E6,1702   115   QREL
E6,1556   113   DRHO2      E6,1603   109   DELYBAR    E6,1630   109   KTLX/I     E6,1660   114   YMANNDX    E6,1702   118   RPSTART
E6,1557   109   YTMP2      E6,1603   113   DCDU       E6,1630   113   ACORBD     E6,1661   110   CNTRTMP    E6,1702   188   DL402
E6,1560   113   ATTSEC     E6,1603   116   ALFACOM    E6,1631   109   I/CONACC   E6,1661   115   AOG        E6,1702   188   DL420
E6,1561   109   YTMP3      E6,1604   116   BETACOM    E6,1631   113   XTRANS     E6,1661   118   BCDU       E6,1703   115   RREL
E6,1561   113   TAU        E6,1605   109   PDELOFF    E6,1632   109   VARK       E6,1661   118   POLYNUM    E6,1703   118   POLYSTOP
E6,1562   113   TAU1       E6,1605   116   TOFF       E6,1632   113   CH31TEMP   E6,1662   110   DELBRTMP   E6,1703   188   DL403
E6,1563   109   YTMP4      E6,1606   116   TBITS      E6,1633   109   REPFRAC    E6,1662   115   AIG        E6,1703   188   DL421
E6,1563   113   TAU2       E6,1607   109   YDELOFF    E6,1633   113   CHANTEMP   E6,1663   115   AMG        E6,1704   110   COEFFADR
E6,1564   113   BIAS       E6,1607   116   TON2       E6,1634   109   VCNTR      E6,1664   110   ERRBTMP    E6,1704   115   BETADOT
E6,1565   109   YTMP5      E6,1610   116   T2BITS     E6,1634   113   T5TIME     E6,1664   115   ROLL/180   E6,1704   119   SPOLYARG
E6,1565   113   BIAS1      E6,1611   109   TTMP1      E6,1635   109   TVCPHASE   E6,1664   118   KSPNDX     E6,1705   110   N10
E6,1566   113   BIAS2      E6,1611   110   PHASETMP   E6,1635   113   RHO        E6,1665   115   ALFA/180   E6,1705   115   PHIDOT
E6,1567   109   YTMP6      E6,1611   113   DTHETASM   E6,1636   109   PCDUYPST   E6,1665   118   KDPNDX     E6,1705   119   BOOSTEMP
E6,1567   113   ERRORX     E6,1611   116   OUTTAG     E6,1636   113   RHO1       E6,1666   110   CMDTMP     E6,1706   115   OLDELP
E6,1567   117   VDT/180    E6,1612   116   NOJET      E6,1637   109   PCDUZPST   E6,1666   115   BETA/180   E6,1707   115   OLDELQ
E6,1570   113   ERRORY     E6,1613   109   TTMP2      E6,1637   113   RHO2       E6,1666   118   MFISYM     E6,1710   115   OLDELR
E6,1570   117   -VT/180E   E6,1613   110   RTRNLOC    E6,1640   109   YCDUYPST   E6,1666   118   NCDU       E6,1710   117   VECQTEMP
E6,1570   182   DL124      E6,1613   116   -VT/180    E6,1640   113   AMGB1      E6,1666   118   TMFI       E6,1710   118   BRATE
E6,1570   188   DL414      E6,1614   116   LCX/360    E6,1641   109   YCDUZPST   E6,1666   118   TMIS       E6,1710   118   COFSKEW
E6,1571   109   ROLLFIRE   E6,1615   109   DAP1       E6,1641   113   AMGB4      E6,1666   188   DL411      E6,1710   119   SATRATE
E6,1571   113   ERRORZ     E6,1615   116   XD/360     E6,1642   109   MCDUYDOT   E6,1667   115   AOG/PIP    E6,1711   115   JETAG
E6,1571   182   DL125      E6,1616   116   VSQ/4API   E6,1642   114   AMGB5      E6,1670   110   TMP1       E6,1712   115   TUSED
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

   DEF   PAGE  SYMBOL        DEF   PAGE  SYMBOL        DEF   PAGE  SYMBOL        DEF   PAGE  SYMBOL        DEF   PAGE  SYMBOL

E6,1713  115  PAXERR1    E7,1402  188  DL410      E7,1473  122  RT         E7,1557  134  MUSUBC     E7,1631  131  RTEDVD
E6,1714  115  ROLLTM     E7,1404  121  DELVLVC    E7,1473  126  INIT       E7,1561  126  VPASS3     E7,1633  122  L/D
E6,1714  119  SATSW      E7,1404  121  DELVSLV    E7,1473  133  VACT4      E7,1561  131  UV1/       E7,1633  125  VZC
E6,1714  188  DL407      E7,1412  121  TIG        E7,1475  126  INITPREV   E7,1561  132  UH/        E7,1633  131  RTEGAM2D
E6,1715  115  ROLLC      E7,1412  132  SPRTETIG   E7,1501  122  UN1        E7,1563  122  UBX/2      E7,1635  122  L/D1
E6,1715  119  BIASAK     E7,1414  121  RTARG      E7,1501  125  BVECTOR    E7,1565  134  MUSUBS     E7,1635  131  RCON
E6,1715  188  DL424      E7,1422  121  DELLT4     E7,1501  125  N49DISP    E7,1567  126  RINIT      E7,1637  122  D
E6,1716  118  CAM        E7,1424  121  ECSTEER    E7,1501  125  S22UMRL    E7,1567  127  VAPREC     E7,1637  127  VPASS4
E6,1716  118  TM         E7,1425  121  DVTOTAL    E7,1501  133  RDOTV      E7,1571  122  UBY/2      E7,1637  127  VTIG
E6,1717  116  ROLLHOLD   E7,1425  121  END-DELV   E7,1502  126  INTIME     E7,1573  134  MUSUBN     E7,1637  131  R(T1)/
E6,1720  116  JETEM      E7,1425  125  DEL        E7,1503  133  VACT1      E7,1575  126  VINIT      E7,1641  122  DLEWD
E6,1720  118  MIS        E7,1425  125  MFI        E7,1504  126  ITCTR      E7,1575  127  RAPREC     E7,1641  125  UCLSTAR
E6,1720  119  SATSCALE   E7,1425  125  MFS        E7,1507  122  UNITV      E7,1577  122  UBZ/2      E7,1643  122  K2ROLL
E6,1722  116  GAMA       E7,1427  121  TGO        E7,1511  133  VPASS1     E7,1603  125  UBAR0      E7,1645  122  GOTOADDR
E6,1723  116  GAMDOT     E7,1431  121  DELVREF    E7,1515  122  VEL        E7,1603  126  RTARG1     E7,1645  127  DELVEET3
E6,1724  110  NBRCYCLS   E7,1447  121  NOMTIG     E7,1523  122  TIME/RTO   E7,1603  133  P21ORIG    E7,1645  127  DELVSIN
E6,1724  116  POSEXIT    E7,1447  125  END-KALC   E7,1523  125  DELTAQ     E7,1604  133  P21BASER   E7,1645  127  VGTEMP
E6,1725  110  NBRCYCLP   E7,1447  125  TX789      E7,1525  122  -VREL      E7,1604  134  P29BASER   E7,1645  131  R(T1)
E6,1725  116  CM/GYMDT   E7,1447  126  DELTEEO    E7,1525  125  VARIANCE   E7,1605  122  DTEAROT    E7,1646  122  TEM1B
E6,1726  110  DELVSUM    E7,1451  121  END-SVCR   E7,1530  125  RCLP       E7,1607  122  DIFF       E7,1647  125  USSTAR
E6,1726  116  HEADSUP    E7,1451  121  VEL/C      E7,1533  122  OLDUYA     E7,1611  122  DIFFOLD    E7,1647  131  DT21PR
E6,1727  116  P63FLAG    E7,1451  122  RTINIT     E7,1536  125  GRP2SVQ    E7,1611  125  UBAR1      E7,1650  122  MM
E6,1734  110  DELVSUMP   E7,1451  126  DELEL      E7,1537  125  SVMRKDAT   E7,1611  126  V1PRIME    E7,1651  122  GRAD
E6,1734  111  MASSTMP    E7,1453  126  SECMAX     E7,1537  126  DELVOV     E7,1611  127  VPPREC     E7,1651  131  MAMAX1
E6,1742  118  COF        E7,1455  125  GAMMA      E7,1537  126  RACT3      E7,1612  133  P21BASEV   E7,1652  122  FX
E6,1750  118  SCAXIS     E7,1455  126  XXXALT     E7,1537  133  P21TIME    E7,1612  134  P29BASEV   E7,1653  122  LEQ
E6,1750  118  UTX        E7,1457  121  R53EXIT    E7,1537  134  P29BASET   E7,1613  122  FACTOR     E7,1653  127  DELVSAB
E6,1756  118  POINTVSM   E7,1457  122  RTEAST     E7,1541  122  URH        E7,1615  122  FACT1      E7,1653  131  MAMAX2
E6,1756  118  UTY        E7,1457  125  OMEGA      E7,1541  122  UXA/2      E7,1617  122  FACT2      E7,1655  122  DHOOK
E6,1764  118  AM         E7,1457  126  VG         E7,1541  134  PASSTIME   E7,1617  125  UBAR2      E7,1655  127  TPASS4
E6,1766  118  RAC        E7,1457  128  AVEGDT     E7,1543  134  LONGFOR    E7,1617  126  VTPRIME    E7,1655  131  R(T2)/
E6,1770  119  GENRET     E7,1457  128  DV47TEMP   E7,1545  126  OPTFLAG    E7,1617  127  RPPREC     E7,1655  133  T2TOT3
E6,1770  119  TEMPROLL   E7,1457  133  POSTCSI    E7,1545  126  VACT3      E7,1620  133  P21ALT     E7,1657  122  AHOOKDV
E6,1771  119  SAVBNK     E7,1460  121  MARK2DWN   E7,1545  131  NN2        E7,1621  122  VSQUARE    E7,1657  127  QTEMP
E6,1771  119  TEMPALFA   E7,1461  128  VPAST      E7,1545  133  UNVEC      E7,1622  133  P21VEL     E7,1660  127  TTOGO
E6,1772  119  RATEPTC    E7,1461  133  DELVCSI    E7,1545  134  DELTLONG   E7,1623  122  LAD        E7,1661  123  DVL
E6,1772  119  TEMPBETA   E7,1463  128  TLITMP     E7,1547  122  UYA/2      E7,1624  133  P21GAM     E7,1662  127  TTPI
E6,1773  119  DBPTC      E7,1463  133  DELDV      E7,1547  131  RTENCKEX   E7,1625  122  LOD        E7,1663  123  A1
E6,1773  119  60GENRET   E7,1465  122  RTNORM     E7,1547  134  FUDGE      E7,1625  125  RZC        E7,1663  131  RD
E6,1774  119  R61CNTR    E7,1465  126  VRPREV     E7,1550  131  CONICX1    E7,1625  126  +MGA       E7,1664  127  DELVCTL
E6,1774  119  S61DT      E7,1465  128  T-TO-ADD   E7,1551  131  T2         E7,1627  122  L/DCMINR   E7,1664  127  END-P30S
E6,1775  120  HORISLP    E7,1465  133  GAMPREV    E7,1551  134  MUSUBE     E7,1627  126  COZY4      E7,1664  127  VGBODY
E7,1400  121  LAT(SPL)   E7,1467  133  DVPREV     E7,1553  126  RPASS3     E7,1631  122  KLAT       E7,1664  129  TITER
E7,1402  121  LNG(SPL)   E7,1471  133  HAFPAI     E7,1553  131  URT/       E7,1631  127  END-IN/M   E7,1664  129  TSTRT
E7,1402  186  DL305      E7,1471  133  POSTCDH    E7,1555  122  UZA/2      E7,1631  127  RTIG       E7,1664  133  CSIALRM
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

   DEF   PAGE  SYMBOL       DEF   PAGE  SYMBOL        DEF   PAGE  SYMBOL       DEF  PAGE  SYMBOL      DEF  PAGE  SYMBOL

E7,1665  123  VBARS      E7,1720  128  VGPREV     E7,1746  131  CFPA         4052  140  UPRPTBB     4537  906  V4N06RTE
E7,1665  131  DRCON      E7,1720  128  VGTIG      E7,1747  130  RTMU         4076  107  DPCONFIG    4615  385  VBSP3LD
E7,1666  133  DELVEET2   E7,1721  123  GMAX       E7,1747  134  BNN          4076  366  BIT15/14    4615  714  OCT27/24
E7,1667  123  COSG/2     E7,1721  131  X(T1)      E7,1750  131  PHI2         4076 1204  OCT60000    4751 1200  LIMITS
E7,1667  129  S22TOFF    E7,1722  123  VMAGI      E7,1750  134  S22LOC       4124  174  200MS       4751 1203  -BIT14
E7,1667  131  RPRE,      E7,1722  124  VNOW       E7,1751  130  RTSR1/MU     4124  214  DEC20       4752   46  NJETSBIT
E7,1671  123  VS1        E7,1722  129  MRKBUF1    E7,1751  134  LANDMARK     4125  437  25DECML     4752   50  DRFTBIT
E7,1671  129  S22TPRIM   E7,1722  182  DL1055     E7,1752  131  SPRTEX       4170  366  ENDINST     4752   52  V50N18BT
E7,1671  131  V(T1)/     E7,1723  131  T12        E7,1752  134  HORIZON      4171 1476  VERBMASK    4752   54  MRKIDBIT
E7,1672  127  P40TMP     E7,1723  132  X(T2)PRE   E7,1753  130  CENTANG      4223  378  PINSUPBT    4752   56  DSKYBIT
E7,1673  123  V          E7,1724  122  LEWD       E7,1753  132  VNSTORE      4260  215  DEC34       4752   58  DAP1BIT
E7,1673  129  S22EORM    E7,1724  123  VIO        E7,1753  134  P22DEX       4305  382  ENDBLFF     4752   60  TERMIBIT
E7,1674  128  DELVIMU    E7,1724  124  VGTLI      E7,1754  132  BETA12       4321 1178  FOURTEEN    4752   62  RPQFLBIT
E7,1674  129  MARKDOWN   E7,1724  182  DL1056     E7,1754  134  TRUNION      4321 1178  OCT16       4752   63  SWTOVBIT
E7,1675  123  LATANG     E7,1725  131  DELTAT     E7,1755  133  RPASS1       4322 1200  OCT11       4752   65  PCMANBIT
E7,1675  123  XRNGERR    E7,1725  132  X(T2)      E7,1756  123  VL           4322 1204  NINE        4752   67  S32BIT1
E7,1677  123  RDOT       E7,1726  123  L/DCALC    E7,1756  124  VPRED        4342  214  DEC31       4752   84  TLIMBIT
E7,1677  131  V2(T1)/    E7,1726  123  TTE        E7,1760  123  GAMMAL       4342 1201  OCT37       4752 1081  HALFPR
E7,1677  188  DL408      E7,1726  128  F          E7,1760  123  PREDANG      4344 1116  FBANKMSK    4752 1204  NEGMAX
E7,1701  123  THETAH     E7,1727  131  NN1A       E7,1760  124  GAMMAEI      4344 1204  BANKMASK    4752 1204  VLOADCOD
E7,1701  188  DL409      E7,1730  123  ASKEP      E7,1760  186  DL306        4344 1394  -MAXADRS    4752 1393  SBIT15
E7,1702  128  CSTEER     E7,1730  123  ASPS       E7,1761  123  JJ           4346  201  OCT30000    4752 1477  MKRQST
E7,1703  123  ALP        E7,1730  128  QTEMP1     E7,1762  124  VGDISP       4346 1204  BIT13-14    4753   47  JSWCHBIT
E7,1703  129  RM         E7,1731  123  ASP1       E7,1763  133  LOOPCT       4346 1204  PRIO30      4753   49  STIKBIT
E7,1703  129  S22RTNEX   E7,1731  129  CNT3TEMP   E7,1765  131  NN1          4346 1485  FAILBIT     4753   50  R21BIT
E7,1703  186  DL301      E7,1731  130  PLANVCUT   E7,1765  133  NN           4350 1394  S8BITS      4753   52  GLOKFBIT
E7,1704  128  BDT        E7,1732  123  ASPUP      E7,1767  130  COGA         4351  432  DEC57       4753   54  PRIODBIT
E7,1704  129  Q611       E7,1732  124  TTE1       E7,1767  130  INDEP        4351  448  19DECML     4753   56  RETROBIT
E7,1704  129  STARSAV3   E7,1733  123  ASPDWN     E7,1771  130  EPSILONL     4351  949  NINETEEN    4753   58  DAP2BIT
E7,1705  123  C/D0       E7,1733  130  OLDMKTME   E7,1777  134  END-E7       4351 1204  OCT23       4753   60  ITSWBIT
E7,1705  129  Q6111      E7,1734  123  ASP3       E7,1777  134  WHOCARES     4352  354  OCT21       4753   62  NEWLMBIT
E7,1705  131  DV         E7,1734  124  TTE2          4000   27  EXECP2       4352  432  DEC17       4753   63  P24BIT
E7,1706  129  SAVEPOS    E7,1735  130  AGEOFW        4000   27  FFTAG1       4352  448  17DECML     4753   65  INTFLBIT
E7,1707  123  D0         E7,1736  124  ALTI          4000   27  FFTAG10      4353  385  VBSP1LD     4753   67  S32BIT2
E7,1707  131  V(T2)/     E7,1737  130  UTPIT         4000   27  FFTAG12      4353 1204  OCT25       4753   84  TON1SSBT
E7,1711  123  Q2         E7,1740  124  HDOT          4000   27  FFTAG2       4353 1495  UP21        4753   85  PROCDBIT
E7,1712  128  UT         E7,1741  130  UTYAW         4000   27  FFTAG3       4354 1476  LOWLOAD     4753 1092  KTRCS
E7,1713  123  RTGO       E7,1743  130  ELEV          4000   27  FFTAG4       4355  143  TABLNTH     4753 1204  HALF
E7,1713  124  RTGON64    E7,1743  131  BETA1         4000   27  FFTAG7       4355  714  OCT12       4753 1204  POS1/2
E7,1713  124  RTGON67    E7,1743  134  22SUBSCL      4000   27  FFTAG8       4355  996  -ROLL1      4753 1204  PRIO20
E7,1714  129  SAVEVEL    E7,1744  134  CXOFF         4000   27  P30SUBS      4355 1069  CM/SWIC2    4753 1393  SBIT14
E7,1715  123  DNRNGERR   E7,1745  130  RTX1          4000   27  STOPRAT      4355 1092  VSQMIN      4753 1477  REFLSH
E7,1715  131  T1         E7,1745  131  P(T1)         4000   27  WAITF2       4355 1204  TEN         4754   47  MIDFLBIT
E7,1717  123  KAT        E7,1745  134  BKK           4051  140  DWNRPTBB     4463  388  ENDPINBF    4754   49  ERADFBIT
E7,1717  131  PCON       E7,1746  130  RTX2          4052  140  KEYRPTBB     4535  906  V6N81RTE    4754   51  220SPBIT
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   4754   52  REFSMBIT       4756   62  LMOONBIT       4761   59  EGFLGBIT       4764   48  F2RTEBIT       4766  996  1/TMXFIR
   4754   54  NRMIDBIT       4756   64  V94FLBIT       4761   59  KNOWNBIT       4764   50  TRACKBIT       4766 1013  RCSINIT
   4754   56  SLOWBIT        4756   66  HDSUPBIT       4761   61  GONBYBIT       4764   51  AVFLBIT        4766 1204  FOUR
   4754   58  ENDSPBIT       4756   84  CAGEBIT        4761   62  SURFFBIT       4764   53  STATEBIT       4766 1393  S+4
   4754   58  STRULBIT       4756   85  UPLKFAIL       4761   64  SOURCBIT       4764   55  MRUPTBIT       4766 1393  SBIT3
   4754   60  IGNFLBIT       4756 1204  EBANK4         4761   66  P35BIT         4764   57  GRRBKBIT       4766 1477  BLNKR3
   4754   62  NEWIBIT        4756 1204  PRIO2          4761   67  AZIMBIT        4764   59  INRLBIT        4767   48  AMOONBIT
   4754   64  V82EMBIT       4756 1204  2K             4761   84  ITNON2BT       4764   63  APSESBIT       4767   50  GUESSBIT
   4754   65  REINTBIT       4756 1210  EXECBANK       4761 1393  SBIT8          4764   65  QUITBIT        4767   52  CALC2BIT
   4754   67  S32BIT3A       4756 1393  SBIT11         4761 1439  IMUSEFLG       4764   66  MANEUBIT       4767   54  D6OR9BIT
   4754   84  IMUFLBIT       4757   47  ZMEASBIT       4761 1477  DCMKPERF       4764   85  IMUZROBT       4767   56  VNBIT
   4754   85  PIP2FLBT       4757   49  TARG1BIT       4762   48  RNDVZBIT       4764   85  NOACCALM       4767   57  MGLVFBIT
   4754  201  OCT10000       4757   51  SKIPVBIT       4762   49  UPDATBIT       4764   85  OPMD1BIT       4767   60  CM/DSBIT
   4754  953  FCCRFRAC       4757   53  VFLAGBIT       4762   51  ETPIBIT        4764 1393  SBIT5          4767   61  ATTCHBIT
   4754  981  ERRLIM         4757   55  NWAITBIT       4762   51  FIRSTBIT       4764 1477  PERFRQST       4767   63  R67BIT
   4754 1204  PRIO10         4757   56  NEWTBIT        4762   53  CULTBIT        4765   48  CYC61BIT       4767   65  MIDAVBIT
   4754 1204  QUARTER        4757   58  GONEBIT        4762   55  PRONVBIT       4765   50  MARKBIT        4767   66  FULTKBIT
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   4754 1477  2NDPERF        4757   62  ADVTKBIT       4762   59  NOSWBIT        4765   53  INTYBIT        4767   86  OCDUINHT
   4755   47  MOONBIT        4757   64  SAVECBIT       4762   62  INFINBIT       4765   55  NRUPTBIT       4767 1204  TWO
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   4755   51  P21BIT         4757   84  PIPAFLBT       4762   66  AUTSQBIT       4765   61  UPLOCBIT       4767 1393  SBIT2
   4755   52  LUNABIT        4757   85  ZROPTFIN       4762   67  HABIT          4765   63  COGAFBIT       4767 1477  BLNKR2
   4755   54  PDSPFBIT       4757 1204  PRIO1          4762   85  ITNON1BT       4765   65  R31FLBIT       4767 1493  UP72
   4755   56  V59FLBIT       4757 1393  SBIT10         4762   85  OCDUFBIT       4765   66  PTV93BIT       4770   48  P29BIT
   4755   58  CMARMBIT       4760   47  NEEDLBIT       4762 1201  SUPER100       4765   85  IMUFINHT       4770   50  AVEGBIT
   4755   60  ASINBIT        4760   49  TARG2BIT       4762 1393  SBIT7          4765   85  OPMD2BIT       4770   52  NODOBIT
   4755   62  CMOONBIT       4760   51  IMPULBIT       4762 1477  PRIODSPY       4765  221  OCT00010       4770   54  DIMOBIT
   4755   64  MAXDBBIT       4760   53  POOBIT         4763   48  R53FLBIT       4765 1204  EIGHT          4770   56  XDSPBIT
   4755   66  REJCTBIT       4760   55  MRKNVBIT       4763   49  IDLEBIT        4765 1393  SBIT4          4770   57  RENDWBIT
   4755   67  S3229T3B       4760   57  DMENFBIT       4763   51  FINALBIT       4765 1477  FLSHRQST       4770   60  GYMDIBIT
   4755   84  ICDUFLBT       4760   59  RELVBIT        4763   53  ORBWFBIT       4766   48  FREEFBIT       4770   61  TFFSWBIT
   4755   85  DNLKFAIL       4760   61  RVSWBIT        4763   55  PINBRBIT       4766   50  SLOPEBIT       4770   63  360SWBIT
   4755  333  BLANKCON       4760   62  UTBIT          4763   57  3AXISBIT       4766   52  P24MKBIT       4770   65  AVEMDBIT
   4755 1204  PRIO4          4760   64  VHFRBIT        4763   59  HINDBIT        4766   53  VINTFBIT       4770   67  PCBIT
   4755 1393  SBIT12         4760   66  RANGBIT        4763   61  V37FLBIT       4766   56  MKOVBIT        4770   85  ACCFINHT
   4755 1477  V99PSTE        4760   84  IMUOPBIT       4763   63  ORDERBIT       4766   57  SOLNSBIT       4770   85  LMPTSTBT
   4756   47  NORFBIT        4760 1393  SBIT9          4763   64  N22ORBIT       4766   59  .05GBIT        4770 1204  ONE
   4756   49  ENG2BIT        4760 1417  SPSCODE        4763   67  CSISBIT        4766   61  VERIFBIT       4770 1393  S+1
   4756   51  STEERBIT       4761   47  IMUSEBIT       4763   85  IMUNITBT       4766   63  V96ONBIT       4770 1393  SBIT1
   4756   53  P22MKBIT       4761   49  VEHUPBIT       4763   85  NOIMUDAP       4766   65  MID1FBIT       4770 1477  BLNKR1
   4756   54  MWAITBIT       4761   51  XDELVBIT       4763  174  OCT40          4766   66  TPIMNBIT       4770 1493  UP71
   4756   56  INCORBIT       4761   53  PRECIBIT       4763  214  DEC32          4766   85  ICDUINHT       4771 1394  S-ZERO
   4756   58  GMDIFBIT       4761   55  NRMNVBIT       4763 1393  SBIT6          4766   85  ZOPTCS         4772  227  DNLADP00
   4756   60  TIMRBIT        4761   57  COMPTBIT       4763 1477  RETDSPY        4766  981  1/ERRLIM       4772  776  P51ZERO
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   4772 1393  S+ZERO         5011 1442  OCT62          5736  224  NEG7             7701 1048  =-2          01,2074  536  3P13SPT1
   4772 1477  DSPONLY        5014  996  +ROLL2         5736 1394  S-7              7701 1394  S-2          01,2077  528  3P15SPT1
   4772 1493  UP70           5014 1204  OCT120         5775  168  120MS            7701 1416  MINUS2       01,2102  700  4P2SPT1
   4773  205  NUMGRPS        5015 1204  OCT140         5775 1039  TWELVE           7702 1204  MINUS1       01,2110  700  4P4SPT1
   4773  776  P51FIVE        5016  365  MONDEL         5775 1439  BITS3&4          7702 1204  NEG1         01,2116  700  4P6SPT1
   4773  996  +ROLL1         5016  432  1SECX          5775 1476  PERF4MSK         7702 1394  S-1          01,2124  702  4P3SPT1
   4773 1393  S+5            5020 1092  2JETT          6000   27  FFTAG13          7704  390  SHOLTS       01,2127  703  4P5SPT1
   4773 1495  UPDTPHAS       5023  907  V5N09RTE       6000   27  FFTAG6           7706 1489  ABORT        01,2132  701  4P7SPT1
   4774  370  DSPMSK         5024 1204  EBANK3         6000   27  INTERF3       00,2000   27  DLAYJOB      01,2135  711  4P11SPT1
   4774 1204  LOW3           5024 1394  ERASCON6       6043 1416  OCT177        00,2000   27  INTERB0      01,2140  711  4P13SPT1
   4774 1393  S+7            5025 1202  7.9SEC         6056 1204  VLOAD*        01,2000   27  EXECB1       01,2143  449  4P15SPT1
   4774 1478  OCT7           5026  906  V6N33RTE       6061 1048  =-4           01,2000   27  INTERB1      01,2146  259  4P17SPT1
   4775  174  OCT13          5027  458  V6N34          6061 1394  S-4           01,2000   27  RESTART      01,2151  699  4P21SPT1
   4775  835  DVTHRUSH       5027  560  V06N34UT       6211  781  SIGHTSIX      01,2000   27  R02          01,2154  699  4P23SPT1
   4775 1204  NOUTCON        5030  623  V06N49EE       6211 1204  SIX           01,2000  230  PRDTTAB      01,2154  738  4P23SPT2
   4776  748  ALRM15         5030 1394  ERASCON3       6211 1393  S+6           01,2001  230  CADRTAB      01,2162  702  4P27SPT1
   4776  776  PRFMSTAQ       5031  627  VB06N18        6214   35  DELAYNUM      01,2014  829  1P3SPT1      01,2165  755  4P31SPT1
   4776 1178  THIRTEEN       5033  906  V6N60RTE       6214  541  POWDNCOD      01,2017  717  1P5SPT1      01,2170 1077  4P33SPT1
   4777  215  CKLSTAUT       5034  906  V6N61RTE       6214 1204  LOW2          01,2022  395  1P7SPT1      01,2173  704  4P35SPT1
   4777  585  OCT17          5035  560  V06N88UT       6214 1204  THREE         01,2025  415  1P11SPT2     01,2176  700  4P37SPT1
   4777  887  DEC15          5035  787  VNPLANV        6214 1393  S+3           01,2025  554  1P11SPT3     01,2201  883  4P41SPT1
   5000  224  EIGHTEEN       5036  623  V06N398        6214 1493  UP73          01,2025  555  1P11SPT4     01,2204  808  4P43SPT1
   5000 1447  ELRCODE        5036  746  V06N89*        6440 1204  OCT30002      01,2025  559  1P11SPT5     01,2207  808  4P45SPT1
   5001  174  OCTHIRTY       5041   35  ERASID         6706  339  DPTEST1       01,2025  572  1P11SPT6     01,2212  869  4P47SPT1
   5001  205  UPTINITR       5041 1394  S10BITS        6710 1131  Q+2           01,2025  834  1P11SPT7     01,2215  538  4P51SPT1
   5001  354  OCT30          5045 1204  EBANK6         7617 1204  OCT10001      01,2025  834  1P11SPT8     01,2220  710  4P53SPT1
   5001  996  TMINFIRE       5045 1477  WAITMASK       7652  996  T6SCALE       01,2030  558  1P13SPT1     01,2223  801  4P55SPT1
   5001 1002  BITS4,5        5050  178  11,12          7656 1204  B12T14        01,2030  834  2P13SPT2     01,2226  740  4P57SPT1
   5001 1439  BITS4-5        5050 1394  SBNK03         7660  205  IM30INIR      01,2033 1314  2P3SPT1      01,2231  531  4P61SPT1
   5001 1476  PERF2MSK       5053 1408  OCT14000       7661  551  100MST5       01,2036  212  2P5SPT1      01,2234  540  5P2SPT1
   5003  214  DEC33          5054  168  OCT15000       7663  145  20MRUPT       01,2036  213  2P5SPT2      01,2234  827  5P2SPT2
   5004  214  DEC40          5055  168  33ROMSK        7663 1001  DELTATT2      01,2036  555  2P5SPT3      01,2242  829  5P4SPT1
   5004  282  MIXCON         5055  205  IM33INIT       7663 1039  DELATT20      01,2036 1313  2P5SPT4      01,2250  531  5P3SPT16
   5004  336  LST2CON        5060  997  SPCOS1         7664  168  OC40010       01,2041  554  2P7SPT1      01,2250  541  5P3SPT1
   5004  393  GL+NOATT       5060  997  SPCOS2         7664 1423  OCT40010      01,2044  275  2P11SPT1     01,2250  706  5P3SPT2
   5004 1092  2T/TCDU        5061  997  SPSIN1         7664 1477  MARKFMSK      01,2047  588  2P13SPT1     01,2250  717  5P3SPT3
   5004 1394  CNTRCON        5061  997  SPSIN2         7667 1477  ITISMASK      01,2052  230  1.2SPOT      01,2250  725  5P3SPT4
   5004 1439  BITS4&6        5205 1489  DUALARM        7673  608  FURST3        01,2052  231  2.2SPOT      01,2250  728  5P3SPT5
   5004 1476  CADRMASK       5254  140  T3RPTBB        7673 1476  PINMASK       01,2052  529  3P2SPT1      01,2250  728  5P3SPT6
   5005  143  OCT54          5313  385  TCTSKOVR       7674  393  NOT31T12      01,2060  701  3P3SPT1      01,2250  740  5P3SPT7
   5006 1028  WL-H/SLP       5323  168  GLOCKOK        7674 1100  MINB12        01,2060  711  3P3SPT2      01,2250  801  5P3SPT8
   5010  536  BITS5-6        5516 1476  LINUS          7675  141  74K           01,2063  704  3P5SPT1      01,2250  832  5P3SPT9
   5010 1394  SIXTY          5524  250  TERMEXTV       7675 1477  IDLEMASK      01,2063  706  3P5SPT2      01,2250  833  5P3SPT10
   5011  215  DEC50          5524  251  ENDEXTVB       7700  333  BRNCHCON      01,2066  537  3P7SPT1      01,2250  833  5P3SPT11
   5011  448  1/2SECX        5524 1476  ENDEXT         7700 1394  S-3           01,2071  536  3P11SPT1     01,2250  833  5P3SPT12
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 01,2250  834  5P3SPT13  04,3757 1251  1B1         05,2211  187  CMENTRDL  13,2000   29  ORBITAL2  17,2000   30  DAPS5
 01,2250  855  5P3SPT14  04,3761   34  LO6ZEROS    05,2267  189  CMPG22DL  13,2000   29  P24PROG   17,2000   30  DAPS7
 01,2250  883  5P3SPT15  04,3761 1206  ZERODP      05,3305  685  1/10FPS   13,2000   29  P76LOC    17,2000   30  EXTVRBS1
 01,2253  828  5P5SPT1   04,3761 1240  2DZERO      06,2000   28  CSIPROG   13,2000   29  SR52/1    17,2000   30  P50S3
 01,2256  435  5P7SPT1   04,3761 1288  KEPZERO     06,2000   28  IMUCOMP   13,2345  766  LOCSAM    17,3727 1061  ENDSLECT
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 01,2264  437  5P13SPT1  04,3772 1305  LDPOSMAX    06,2706  167  ICDUFAIL  13,3034   34  ATOPOTH   20,2000   30  DAPS6
 01,2267  446  5P15SPT1  05,2000   28  CONICS4     06,2706  167  IMUFAIL   13,3145   35  THISPREC  20,2000   30  MANUSTUF
 01,2272  808  5P17SPT1  05,2000   28  CSITAG1     06,3557  156  -15DEGS   13,3161   34  OTHPREC   20,2000   30  P15LOC
 01,2275  439  5P21SPT1  05,2000   28  DAPMASS     07,2000   28  CSIPROG6  13,3735 1353  MUM       20,2000   30  P29TAG2
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 01,2311  829  5P31SPT1  05,2001  180  CMPOWEDL    07,2000   28  SXTMARKE  14,2002  743  P54       21,2000   30  P11THREE
 01,2314  447  5P33SPT1  05,2043  183  CMCSTA01    07,2073  242  MKRELEAS  14,3414  773  P53       22,2000   30  APOPERI
 01,2317  699  6P2SPT1   05,2043  185  CMREND01    07,3133 1439  IMUFIN20  15,2000   29  CDHTAGS   22,2000   30  DAPS8
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 01,2325  645  6P3SPT1   05,2052  183  CMCSTA02    10,2000   28  CONICS5   15,2000   29  STARTAB   22,2000   30  RTBCODES
 01,2325  703  6P3SPT2   05,2052  185  CMREND02    10,2000   28  CSIPROG8  15,3375 1092  1/16A1    22,2000   31  CSIPROG3
 01,2325  738  6P3SPT3   05,2052  187  CMENTR02    10,2000   28  DISPLAYS  15,3400 1092  -VMT/180  22,2000   31  P36TAG
 01,2330 1497  6P5SPT1   05,2052  189  CMPG2202    10,2000   28  KALCMON3  15,3401 1092  BUFLIM    22,2522  411  ENDDCM
 01,2333  711  6P7SPT1   05,2057  183  CMCSTA03    10,2000   28  OPTDRV    15,3411   34  LODP1/4   22,2745  416  LOCSKIRT
 01,2336 1068  6P11SPT1  05,2057  185  CMREND03    10,2000   28  PHASETAB  15,3411  671  1DPB2     22,3172 1386  RPAD1
 01,2513 1199  SW/       05,2057  188  CMENTR03    10,2000   28  P60S4     15,3411 1352  DP1/4     23,2000   31  COMGEOM1
 01,3024 1199  B3TOB4    05,2057  190  CMPG2203    10,2576 1476  GOXDSPF   15,3411 1352  DQUARTER  23,2000   31  CSIPROG4
 04,2000   27  CSI/CDH1  05,2061  183  CMCSTA04    10,3315 1476  GOPLAY    15,3414 1288  BEE19     23,2000   31  INFLIGHT
 04,2000   27  INTPRET2  05,2061  185  CMREND04    10,3732 1477  OCT700    15,3416  671  LOOPMX    23,2000   31  POWFLITE
 04,2000   27  P50S4     05,2061  188  CMENTR04    11,2000   29  CONICS3   15,3420 1288  BEE22     23,2000   31  POWFLIT1
 04,2000   27  VERB37    05,2061  190  CMPG2204    11,2000   29  INTINIT1  15,3431  671  1DPB28    23,2000   31  POWFLIT2
 04,2000   28  C13BANK   05,2063  183  CMCSTA05    11,2000   29  INTVEL    15,3432  663  HIGH1     23,2000   31  P20S2
 04,2000   28  MIDDGIM   05,2063  186  CMREND05    11,2000   29  ORBITAL   16,2000   30  CSIPROG5  23,2000   31  R30LOC
 04,2000   28  P31TAG    05,2072  183  CMCSTA06    11,2000   29  ORBITAL1  16,2000   30  DAPROLL   23,2455  815  300KFT
 04,2000   28  P60S6     05,2072  186  CMREND06    11,2000   29  S52/2     16,2000   30  INTVEL1   23,3526  603  UT166
 04,2007  373  MODROUTB  05,2072  190  CMPG2206    11,3760   34  3/4LOWOP  16,2000   30  LATLONG1  24,2000   31  CSIPROG7
 04,3055  225  FCADRMM1  05,2101  183  CMCSTA07    11,3770 1352  2/3       16,2000   30  P40S1     24,2000   31  P20S5
 04,3124  226  PREMM1    05,2101  186  CMREND07    12,2000   29  CONICS    16,2000   30  P50S2     24,2000   31  P40S
 04,3173  227  EPREMM1   05,2101  188  CMENTR07    12,2000   29  CSI/CDH2  16,2000   30  RTE2      24,2000   31  RTBCODE1
 04,3753   34  LOUNITZ   05,2101  190  CMPG2207    12,2000   29  CSIPROG2  16,2623  733  1SEC2D    24,2000   31  R36CM
 04,3755   34  LOUNITY   05,2107  188  CMENTR09    12,2000   29  E/PROG    16,2625  733  5SECOND   25,2000   31  REENTRY
 04,3757   34  LODPHALF  05,2113  179  NOMDNLST    12,2000   29  N90TAG    16,2657  768  R54       26,2000   31  EPHEM
 04,3757   34  LOUNITX   05,2113  183  CMCSTADL    13,2000   29  E/PROG1   16,3331  963  TVCADDR   26,2000   31  INTPRET1
 04,3757 1206  HALFDP    05,2146  185  CMRENDDL    13,2000   29  INTINIT   17,2000   30  CONICS2   26,2000   31  PLANTIN
 04,3757 1239  DP1/2     05,2211  179  UPDNLIST    13,2000   29  LATLONG   17,2000   30  DAPS4     26,2000   31  P05P06
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

    DEF   PAGE  SYMBOL         DEF   PAGE  SYMBOL         DEF   PAGE  SYMBOL         DEF   PAGE  SYMBOL         DEF   PAGE  SYMBOL

  26,2000   31  P11FOUR     26,3333  938  CSUBT        27,3705 1499  UPCUI        33,2000   33  TESTLEAD   37,2000    33  BODYATT
  26,2000   31  P30S1A      26,3333  938  1RTEB1       30,2000   32  LOWSUPER     33,2223  432  3990DEC    37,2000    33  CDHTAG3
  26,2000   31  P60S        26,3333 1205  DPHALF       30,2000   32  P20S1        34,2000   33  P11ONE     37,2000    33  P20S
  26,2000   31  P60S1       26,3335   34  HI6ZEROS     30,2000   32  P20S6        34,2000   33  P20S3      37,2000    33  RENDEZ
  26,2000   31  P60S2       26,3335  887  3ZEROS       30,2000   32  P29TAG1      34,2000   33  P20S4      37,2000    33  SERVICES
  26,2000   31  P60S3       26,3335 1260  ZEROO        30,2000   32  P40S3        34,2000   33  TOF-FF1    40,2000    34  PINBALL1
  26,2000   31  REENTRY1    26,3335 1386  TFFZEROS     31,2000   32  CDHTAG2      34,3766  938  1RTEB3     40,2000    34  PINSUPER
  26,2000   31  26P50S      26,3343  303  NEARLY1      31,2000   32  CSIPROG9     34,3770  791  ONEB4      40,2212   329  ELRCODE1
  26,2643  806  SERVCAD2    26,3343  887  BARELY1      31,2000   32  MEASINC3     34,3770  887  C1/16      40,3377  1402  DSPMMJOB
  26,3150  889  LATSLOPE    26,3343  889  Q7MIN        31,2000   32  P22S         34,3770  887  1/16TH     40,3636   393  ENDPINS1
  26,3325   34  HIDP1/4     26,3343  938  2RTEB1       31,2000   32  RTE3         34,3770  938  1RTEB4     41,2000    34  PINBALL2
  26,3325  623  DEC182      26,3343 1386  NEARONE      31,2000   32  RT23         35,2000   33  CSI/CDH    41,3001   334  LOADLV1
  26,3325  888  VMIN        27,2000   32  CDHTAG       31,2000   32  R31          35,2000   33  INTINIT2   41,3513   334  NVSUBB
  26,3325  889  FOURTH      27,2000   32  JANESUB      31,2000   32  R34          35,2000   33  P20S8      42,2000    34  EXTVBS
  26,3325  938  1RTEB2      27,2000   32  MANUVER      31,2000   32  V69TAG       35,2000   33  P30S1      42,2000    34  PINBALL3
  26,3325 1386  TFF1/4      27,2000   32  MANUVER1     31,2031   35  STATEST      35,2000   33  RTECON1    42,2000    34  SBAND
  26,3327   34  HIUNITZ     27,2000   32  MGIM         31,3512  562  V05N7022     35,3171  627  R63COMP    42,2000    34  UPDATE3
  26,3327  938  ZERORTE     27,2000   32  P40S5        31,3513  562  V05N7122     35,3573  600  20.48SEC   42,3626  1493  UPPART2
  26,3331   34  HIUNITY     27,2000   32  P50S5        32,2000   32  DELRSPL1     35,3575  939  EPC9RTE    42,3750  1495  UPSTORE
  26,3333   34  HIDPHALF    27,2000   32  R22S1        32,2000   32  IMUCAL3      36,2000   33  MEASINC    43,2000    34  EXTVERBS
  26,3333   34  HIUNITX     27,2000   32  TOF-FF       32,2000   32  P20S9        36,2000   33  MEASINC1   43,2000    34  SELFCHEC
  26,3333   35  THISAXIS    27,2000   32  UPDATE2      32,2000   32  RTE          36,2000   33  P15LOC2    43,2002   389  PINTEST
  26,3333  448  GEOCONS5    27,2000   32  VECPT        33,2000   33  IMUCAL       36,2000   33  P20S7      43,2164   255  OPTCOARV
  26,3333  888  Q19         27,3544 1385  TCDANZIG     33,2000   33  P11TWO       36,2000   33  RTE1       43,2706   271  V74
  26,3333  889  HALVE       27,3556 1496  UPPART3      33,2000   33  P15LOC1      36,2000   33  S3435LOC   43,2735   273  GOSHOSUM
  26,3333  889  1/GMAX
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SUMMARY OF SYMBOL TABLE LISTINGS

             4964  DEFINED NORMALLY

             2465  DEFINED BY EQUALS
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TOTAL:       7429
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MEMORY TYPE & AVAILABILITY DISPLAY

   0000 TO    0057  SPECIAL OR NONEXISTENT MEMORY           23,3776 TO 23,3777  AVAILABLE SWITCHABLE FIXED MEMORY
                                                            24,2000 TO 24,3772  RESERVED SWITCHABLE FIXED MEMORY
              0060  AVAILABLE ERASABLE MEMORY               24,3773 TO 24,3777  AVAILABLE SWITCHABLE FIXED MEMORY
   0061 TO    1377  RESERVED ERASABLE MEMORY                25,2000 TO 25,3773  RESERVED SWITCHABLE FIXED MEMORY
                                                            25,3774 TO 25,3777  AVAILABLE SWITCHABLE FIXED MEMORY
E3,1400 TO E3,1765  RESERVED SWITCHABLE ERASABLE MEMORY     26,2000 TO 26,3775  RESERVED SWITCHABLE FIXED MEMORY
E3,1766 TO E3,1777  AVAILABLE SWITCHABLE ERASABLE MEMORY    26,3776 TO 26,3777  AVAILABLE SWITCHABLE FIXED MEMORY
E4,1400 TO E4,1550  RESERVED SWITCHABLE ERASABLE MEMORY     27,2000 TO 27,3767  RESERVED SWITCHABLE FIXED MEMORY
E4,1551 TO E4,1777  AVAILABLE SWITCHABLE ERASABLE MEMORY    27,3770 TO 27,3777  AVAILABLE SWITCHABLE FIXED MEMORY
E5,1400 TO E5,1657  RESERVED SWITCHABLE ERASABLE MEMORY     30,2000 TO 30,3771  RESERVED SWITCHABLE FIXED MEMORY
E5,1660 TO E5,1777  AVAILABLE SWITCHABLE ERASABLE MEMORY    30,3772 TO 30,3777  AVAILABLE SWITCHABLE FIXED MEMORY
E6,1400 TO E6,1540  RESERVED SWITCHABLE ERASABLE MEMORY     31,2000 TO 31,3772  RESERVED SWITCHABLE FIXED MEMORY
E6,1541 TO E6,1777  AVAILABLE SWITCHABLE ERASABLE MEMORY    31,3773 TO 31,3777  AVAILABLE SWITCHABLE FIXED MEMORY
E7,1400 TO E7,1425  RESERVED SWITCHABLE ERASABLE MEMORY     32,2000 TO 34,3774  RESERVED SWITCHABLE FIXED MEMORY
E7,1426 TO E7,1777  AVAILABLE SWITCHABLE ERASABLE MEMORY    34,3775 TO 34,3777  AVAILABLE SWITCHABLE FIXED MEMORY
                                                            35,2000 TO 35,3772  RESERVED SWITCHABLE FIXED MEMORY
   4000 TO    7730  RESERVED FIXED MEMORY                   35,3773 TO 35,3777  AVAILABLE SWITCHABLE FIXED MEMORY
   7731 TO    7777  AVAILABLE FIXED MEMORY                  36,2000 TO 36,3770  RESERVED SWITCHABLE FIXED MEMORY
                                                            36,3771 TO 36,3777  AVAILABLE SWITCHABLE FIXED MEMORY
00,2000 TO 00,3771  RESERVED SWITCHABLE FIXED MEMORY        37,2000 TO 37,3766  RESERVED SWITCHABLE FIXED MEMORY
00,3772 TO 00,3777  AVAILABLE SWITCHABLE FIXED MEMORY       37,3767 TO 37,3777  AVAILABLE SWITCHABLE FIXED MEMORY
01,2000 TO 01,3753  RESERVED SWITCHABLE FIXED MEMORY        40,2000 TO 41,3560  RESERVED SWITCHABLE FIXED MEMORY
01,3754 TO 01,3777  AVAILABLE SWITCHABLE FIXED MEMORY       41,3561 TO 41,3777  AVAILABLE SWITCHABLE FIXED MEMORY
                                                            42,2000 TO 43,3724  RESERVED SWITCHABLE FIXED MEMORY
02,2000 TO 03,3777  SPECIAL OR NONEXISTENT MEMORY           43,3725 TO 43,3777  AVAILABLE SWITCHABLE FIXED MEMORY

04,2000 TO 05,3776  RESERVED SWITCHABLE FIXED MEMORY        44,2000 TO 57,3777  SPECIAL OR NONEXISTENT MEMORY
           05,3777  AVAILABLE SWITCHABLE FIXED MEMORY
06,2000 TO 11,3774  RESERVED SWITCHABLE FIXED MEMORY        60,2000 TO 67,3777  AVAILABLE SWITCHABLE FIXED MEMORY
11,3775 TO 11,3777  AVAILABLE SWITCHABLE FIXED MEMORY
12,2000 TO 12,3774  RESERVED SWITCHABLE FIXED MEMORY        70,2000 TO 73,3777  SPECIAL OR NONEXISTENT MEMORY
12,3775 TO 12,3777  AVAILABLE SWITCHABLE FIXED MEMORY
13,2000 TO 13,3773  RESERVED SWITCHABLE FIXED MEMORY
13,3774 TO 13,3777  AVAILABLE SWITCHABLE FIXED MEMORY
14,2000 TO 14,3775  RESERVED SWITCHABLE FIXED MEMORY
14,3776 TO 14,3777  AVAILABLE SWITCHABLE FIXED MEMORY
15,2000 TO 17,3774  RESERVED SWITCHABLE FIXED MEMORY
17,3775 TO 17,3777  AVAILABLE SWITCHABLE FIXED MEMORY
20,2000 TO 20,3752  RESERVED SWITCHABLE FIXED MEMORY
20,3753 TO 20,3777  AVAILABLE SWITCHABLE FIXED MEMORY
21,2000 TO 21,3773  RESERVED SWITCHABLE FIXED MEMORY
21,3774 TO 21,3777  AVAILABLE SWITCHABLE FIXED MEMORY
22,2000 TO 22,3775  RESERVED SWITCHABLE FIXED MEMORY
22,3776 TO 22,3777  AVAILABLE SWITCHABLE FIXED MEMORY
23,2000 TO 23,3775  RESERVED SWITCHABLE FIXED MEMORY
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ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL        ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL

             REF    0 LAST      TO   27:      0     0     0     02/WAIT    REF   3 LAST 1233 TO 1234:    10    82  3106
BANKSUM      REF    1 LAST   27 TO  139:     67    67    67     03/ALARM   REF   1 LAST 1487 TO 1488:    16    16  3122
00/DELAY     REF    1 LAST 1481 TO 1483:     31    31    98     03/DAPEN   REF   1 LAST 1065 TO 1065:     6     6  3128
00/INTER     REF    2 LAST 1152 TO 1192:    969   984  1082     03/FCONS   REF   1 LAST 1202 TO 1205:    31    31  3159

01/EXEC      REF    1 LAST 1211 TO 1220:    269   269  1351     03/INTER   REF   2 LAST 1120 TO 1152:   721   926  4085
01/INTER     REF    1 LAST 1192 TO 1200:    157   157  1508     03/WAIT    REF   1 LAST 1225 TO 1226:     3     3  4088
01/RSROU     REF    3 LAST 1415 TO 1417:     49   162  1670     04/CHN13   REF   1 LAST  592 TO  595:    26    26  4114
01/RSTAB     REF    1 LAST  230 TO  238:    225   225  1895     04/ICONS   REF   1 LAST 1206 TO 1207:    19    19  4133

01/R02       REF    1 LAST 1440 TO 1442:     16    16  1911     04/MIDG    REF   1 LAST  495 TO  498:    41    41  4174
01/WAIT      REF    2 LAST 1234 TO 1236:     34   172  2083     04/MNKEY   REF   2 LAST  219 TO  219:    10   202  4376
02/ALARM     REF    2 LAST 1488 TO 1492:     41    70  2153     04/P00     REF   2 LAST  211 TO  212:    20    27  4403
02/BANK      REF    1 LAST 1104 TO 1108:     73    73  2226     04/P3136   REF   1 LAST  653 TO  655:    64    64  4467

02/CFAIL     REF    1 LAST 1485 TO 1486:     13    13  2239     04/P3272   REF   1 LAST  661 TO  667:   120   120  4587
02/CHN13     REF    1 LAST  592 TO  592:      4     4  2243     04/P3373   REF   2 LAST  668 TO  669:    28    83  4670
02/COMST     REF    1 LAST  432 TO  435:     18    18  2261     04/P5153   REF   1 LAST  776 TO  776:    11    11  4681
02/DAPAM     REF    1 LAST 1024 TO 1025:      4     4  2265     04/P79     REF   1 LAST  219 TO  219:    21    21  4702

02/DAPEX     REF    1 LAST 1037 TO 1038:      1     1  2266     04/S61.1   REF   1 LAST  820 TO  821:    18    18  4720
02/DPROG     REF    1 LAST 1096 TO 1096:     13    13  2279     04/V37     REF   4 LAST  224 TO  227:    90   390  5110
02/DSPLA     REF    2 LAST 1485 TO 1485:     18    43  2322     05/CONIC   REF   1 LAST 1291 TO 1292:    29    29  5139
02/EXEC      REF    2 LAST 1220 TO 1223:      6    66  2388     05/CSI     REF   1 LAST  671 TO  671:    21    21  5160

02/EXTVB     REF    1 LAST 1484 TO 1485:      4     4  2392     05/DLIST   REF   1 LAST  179 TO  194:   247   247  5407
02/FCONS     REF    1 LAST 1200 TO 1202:     73    73  2465     05/DPROG   REF   1 LAST 1096 TO 1104:   169   169  5576
02/FLAG      REF    1 LAST 1479 TO 1481:     32    32  2497     05/MASP    REF   1 LAST  956 TO  961:    91    91  5667
02/IMODE     REF    1 LAST 1417 TO 1418:      5     5  2502     05/R41     REF   1 LAST 1330 TO 1331:    16    16  5683

02/INTER     REF    1 LAST 1207 TO 1208:     32    32  2534     05/START   REF   1 LAST  194 TO  206:   447   447  6130
02/KALC      REF    1 LAST  422 TO  423:     21    21  2555     06/CSI     REF   2 LAST  685 TO  685:    17    69  6199
02/PHASE     REF    4 LAST 1410 TO 1411:      4   103  2658     06/ICOMP   REF   1 LAST  308 TO  326:   252   252  6451
02/PIN       REF    6 LAST  384 TO  390:    110   214  2872     06/T4RPT   REF   2 LAST  142 TO  175:   692   702  7153

02/P00       REF    1 LAST  206 TO  206:     17    17  2889     07/CSI     REF   2 LAST  684 TO  685:     8    56  7209
02/P11       REF    1 LAST  551 TO  552:      2     2  2891     07/IMODE   REF   1 LAST 1418 TO 1440:   543   543  7752
02/P30       REF    1 LAST  652 TO  653:     24    24  2915     07/KEYUP   REF   1 LAST 1445 TO 1459:    73    73  7825
02/P3272     REF    1 LAST  669 TO  670:      3     3  2918     07/R52     REF   1 LAST  763 TO  766:    63    63  7888

02/P3474     REF    1 LAST  487 TO  488:      6     6  2924     07/SXTMK   REF   1 LAST  241 TO  249:   288   288  8176
02/RSROU     REF    2 LAST 1414 TO 1415:     10    17  2941     10/CONIC   REF   1 LAST 1302 TO 1303:     8     8  8184
02/RUPTS     REF    1 LAST  139 TO  141:     51    51  2992     10/CSI     REF   1 LAST  680 TO  681:    60    60  8244
02/R22       REF    1 LAST  640 TO  640:      5     5  2997     10/DSPLA   REF   3 LAST 1487 TO 1487:     9   642  8886

02/R40       REF    1 LAST  713 TO  713:      6     6  3003     10/GEOM    REF   1 LAST  301 TO  303:    35    35  8921
02/TRAN      REF    1 LAST 1483 TO 1484:     15    15  3018     10/KALC    REF   1 LAST  422 TO  422:    11    11  8932
02/T4RPT     REF    1 LAST  178 TO  179:      4     4  3022     10/PHASE   REF   2 LAST 1408 TO 1410:    66    74  9006
02/V37       REF    1 LAST  208 TO  208:      2     2  3024     10/SXT     REF   2 LAST  176 TO  177:    28    44  9050
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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971                PAGE 1585

ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL        ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL

10/S62.3     REF   1 LAST  821 TO  826:   33    33  9083        16/RSRT      REF   1 LAST  961 TO  965:   80    80 14723
10/T4RPT     REF   2 LAST  177 TO  178:   76   116  9199        16/R50       REF   1 LAST  769 TO  770:   22    22 14745
11/CONIC     REF   1 LAST 1305 TO 1313:   16    16  9215        16/R51       REF   1 LAST  770 TO  773:   36    36 14781
11/INITV     REF   2 LAST  494 TO  495:   22   167  9382        16/R54       REF   1 LAST  768 TO  769:   41    41 14822

11/INTIN     REF   1 LAST 1320 TO 1320:    7     7  9389        16/S40.1     REF   1 LAST  723 TO  724:   58    58 14880
11/ORBIT     REF   3 LAST 1352 TO 1352:   22   803 10192        16/S40.2     REF   1 LAST  724 TO  725:   15    15 14895
11/S52.2     REF   1 LAST  782 TO  783:   25    25 10217        16/S40.8     REF   1 LAST  725 TO  729:  130   130 15025
12/CONIC     REF   4 LAST 1303 TO 1305:   43   955 11172        16/S40.9     REF   1 LAST  729 TO  732:   92    92 15117

12/CSI       REF   1 LAST  673 TO  673:   23    23 11195        16/S50       REF   1 LAST  767 TO  768:   20    20 15137
12/P07       REF   1 LAST  426 TO  426:    5     5 11200        16/TVCX      REF   1 LAST  951 TO  956:  115   115 15252
12/P3136     REF   1 LAST  657 TO  661:   24    24 11224        16/40.13     REF   1 LAST  732 TO  733:   55    55 15307
12/P3373     REF   1 LAST  668 TO  668:   11    11 11235        17/CONIC     REF   1 LAST 1289 TO 1291:   35    35 15342

13/INTIN     REF   3 LAST 1320 TO 1326:  204   466 11701        17/DAPJS     REF   1 LAST 1038 TO 1060:  549   549 15891
13/LT-LG     REF   1 LAST 1236 TO 1241:  129   129 11830        17/EXTVB     REF   2 LAST  275 TO  275:   15    42 15933
13/ORBIT     REF   1 LAST 1352 TO 1354:   42    42 11872        17/INIT      REF   1 LAST  943 TO  951:  238   238 16171
13/P07       REF   1 LAST  424 TO  426:   27    27 11899        17/R51       REF   1 LAST  778 TO  780:   27    27 16198

13/P24       REF   1 LAST  565 TO  567:   57    57 11956        17/R56       REF   1 LAST  785 TO  786:   46    46 16244
13/P7677     REF   1 LAST  513 TO  517:  115   115 12071        17/T6RPT     REF   1 LAST 1060 TO 1063:   81    81 16325
13/R41       REF   1 LAST 1328 TO 1330:   89    89 12160        17/40.13     REF   1 LAST  733 TO  733:    8     8 16333
13/S50       REF   1 LAST  766 TO  767:   70    70 12230        20/DAPEN     REF   1 LAST 1066 TO 1070:   84    84 16417

14/PICAP     REF   1 LAST  750 TO  754:  125   125 12355        20/DAPS      REF   1 LAST  965 TO  987:  496   496 16913
14/PLNET     REF   1 LAST  786 TO  787:   57    57 12412        20/KALC      REF   2 LAST  423 TO  423:    7    86 16999
14/P5153     REF   2 LAST  776 TO  778:    4   109 12521        20/P15       REF   1 LAST  528 TO  530:   36    36 17035
14/P52       REF   2 LAST  750 TO  750:   14   232 12753        20/P29       REF   1 LAST  460 TO  461:   63    63 17098

14/R50       REF   2 LAST  787 TO  790:   25    68 12821        20/START     REF   1 LAST  223 TO  224:   52    52 17150
14/R51       REF   2 LAST  755 TO  757:   39    93 12914        20/S40.6     REF   1 LAST  718 TO  720:   70    70 17220
14/R52       REF   1 LAST  757 TO  763:  263   263 13177        20/S41.2     REF   1 LAST  720 TO  723:   87    87 17307
14/R53       REF   1 LAST  780 TO  782:   48    48 13225        20/40.14     REF   1 LAST  733 TO  734:   26    26 17333

14/R55       REF   1 LAST  755 TO  755:   22    22 13247        21/DAPAM     REF   2 LAST 1025 TO 1036:  285   319 17652
14/STARS     REF   1 LAST  640 TO  640:    2     2 13249        21/DAPMS     REF   1 LAST  997 TO 1000:   35    35 17687
15/CDH       REF   1 LAST  687 TO  688:   11    11 13260        21/DAPRC     REF   1 LAST 1000 TO 1024:  615   615 18302
15/CONIC     REF   1 LAST 1288 TO 1289:   29    29 13289        21/P11       REF   1 LAST  550 TO  551:   26    26 18328

15/CRS61     REF   1 LAST  602 TO  603:   40    40 13329        21/RCSUP     REF   1 LAST  734 TO  735:   22    22 18350
15/DAPEN     REF   3 LAST 1070 TO 1096:  653   719 14048        22/CSI       REF   2 LAST  685 TO  686:    8   106 18456
15/STARS     REF   1 LAST 1387 TO 1393:  223   223 14271        22/DAPEX     REF   1 LAST 1036 TO 1037:   33    33 18489
16/CSI       REF   1 LAST  677 TO  678:   43    43 14314        22/KALC      REF   6 LAST  423 TO  424:    7   634 19123

16/INITV     REF   1 LAST  493 TO  494:   10    10 14324        22/PERAP     REF   1 LAST  498 TO  504:   98    98 19221
16/LT-LG     REF   1 LAST 1241 TO 1243:   30    30 14354        22/P3136     REF   1 LAST  655 TO  657:   42    42 19263
16/P37       REF   1 LAST  919 TO  920:   13    13 14367        22/RTB       REF   1 LAST 1501 TO 1501:  106   106 19369
16/ROLL      REF   1 LAST  987 TO  997:  276   276 14643        23/CSI       REF   1 LAST  675 TO  677:   59    59 19428
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ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL        ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL

23/GEOM      REF   2 LAST  303 TO  308:   107    216 19644      27/INTIN     REF   1 LAST 1331 TO 1332:    47     47 23611
23/INCOR     REF   1 LAST  574 TO  577:    42     42 19686      27/MIDG      REF   1 LAST  495 TO  495:    12     12 23623
23/INFLT     REF   1 LAST 1354 TO 1364:   184    184 19870      27/MNKEY     REF   1 LAST  219 TO  221:    60     60 23683
23/POWFL     REF   2 LAST 1370 TO 1374:    24    163 20033      27/P27       REF   1 LAST 1496 TO 1501:   144    144 23827

23/R22       REF   1 LAST  586 TO  587:    75     75 20108      27/R22       REF   2 LAST  589 TO  592:    66    112 23939
23/R30       REF   1 LAST  517 TO  524:   216    216 20324      27/R60       REF   1 LAST  394 TO  398:    89     89 24028
23/R63       REF   1 LAST  623 TO  626:     2      2 20326      27/R62       REF   1 LAST  402 TO  403:    11     11 24039
23/SR30S     REF   1 LAST  524 TO  527:    62     62 20388      27/S41.1     REF   1 LAST  720 TO  720:    16     16 24055

24/CSI       REF   1 LAST  679 TO  680:    57     57 20445      27/S61.2     REF   1 LAST  819 TO  820:    16     16 24071
24/P40       REF   4 LAST  713 TO  716:    42    440 20885      27/TFF       REF   1 LAST 1374 TO 1386:   252    252 24323
24/P41       REF   1 LAST  737 TO  740:    63     63 20948      27/VECPT     REF   2 LAST  400 TO  402:    13    130 24453
24/P47       REF   1 LAST  740 TO  743:    55     55 21003      30/P22       REF   3 LAST  619 TO  623:   181    804 25257

24/RTB       REF   1 LAST 1501 TO 1501:    15     15 21018      30/P29       REF   2 LAST  461 TO  466:    25    107 25364
24/R22       REF   1 LAST  587 TO  588:    15     15 21033      30/P40       REF   1 LAST  716 TO  718:    79     79 25443
24/R36       REF   1 LAST  504 TO  507:    68     68 21101      30/R22       REF   1 LAST  583 TO  584:    25     25 25468
24/R40       REF   3 LAST  713 TO  713:    16    139 21240      31/CDH       REF   1 LAST  686 TO  687:    14     14 25482

24/S40.1     REF   1 LAST  694 TO  696:    56     56 21296      31/CSI       REF   1 LAST  681 TO  683:    41     41 25523
24/S40.2     REF   1 LAST  696 TO  698:    75     75 21371      31/INCOR     REF   1 LAST 1260 TO 1277:    51     51 25574
24/S40.8     REF   1 LAST  706 TO  706:    33     33 21404      31/P22       REF   1 LAST  618 TO  619:    31     31 25605
25/ENTRY     REF   2 LAST  861 TO  887:   841   1017 22421      31/P23       REF   1 LAST  628 TO  640:   569    569 26174

26/ENTRY     REF   2 LAST  887 TO  890:   109    150 22571      31/P37       REF   1 LAST  922 TO  923:    49     49 26223
26/EPHEM     REF   1 LAST  790 TO  792:    62     62 22633      31/R3134     REF   2 LAST  512 TO  513:    17    224 26447
26/ICONS     REF   1 LAST 1205 TO 1206:    16     16 22649      31/R63       REF   1 LAST  626 TO  628:    37     37 26484
26/LUROT     REF   1 LAST 1243 TO 1252:   199    199 22848      32/COMST     REF   1 LAST  431 TO  431:    15     15 26499

26/P05       REF   1 LAST 1443 TO 1445:    30     30 22878      32/P22       REF   1 LAST  623 TO  623:     8      8 26507
26/P06       REF   1 LAST 1442 TO 1443:    49     49 22927      32/P30       REF   2 LAST  649 TO  652:    49    163 26670
26/P11       REF   1 LAST  550 TO  550:    17     17 22944      32/P37       REF   3 LAST  923 TO  938:   443    835 27505
26/P30       REF   1 LAST  646 TO  647:    15     15 22959      33/COMST     REF   4 LAST  440 TO  443:   159    310 27815

26/P61       REF   1 LAST  792 TO  795:    49     49 23008      33/P01       REF   1 LAST  443 TO  445:    49     49 27864
26/P62       REF   1 LAST  795 TO  798:    57     57 23065      33/P02       REF   3 LAST  452 TO  452:     5    296 28160
26/P63       REF   1 LAST  798 TO  800:    20     20 23085      33/P03       REF   4 LAST  452 TO  452:    18    158 28318
26/P64       REF   1 LAST  800 TO  801:     6      6 23091      33/P11       REF   1 LAST  544 TO  545:    68     68 28386

26/P65       REF   1 LAST  801 TO  803:    27     27 23118      33/P15       REF   2 LAST  530 TO  532:    90    141 28527
26/P66       REF   1 LAST  803 TO  804:     4      4 23122      34/CRS61     REF   1 LAST  595 TO  600:   212    212 28739
26/P67       REF   2 LAST  804 TO  807:    29     39 23161      34/P11       REF   2 LAST  545 TO  550:   138    405 29144
26/R52       REF   1 LAST  783 TO  785:    62     62 23223      34/R22       REF   5 LAST  589 TO  589:    20    389 29533

26/S61.1     REF   1 LAST  807 TO  812:    68     68 23291      34/TFF       REF   1 LAST 1386 TO 1387:    12     12 29545
26/S61.2     REF   1 LAST  812 TO  819:   149    149 23440      35/CRS61     REF   3 LAST  605 TO  607:    96    171 29716
27/CDH       REF   1 LAST  686 TO  693:    94     94 23534      35/CSI       REF   1 LAST  671 TO  672:    10     10 29726
27/CRS61     REF   1 LAST  607 TO  609:    30     30 23564      35/INTIN     REF   1 LAST 1326 TO 1328:    57     57 29783
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ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL        ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL

35/P30       REF   1 LAST  644 TO  646:    81     81 29864      37/R57       REF   1 LAST  567 TO  569:    60     60 32100
35/P3474     REF   3 LAST  488 TO  490:    14    389 30253      37/R61       REF   1 LAST  571 TO  574:    58     58 32158
35/P3575     REF   1 LAST  472 TO  478:   235    235 30488      37/SERV      REF   2 LAST  832 TO  852:   252    381 32539
35/P37       REF   2 LAST  939 TO  940:    14     70 30553      40/EXTVB     REF   1 LAST  640 TO  644:    95     95 32634

35/P40       REF   1 LAST  735 TO  737:     3      3 30561      40/PIN       REF  10 LAST  392 TO  394:    51    926 33560 —
36/INCOR     REF   2 LAST 1256 TO 1260:   138    326 30887      41/PIN       REF   7 LAST  379 TO  380:    56    878 34438 —
36/P15       REF   1 LAST  532 TO  536:     4      4 30891      42/NOUNS     REF   1 LAST  282 TO  297:   561    561 34999
36/P20       REF   1 LAST  552 TO  561:   304    304 31195      42/PIN       REF   2 LAST  362 TO  364:    83    229 35228

36/P3474     REF   1 LAST  478 TO  479:    10     10 31205      42/P27       REF   1 LAST 1493 TO 1496:   103    103 35331
36/P37       REF   1 LAST  897 TO  906:   370    370 31575      42/R03       REF   1 LAST  265 TO  266:    46     46 35377
37/CDH       REF   1 LAST  683 TO  684:    23     23 31598      42/R05       REF   1 LAST  940 TO  943:    82     82 35459
37/CMBAT     REF   1 LAST  890 TO  897:   192    192 31790      43/EXTVB     REF   8 LAST  452 TO  456:    28    593 36052

37/CRS61     REF   2 LAST  603 TO  605:    45     74 31864      43/FLAG      REF   1 LAST  278 TO  279:    13     13 36065
37/CSI       REF   1 LAST  670 TO  671:    17     17 31881      43/P27       REF   1 LAST 1492 TO 1493:    36     36 36101
37/P21       REF   1 LAST  456 TO  458:   119    119 32000      43/R33       REF   1 LAST  258 TO  258:    24     24 36125
37/R23       REF   1 LAST  569 TO  571:    40     40 32040      43/SELF      REF   1 LAST 1393 TO 1402:   312    312 36437
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PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

    4000  TO     4377     PARAGRAPH # 010        ROPE MODULE 1, SIDE A, SENSE LINE SET  5 (WIRES  65- 80)
    4400  TO     4777     PARAGRAPH # 011        ROPE MODULE 1, SIDE B, SENSE LINE SET  5 (WIRES  65- 80)
    5000  TO     5377     PARAGRAPH # 012        ROPE MODULE 1, SIDE A, SENSE LINE SET  6 (WIRES  81- 96)
    5400  TO     5777     PARAGRAPH # 013        ROPE MODULE 1, SIDE B, SENSE LINE SET  6 (WIRES  81- 96)
    6000  TO     6377     PARAGRAPH # 014        ROPE MODULE 1, SIDE A, SENSE LINE SET  7 (WIRES  97-112)
    6400  TO     6777     PARAGRAPH # 015        ROPE MODULE 1, SIDE B, SENSE LINE SET  7 (WIRES  97-112)
    7000  TO     7377     PARAGRAPH # 016        ROPE MODULE 1, SIDE A, SENSE LINE SET  8 (WIRES 113-128)
    7400  TO     7777     PARAGRAPH # 017        ROPE MODULE 1, SIDE B, SENSE LINE SET  8 (WIRES 113-128)
 00,2000  TO 00,2377     PARAGRAPH # 020        ROPE MODULE 1, SIDE A, SENSE LINE SET  1 (WIRES   1- 16)
 00,2400  TO 00,2777     PARAGRAPH # 021        ROPE MODULE 1, SIDE B, SENSE LINE SET  1 (WIRES   1- 16)
 00,3000  TO 00,3377     PARAGRAPH # 022        ROPE MODULE 1, SIDE A, SENSE LINE SET  2 (WIRES  17- 32)
 00,3400  TO 00,3777     PARAGRAPH # 023        ROPE MODULE 1, SIDE B, SENSE LINE SET  2 (WIRES  17- 32)
 01,2000  TO 01,2377     PARAGRAPH # 024        ROPE MODULE 1, SIDE A, SENSE LINE SET  3 (WIRES  33- 48)
 01,2400  TO 01,2777     PARAGRAPH # 025        ROPE MODULE 1, SIDE B, SENSE LINE SET  3 (WIRES  33- 48)
 01,3000  TO 01,3377     PARAGRAPH # 026        ROPE MODULE 1, SIDE A, SENSE LINE SET  4 (WIRES  49- 64)
 01,3400  TO 01,3777     PARAGRAPH # 027        ROPE MODULE 1, SIDE B, SENSE LINE SET  4 (WIRES  49- 64)

 04,2000  TO 04,2377     PARAGRAPH # 040        ROPE MODULE 1, SIDE A, SENSE LINE SET  9 (WIRES 129-144)
 04,2400  TO 04,2777     PARAGRAPH # 041        ROPE MODULE 1, SIDE B, SENSE LINE SET  9 (WIRES 129-144)
 04,3000  TO 04,3377     PARAGRAPH # 042        ROPE MODULE 1, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
 04,3400  TO 04,3777     PARAGRAPH # 043        ROPE MODULE 1, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
 05,2000  TO 05,2377     PARAGRAPH # 044        ROPE MODULE 1, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
 05,2400  TO 05,2777     PARAGRAPH # 045        ROPE MODULE 1, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
 05,3000  TO 05,3377     PARAGRAPH # 046        ROPE MODULE 1, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
 05,3400  TO 05,3777     PARAGRAPH # 047        ROPE MODULE 1, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
 06,2000  TO 06,2377     PARAGRAPH # 050        ROPE MODULE 2, SIDE A, SENSE LINE SET  1 (WIRES   1- 16)
 06,2400  TO 06,2777     PARAGRAPH # 051        ROPE MODULE 2, SIDE B, SENSE LINE SET  1 (WIRES   1- 16)
 06,3000  TO 06,3377     PARAGRAPH # 052        ROPE MODULE 2, SIDE A, SENSE LINE SET  2 (WIRES  17- 32)
 06,3400  TO 06,3777     PARAGRAPH # 053        ROPE MODULE 2, SIDE B, SENSE LINE SET  2 (WIRES  17- 32)
 07,2000  TO 07,2377     PARAGRAPH # 054        ROPE MODULE 2, SIDE A, SENSE LINE SET  3 (WIRES  33- 48)
 07,2400  TO 07,2777     PARAGRAPH # 055        ROPE MODULE 2, SIDE B, SENSE LINE SET  3 (WIRES  33- 48)
 07,3000  TO 07,3377     PARAGRAPH # 056        ROPE MODULE 2, SIDE A, SENSE LINE SET  4 (WIRES  49- 64)
 07,3400  TO 07,3777     PARAGRAPH # 057        ROPE MODULE 2, SIDE B, SENSE LINE SET  4 (WIRES  49- 64)
 10,2000  TO 10,2377     PARAGRAPH # 060        ROPE MODULE 2, SIDE A, SENSE LINE SET  5 (WIRES  65- 80)
 10,2400  TO 10,2777     PARAGRAPH # 061        ROPE MODULE 2, SIDE B, SENSE LINE SET  5 (WIRES  65- 80)
 10,3000  TO 10,3377     PARAGRAPH # 062        ROPE MODULE 2, SIDE A, SENSE LINE SET  6 (WIRES  81- 96)
 10,3400  TO 10,3777     PARAGRAPH # 063        ROPE MODULE 2, SIDE B, SENSE LINE SET  6 (WIRES  81- 96)
 11,2000  TO 11,2377     PARAGRAPH # 064        ROPE MODULE 2, SIDE A, SENSE LINE SET  7 (WIRES  97-112)
 11,2400  TO 11,2777     PARAGRAPH # 065        ROPE MODULE 2, SIDE B, SENSE LINE SET  7 (WIRES  97-112)
 11,3000  TO 11,3377     PARAGRAPH # 066        ROPE MODULE 2, SIDE A, SENSE LINE SET  8 (WIRES 113-128)
 11,3400  TO 11,3777     PARAGRAPH # 067        ROPE MODULE 2, SIDE B, SENSE LINE SET  8 (WIRES 113-128)
 12,2000  TO 12,2377     PARAGRAPH # 070        ROPE MODULE 2, SIDE A, SENSE LINE SET  9 (WIRES 129-144)
 12,2400  TO 12,2777     PARAGRAPH # 071        ROPE MODULE 2, SIDE B, SENSE LINE SET  9 (WIRES 129-144)
 12,3000  TO 12,3377     PARAGRAPH # 072        ROPE MODULE 2, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
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PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

12,3400  TO 12,3777      PARAGRAPH # 073        ROPE MODULE 2, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
13,2000  TO 13,2377      PARAGRAPH # 074        ROPE MODULE 2, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
13,2400  TO 13,2777      PARAGRAPH # 075        ROPE MODULE 2, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
13,3000  TO 13,3377      PARAGRAPH # 076        ROPE MODULE 2, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
13,3400  TO 13,3777      PARAGRAPH # 077        ROPE MODULE 2, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
14,2000  TO 14,2377      PARAGRAPH # 100        ROPE MODULE 3, SIDE A, SENSE LINE SET  1 (WIRES   1- 16)
14,2400  TO 14,2777      PARAGRAPH # 101        ROPE MODULE 3, SIDE B, SENSE LINE SET  1 (WIRES   1- 16)
14,3000  TO 14,3377      PARAGRAPH # 102        ROPE MODULE 3, SIDE A, SENSE LINE SET  2 (WIRES  17- 32)
14,3400  TO 14,3777      PARAGRAPH # 103        ROPE MODULE 3, SIDE B, SENSE LINE SET  2 (WIRES  17- 32)
15,2000  TO 15,2377      PARAGRAPH # 104        ROPE MODULE 3, SIDE A, SENSE LINE SET  3 (WIRES  33- 48)
15,2400  TO 15,2777      PARAGRAPH # 105        ROPE MODULE 3, SIDE B, SENSE LINE SET  3 (WIRES  33- 48)
15,3000  TO 15,3377      PARAGRAPH # 106        ROPE MODULE 3, SIDE A, SENSE LINE SET  4 (WIRES  49- 64)
15,3400  TO 15,3777      PARAGRAPH # 107        ROPE MODULE 3, SIDE B, SENSE LINE SET  4 (WIRES  49- 64)
16,2000  TO 16,2377      PARAGRAPH # 110        ROPE MODULE 3, SIDE A, SENSE LINE SET  5 (WIRES  65- 80)
16,2400  TO 16,2777      PARAGRAPH # 111        ROPE MODULE 3, SIDE B, SENSE LINE SET  5 (WIRES  65- 80)
16,3000  TO 16,3377      PARAGRAPH # 112        ROPE MODULE 3, SIDE A, SENSE LINE SET  6 (WIRES  81- 96)
16,3400  TO 16,3777      PARAGRAPH # 113        ROPE MODULE 3, SIDE B, SENSE LINE SET  6 (WIRES  81- 96)
17,2000  TO 17,2377      PARAGRAPH # 114        ROPE MODULE 3, SIDE A, SENSE LINE SET  7 (WIRES  97-112)
17,2400  TO 17,2777      PARAGRAPH # 115        ROPE MODULE 3, SIDE B, SENSE LINE SET  7 (WIRES  97-112)
17,3000  TO 17,3377      PARAGRAPH # 116        ROPE MODULE 3, SIDE A, SENSE LINE SET  8 (WIRES 113-128)
17,3400  TO 17,3777      PARAGRAPH # 117        ROPE MODULE 3, SIDE B, SENSE LINE SET  8 (WIRES 113-128)
20,2000  TO 20,2377      PARAGRAPH # 120        ROPE MODULE 3, SIDE A, SENSE LINE SET  9 (WIRES 129-144)
20,2400  TO 20,2777      PARAGRAPH # 121        ROPE MODULE 3, SIDE B, SENSE LINE SET  9 (WIRES 129-144)
20,3000  TO 20,3377      PARAGRAPH # 122        ROPE MODULE 3, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
20,3400  TO 20,3777      PARAGRAPH # 123        ROPE MODULE 3, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
21,2000  TO 21,2377      PARAGRAPH # 124        ROPE MODULE 3, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
21,2400  TO 21,2777      PARAGRAPH # 125        ROPE MODULE 3, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
21,3000  TO 21,3377      PARAGRAPH # 126        ROPE MODULE 3, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
21,3400  TO 21,3777      PARAGRAPH # 127        ROPE MODULE 3, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
22,2000  TO 22,2377      PARAGRAPH # 130        ROPE MODULE 4, SIDE A, SENSE LINE SET  1 (WIRES   1- 16)
22,2400  TO 22,2777      PARAGRAPH # 131        ROPE MODULE 4, SIDE B, SENSE LINE SET  1 (WIRES   1- 16)
22,3000  TO 22,3377      PARAGRAPH # 132        ROPE MODULE 4, SIDE A, SENSE LINE SET  2 (WIRES  17- 32)
22,3400  TO 22,3777      PARAGRAPH # 133        ROPE MODULE 4, SIDE B, SENSE LINE SET  2 (WIRES  17- 32)
23,2000  TO 23,2377      PARAGRAPH # 134        ROPE MODULE 4, SIDE A, SENSE LINE SET  3 (WIRES  33- 48)
23,2400  TO 23,2777      PARAGRAPH # 135        ROPE MODULE 4, SIDE B, SENSE LINE SET  3 (WIRES  33- 48)
23,3000  TO 23,3377      PARAGRAPH # 136        ROPE MODULE 4, SIDE A, SENSE LINE SET  4 (WIRES  49- 64)
23,3400  TO 23,3777      PARAGRAPH # 137        ROPE MODULE 4, SIDE B, SENSE LINE SET  4 (WIRES  49- 64)
24,2000  TO 24,2377      PARAGRAPH # 140        ROPE MODULE 4, SIDE A, SENSE LINE SET  5 (WIRES  65- 80)
24,2400  TO 24,2777      PARAGRAPH # 141        ROPE MODULE 4, SIDE B, SENSE LINE SET  5 (WIRES  65- 80)
24,3000  TO 24,3377      PARAGRAPH # 142        ROPE MODULE 4, SIDE A, SENSE LINE SET  6 (WIRES  81- 96)
24,3400  TO 24,3777      PARAGRAPH # 143        ROPE MODULE 4, SIDE B, SENSE LINE SET  6 (WIRES  81- 96)
25,2000  TO 25,2377      PARAGRAPH # 144        ROPE MODULE 4, SIDE A, SENSE LINE SET  7 (WIRES  97-112)
25,2400  TO 25,2777      PARAGRAPH # 145        ROPE MODULE 4, SIDE B, SENSE LINE SET  7 (WIRES  97-112)
25,3000  TO 25,3377      PARAGRAPH # 146        ROPE MODULE 4, SIDE A, SENSE LINE SET  8 (WIRES 113-128)
25,3400  TO 25,3777      PARAGRAPH # 147        ROPE MODULE 4, SIDE B, SENSE LINE SET  8 (WIRES 113-128)
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PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

26,2000   TO 26,2377      PARAGRAPH # 150        ROPE MODULE 4, SIDE A, SENSE LINE SET  9 (WIRES 129-144)
26,2400   TO 26,2777      PARAGRAPH # 151        ROPE MODULE 4, SIDE B, SENSE LINE SET  9 (WIRES 129-144)
26,3000   TO 26,3377      PARAGRAPH # 152        ROPE MODULE 4, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
26,3400   TO 26,3777      PARAGRAPH # 153        ROPE MODULE 4, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
27,2000   TO 27,2377      PARAGRAPH # 154        ROPE MODULE 4, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
27,2400   TO 27,2777      PARAGRAPH # 155        ROPE MODULE 4, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
27,3000   TO 27,3377      PARAGRAPH # 156        ROPE MODULE 4, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
27,3400   TO 27,3777      PARAGRAPH # 157        ROPE MODULE 4, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
30,2000   TO 30,2377      PARAGRAPH # 160        ROPE MODULE 5, SIDE A, SENSE LINE SET  1 (WIRES   1- 16)
30,2400   TO 30,2777      PARAGRAPH # 161        ROPE MODULE 5, SIDE B, SENSE LINE SET  1 (WIRES   1- 16)
30,3000   TO 30,3377      PARAGRAPH # 162        ROPE MODULE 5, SIDE A, SENSE LINE SET  2 (WIRES  17- 32)
30,3400   TO 30,3777      PARAGRAPH # 163        ROPE MODULE 5, SIDE B, SENSE LINE SET  2 (WIRES  17- 32)
31,2000   TO 31,2377      PARAGRAPH # 164        ROPE MODULE 5, SIDE A, SENSE LINE SET  3 (WIRES  33- 48)
31,2400   TO 31,2777      PARAGRAPH # 165        ROPE MODULE 5, SIDE B, SENSE LINE SET  3 (WIRES  33- 48)
31,3000   TO 31,3377      PARAGRAPH # 166        ROPE MODULE 5, SIDE A, SENSE LINE SET  4 (WIRES  49- 64)
31,3400   TO 31,3777      PARAGRAPH # 167        ROPE MODULE 5, SIDE B, SENSE LINE SET  4 (WIRES  49- 64)
32,2000   TO 32,2377      PARAGRAPH # 170        ROPE MODULE 5, SIDE A, SENSE LINE SET  5 (WIRES  65- 80)
32,2400   TO 32,2777      PARAGRAPH # 171        ROPE MODULE 5, SIDE B, SENSE LINE SET  5 (WIRES  65- 80)
32,3000   TO 32,3377      PARAGRAPH # 172        ROPE MODULE 5, SIDE A, SENSE LINE SET  6 (WIRES  81- 96)
32,3400   TO 32,3777      PARAGRAPH # 173        ROPE MODULE 5, SIDE B, SENSE LINE SET  6 (WIRES  81- 96)
33,2000   TO 33,2377      PARAGRAPH # 174        ROPE MODULE 5, SIDE A, SENSE LINE SET  7 (WIRES  97-112)
33,2400   TO 33,2777      PARAGRAPH # 175        ROPE MODULE 5, SIDE B, SENSE LINE SET  7 (WIRES  97-112)
33,3000   TO 33,3377      PARAGRAPH # 176        ROPE MODULE 5, SIDE A, SENSE LINE SET  8 (WIRES 113-128)
33,3400   TO 33,3777      PARAGRAPH # 177        ROPE MODULE 5, SIDE B, SENSE LINE SET  8 (WIRES 113-128)
34,2000   TO 34,2377      PARAGRAPH # 200        ROPE MODULE 5, SIDE A, SENSE LINE SET  9 (WIRES 129-144)
34,2400   TO 34,2777      PARAGRAPH # 201        ROPE MODULE 5, SIDE B, SENSE LINE SET  9 (WIRES 129-144)
34,3000   TO 34,3377      PARAGRAPH # 202        ROPE MODULE 5, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
34,3400   TO 34,3777      PARAGRAPH # 203        ROPE MODULE 5, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
35,2000   TO 35,2377      PARAGRAPH # 204        ROPE MODULE 5, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
35,2400   TO 35,2777      PARAGRAPH # 205        ROPE MODULE 5, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
35,3000   TO 35,3377      PARAGRAPH # 206        ROPE MODULE 5, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
35,3400   TO 35,3777      PARAGRAPH # 207        ROPE MODULE 5, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
36,2000   TO 36,2377      PARAGRAPH # 210        ROPE MODULE 6, SIDE A, SENSE LINE SET  1 (WIRES   1- 16)
36,2400   TO 36,2777      PARAGRAPH # 211        ROPE MODULE 6, SIDE B, SENSE LINE SET  1 (WIRES   1- 16)
36,3000   TO 36,3377      PARAGRAPH # 212        ROPE MODULE 6, SIDE A, SENSE LINE SET  2 (WIRES  17- 32)
36,3400   TO 36,3777      PARAGRAPH # 213        ROPE MODULE 6, SIDE B, SENSE LINE SET  2 (WIRES  17- 32)
37,2000   TO 37,2377      PARAGRAPH # 214        ROPE MODULE 6, SIDE A, SENSE LINE SET  3 (WIRES  33- 48)
37,2400   TO 37,2777      PARAGRAPH # 215        ROPE MODULE 6, SIDE B, SENSE LINE SET  3 (WIRES  33- 48)
37,3000   TO 37,3377      PARAGRAPH # 216        ROPE MODULE 6, SIDE A, SENSE LINE SET  4 (WIRES  49- 64)
37,3400   TO 37,3777      PARAGRAPH # 217        ROPE MODULE 6, SIDE B, SENSE LINE SET  4 (WIRES  49- 64)
40,2000   TO 40,2377      PARAGRAPH # 220        ROPE MODULE 6, SIDE A, SENSE LINE SET  5 (WIRES  65- 80)
40,2400   TO 40,2777      PARAGRAPH # 221        ROPE MODULE 6, SIDE B, SENSE LINE SET  5 (WIRES  65- 80)
40,3000   TO 40,3377      PARAGRAPH # 222        ROPE MODULE 6, SIDE A, SENSE LINE SET  6 (WIRES  81- 96)
40,3400   TO 40,3777      PARAGRAPH # 223        ROPE MODULE 6, SIDE B, SENSE LINE SET  6 (WIRES  81- 96)
41,2000   TO 41,2377      PARAGRAPH # 224        ROPE MODULE 6, SIDE A, SENSE LINE SET  7 (WIRES  97-112)
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PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

41,2400  TO 41,2777      PARAGRAPH # 225         ROPE MODULE 6, SIDE B, SENSE LINE SET  7 (WIRES  97-112)
41,3000  TO 41,3377      PARAGRAPH # 226         ROPE MODULE 6, SIDE A, SENSE LINE SET  8 (WIRES 113-128)
41,3400  TO 41,3777      PARAGRAPH # 227         ROPE MODULE 6, SIDE B, SENSE LINE SET  8 (WIRES 113-128)
42,2000  TO 42,2377      PARAGRAPH # 230         ROPE MODULE 6, SIDE A, SENSE LINE SET  9 (WIRES 129-144)
42,2400  TO 42,2777      PARAGRAPH # 231         ROPE MODULE 6, SIDE B, SENSE LINE SET  9 (WIRES 129-144)
42,3000  TO 42,3377      PARAGRAPH # 232         ROPE MODULE 6, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
42,3400  TO 42,3777      PARAGRAPH # 233         ROPE MODULE 6, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
43,2000  TO 43,2377      PARAGRAPH # 234         ROPE MODULE 6, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
43,2400  TO 43,2777      PARAGRAPH # 235         ROPE MODULE 6, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
43,3000  TO 43,3377      PARAGRAPH # 236         ROPE MODULE 6, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
43,3400  TO 43,3777      PARAGRAPH # 237         ROPE MODULE 6, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
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OCTAL LISTING FOR PARAGRAPH # 010, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

 4000        00004 0     34051 1     56006 1     12563 1     52011 0     00006 1     30111 0     52006 0
 4010        52011 0     40030 0     65011 1     14056 1     52011 0     35254 1     56006 1     13362 1
 4020        52011 0     34054 1     56006 1     12000 1     52011 0     34052 1     56006 1     13666 0
 4030        52011 0     34052 1     56006 1     12105 0     52011 0     34052 1     56006 1     13710 0

 4040        52011 0     34051 1     56006 1     14621 1     52011 0     34053 0     56006 1     12536 1
 4050        50017 1  C: 12063 1  C: 16067 1  C: 56067 0  C: 14062 0  C: 04060 0     00006 1     65327 1
 4060        00006 1     30113 1     52006 0  C: 04025 1  C: 10003 0  C: 14031 0  C: 20033 0  C: 24017 1
 4070     C: 30036 1  C: 34034 1  C: 40023 1  C: 44035 1  C: 50037 0  C: 54000 0  C: 60000 1     44761 1

 4100        00006 1     03012 1     00002 0     05561 0  C: 00236 0     05402 1  C: 05024 1  C: 13000 0
 4110        04655 0  C: 10000 0     34762 0     70106 1     00006 1     16711 1     05402 1  C: 05024 1
 4120     C: 13000 0     34754 0     56004 0     01012 0  C: 00024 1  C: 00031 0     00004 0     54001 1
 4130        50002 0     30000 1     24002 0     60000 1     54061 1     10001 1     14145 1     14145 1

 4140        24000 1     54001 1     40025 1     50061 0     55255 0     40001 1     50061 0     53154 1
 4150        15642 0     34171 1     71225 1     00006 1     14156 0     04157 0     31223 0     54023 1
 4160        30023 0     04636 0  C: 62336 0     34772 1     55216 1     31225 0     04264 0     04170 0
 4170        05205 0  C: 37600 0  C: 00034 0     04362 1     41244 0     55216 1     04636 0  C: 62336 0

 4200        04655 0  C: 62000 0     22007 0     54123 0     23242 1     22002 0     04226 0     23242 1
 4210        23225 0     04235 1     34223 0     56006 1     00006 1     04007 1     55243 1     34223 0
 4220        00006 1     01007 1     03513 0  C: 62102 0     53243 1     05214 0     34753 1     71224 0
 4230        61215 0     10000 0     00001 0     24001 0     00002 0     34752 0     55224 0     00002 0

 4240        11245 1     04245 0     11246 1     04245 0     00002 0     05726 1  C: 21206 0     34223 0
 4250        00006 1     01007 1     34260 1     55216 1     55204 1     04261 0     04655 0  C: 61307 1
 4260     C: 00042 1     44351 0     55202 1     00002 0     74774 0     54123 0     22002 0     04226 0
 4270        10123 0     14273 1     00001 0     34304 1     56006 1     00006 1     04007 1     52131 0

 4300        34223 0     00006 1     01007 1     03351 0  C: 60102 1     55222 0     54003 0     74350 1
 4310        65024 1     54145 0     00002 0     31222 1     14306 1     54003 0     74350 1     65024 1
 4320        00002 0  C: 00016 0  C: 00011 1  C: 00004 0     54020 1     40020 1     40020 1     40020 1
 4330        40020 1     56020 0     00002 0     54022 0     40022 0     40022 0     40022 0     40022 0

 4340        56022 1     00002 0  C: 00037 0  C: 01740 0  C: 76000 0     05135 0  C: 30000 1  C: 03777 0
 4350     C: 00377 1  C: 00023 0  C: 00021 1  C: 00025 0  C: 00026 0  C: 00012 1     34764 0     14363 1
 4360        34763 1     14363 1     34762 0     00006 1     05011 1     00002 0     00006 1     30025 0
 4370        52014 0     00002 0     00006 1     30156 0     20156 1     60154 1     26154 0     54007 1
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OCTAL LISTING FOR PARAGRAPH # 011, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

 4400        00002 0     54162 0     00002 0     54135 1     10000 0     30135 0     17257 1     14405 0
 4410        44772 0     54154 0     54155 1     54156 1     00002 0     44766 0     14420 1     44765 0
 4420        00006 1     03011 1     00002 0     50000 1     34063 0     74342 1     54124 1     31202 0
 4430        54143 0     00002 0     56002 0     54144 1     44753 0     00004 0     71224 0     55224 0

 4440        11246 1     04443 0     04446 0     34772 1     57246 0     05167 1     00003 1     44764 1
 4450        00006 1     03011 1     34772 1     55215 1     00144 0     56002 0     54144 1     11246 1
 4460        04462 0     04446 0     14452 1     34772 1     55575 0     55576 0     55525 0     55526 0
 4470        55564 0     44752 1     71501 0     55501 0     34772 1     55577 1     55600 1     55601 0

 4500        55602 0     55527 1     55530 1     55531 0     55532 0     55565 1     55566 1     00002 0
 4510        00004 0     00006 1     00004 0     54001 1     00006 1     06004 0     00006 1     14523 0
 4520        00006 1     00004 0     54001 1     44750 0     60001 0     00006 1     14511 1     00006 1
 4530        00003 1     00002 0  C: 01445 0  C: 01467 0  C: 01472 1  C: 01521 0  C: 04055 0  C: 01006 0

 4540     C: 02000 0  C: 42066 1     34754 0     56004 0     54071 0     13251 0     00006 1     34552 1
 4550        15214 1  C: 02641 0  C: 66107 1     00006 1     23760 1     05561 0  C: 00050 1     04606 0
 4560        34754 0     55424 0     34756 1     54003 0     01760 1     00006 1     23760 1     05547 1
 4570     C: 00050 1     01760 1     00006 1     23760 1     05547 1  C: 00031 0     05547 1  C: 00027 1

 4600        05561 0  C: 00244 0     01760 1  C: 01413 0  C: 01415 0  C: 01513 1     35046 0     56003 1
 4610        00002 0     35045 0     56003 1     00002 0  C: 00000 1  C: 00027 1  C: 77750 0  C: 00000 1
 4620     C: 01224 1     54016 1     00006 1     22012 1     34762 0     00006 1     02013 1     10000 0
 4630        00334 0     04542 0     34762 0     00006 1     05013 0     00334 0     52134 0     50002 0

 4640        30000 1     24002 0     54001 1     22004 0     75041 0     56002 0     52134 0     50002 0
 4650        02000 0     56134 1     56004 0     56134 1     00133 0     56002 0     50000 1     30000 1
 4660        54004 1     75041 0     56002 0     50002 0     12000 1     35041 1     70133 1     60134 1
 4670        00002 0     54135 1     56004 0     00006 1     04007 1     56135 0     75041 0     56001 0

 4700        00004 0     00006 1     01007 1     50001 0     32000 0     56135 0     00006 1     01007 1
 4710        00003 1     54004 1     30135 0     00002 0     52073 1     50002 0     30000 1     24002 0
 4720        54001 1     22004 0     75041 0     56002 0     52073 1     50002 0     02000 0     56073 0
 4730        56004 0     56073 0     00072 1     54164 0     34761 0     54023 1     30006 1     54165 1

 4740        50002 0     30000 1     54004 1     75041 0     56002 0     56164 1     14663 1  C: 37777 1
 4750     C: 37777 1  C: 57777 1  C: 40000 0  C: 20000 0  C: 10000 0  C: 04000 0  C: 02000 0  C: 01000 0
 4760     C: 00400 0  C: 00200 0  C: 00100 0  C: 00040 0  C: 00020 0  C: 00010 0  C: 00004 0  C: 00002 0
 4770     C: 00001 0  C: 77777 0  C: 00000 1  C: 00005 1  C: 00007 0  C: 00013 0  C: 00015 0  C: 00017 1
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OCTAL LISTING FOR PARAGRAPH # 012,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

   5000      C: 00022 1    C: 00030 1    C: 00032 0    C: 00041 1    C: 00050 1    C: 00054 0    C: 00055 1    C: 00056 1
   5010      C: 00060 1    C: 00062 0    C: 00075 0    C: 00110 1    C: 00120 1    C: 00140 1    C: 00144 0    C: 00310 0
   5020      C: 00620 0    C: 00777 0    C: 01124 1    C: 01211 1    C: 01400 1    C: 01426 0    C: 01441 1    C: 01442 1
   5030      C: 01461 0    C: 01422 1    C: 01451 0    C: 01474 1    C: 01475 0    C: 01530 0    C: 01531 1    C: 01532 1

   5040      C: 01535 0    C: 01777 1    C: 02177 1    C: 02400 1    C: 02600 0    C: 03000 1    C: 03400 0    C: 05000 1
   5050      C: 06000 1    C: 07000 0    C: 13000 0    C: 14000 1    C: 15000 0    C: 16000 0    C: 17770 1    C: 21000 1
   5060         64753 1       54742 1       15064 1       40742 1       60000 1       54742 1       15077 0       56742 0
   5070         50742 0       64751 0       40000 0       60742 0       54742 1       15077 0       15115 0       00006 1

   5100         70742 1       54743 0       00006 1       75022 0       67672 0       00006 1       70743 0       67653 0
   5110         00006 1       70742 1       20001 1       54742 1       00002 0       50000 1       44751 1       00002 0
   5120         34346 1       00004 0       65213 1       54063 0       00006 1       50002 0       30001 0       52066 0
   5130         34756 1       56004 0       54061 1       12620 0       34753 1       00004 0       54063 0       00006 1

   5140         50002 0       30001 0       52066 0       34756 1       56004 0       12576 0       56002 0       67701 0
   5150         56002 0       15142 1       22002 0       34756 1       56006 1       12677 1       40164 0       54001 1
   5160         34756 1       54006 0       12676 0       54164 0       34756 1       54004 1       12767 1       00004 0
   5170         54065 0       44767 1       26002 1       34756 1       56004 0       13014 0       00004 0       54063 0

   5200         34756 1       56006 1       54165 1       30002 0       13063 0       34756 1       54004 1       13074 0
   5210         30061 0       54004 1       16710 0    C: 00110 1       56001 0       00006 1       01007 1       54006 0
   5220         00001 0    C: 77677 1       34770 0       00004 0       54001 1       34750 1       26002 1       30006 1
   5230         00006 1       04007 1       56001 0       00004 0       00006 1       65247 0       56002 0       54061 1

   5240         00006 1       50061 0       30001 0       54063 0       35254 1       56006 1       13213 0       05726 1
   5250      C: 21204 1       52062 1       64767 0       52006 0    C: 02063 0       50002 0       30000 1       24002 0
   5260         00006 1       65247 0       56002 0       54063 0       30006 1       00006 1       04007 1       54001 1
   5270         35273 1       54061 1       15244 1       15312 0    C: 72501 0    C: 73714 1       30076 0       74752 1

   5300         00006 1       15314 0       11335 1       17703 0       15307 1       17703 0       17703 0       37657 1
   5310         05121 0    C: 03561 0    C: 14063 1       05314 1       11137 1       35254 1       54006 0       13367 1
   5320         30016 0       00006 1       01007 1       00006 1       22012 1       30016 0       56006 1       52011 0
   5330         00003 1       50017 1       53305 1       00006 1       50002 0       30001 0       53301 0       00006 1

   5340         35343 0       52006 0    C: 03425 1    C: 02063 0       50002 0       30000 1       24002 0       55214 0
   5350         35353 1       22006 1       14660 1    C: 20463 1       50002 0       40000 0       61214 1       00006 1
   5360         16710 0       16706 1       00004 0       50002 0       30000 1       24002 0       54072 0       74774 0
   5370         60000 1       54071 0       30072 1       75056 0       00006 1       74755 0       56072 1       74752 1
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OCTAL LISTING FOR PARAGRAPH # 013,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

  5400        54066 0      15405 1      00004 0      34770 0      54066 0      50002 0      30000 1      24002 0
  5410        54065 0      00006 1      35415 1      52006 0   C: 02473 0   C: 20063 0      22073 0      22006 1
  5420        22073 0      75053 0      10000 0      15464 0      30062 0      74762 1      10000 0      15451 0
  5430        50061 0      31256 1      54070 1      30062 0      74761 1      10000 0      15455 1      30062 0

  5440        54063 0      30006 1      00006 1      04007 1      54064 1      35450 0      22073 0      52006 0
  5450     C: 02561 1      50002 0      30000 1      24002 0      15432 0      00006 1      50002 0      30001 0
  5460        52064 1      34767 0      26002 1      15445 0      74755 0      10000 0      15431 0      15430 1
  5470        22706 0      22006 1      50000 1      30001 0      22006 1      22706 0      13543 1      22706 0

  5500        22006 1      22706 0      00006 1      50000 1      30001 0      22706 0      22006 1      22706 0
  5510        13650 0      34772 1      54032 1      54033 0      54034 1      00002 0      54162 0      40160 1
  5520        70162 0      50161 1      26160 1      00002 0      05527 1      04655 0   C: 21643 0      34772 1
  5530        55247 0      44770 1      70100 1      54100 1      00002 0      56001 0      35545 0      15542 0

  5540        56001 0      35546 0      24002 0      22155 0      14642 1   C: 20732 0   C: 20735 1      30002 0
  5550        05565 1      40000 0      00006 1      04001 1      50061 0      54074 0      22063 1      00003 1
  5560        00001 0      30002 0      05565 1      70001 1      15554 1      64770 0      00004 0      54063 0
  5570        34777 1      54061 1      50063 1      27777 0      54001 1      34772 1      00006 1      10061 1

  5600        52062 1      50061 0      30074 1      54001 1      50062 0      44752 1      00002 0      00004 0
  5610        54061 1      50002 0      60000 1      50000 1      30000 1      54001 1      30061 0      50002 0
  5620        60001 0      50000 1      22000 1      10061 1      15610 1      16710 0      44764 1      71247 0
  5630        55247 0      05205 0      00004 0      47670 0      71241 0      64752 0      55241 0      41337 0

  5640        74762 1      27337 0      00003 1      00002 0      00004 0      41241 0      77670 0      27241 0
  5650        15642 0      10000 0      24002 0      00002 0      54001 1      30374 1      74346 0      10000 0
  5660        15667 1      00006 1      00031 0      70001 1      00006 1      16711 1      16706 1      30374 1
  5670        15663 0      00004 0      30002 0      55363 1      50002 0      30000 1      54001 1      30006 1

  5700        00006 1      04007 1      55364 0      30002 0      54061 1      10375 1      15712 1      30001 0
  5710        54375 1      15716 0      10376 1      15716 0      30001 0      54376 1      22377 1      41241 0
  5720        77716 1      27241 0      56061 0      00003 1      50000 1      00001 0      00004 0      30002 0
  5730        55363 1      04636 0   C: 40000 0      51363 0      30000 1      05676 0   C: 77770 1      34763 1

  5740        70103 1      10000 0      07717 1      44753 0      71247 0      10000 0      17717 0      05561 0
  5750     C: 00067 0      05561 0   C: 00236 0      05561 0   C: 00230 0      05561 0   C: 00176 1      05561 0
  5760     C: 00010 0      05561 0   C: 00031 0      05561 0   C: 00054 0      04636 0   C: 12536 1      07720 0
  5770        00004 0      54001 1      30002 0      55363 1      05677 1   C: 00014 1      51363 0 CKSM 05072 1
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OCTAL LISTING FOR PARAGRAPH # 014,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

  6000        30007 0       00006 1       01006 0       00006 1       01005 0       00002 0       00003 1       00006 1
  6010        22164 1       30006 1       54165 1       74752 1       54115 0       54023 1       16037 1       22006 1
  6020        16011 0       00006 1       50116 1       30001 0       52155 1       34772 1       54156 1       54163 1
  6030        30165 0       54006 0       10023 1       16046 1       10067 1       15156 1       24164 1       50164 1

  6040        30000 1       10000 0       16331 1    C: 00177 0       54023 1       76043 1       54020 1       10020 1
  6050        16216 0       16712 1       74770 1       10000 0       16115 0       50164 1       40001 1       10000 0
  6060        16164 0    C: 77773 1       24164 1       54116 0       66220 1       10000 0       67676 1       16074 0
  6070        30120 1       26116 0       50020 0       76242 1       00006 1       66105 0       75041 0       65041 1

  6100        56116 1       60115 1       54004 1       50020 0       76242 1       74350 1       65024 1       56116 1
  6110        54003 0       50020 0       76242 1       37666 0       54020 1       30120 1       54130 1       24164 1
  6120        50164 1       40000 0       10000 0       24130 0       16125 0       54116 0       77675 0       00006 1
  6130        16133 1       30115 1       26116 0       50130 0       40046 1       26116 0       77677 1       00006 1

  6140        16153 1       77675 0       00006 1       16155 1       30116 1       54004 1       75041 0       64756 1
  6150        54116 0       50020 0       36242 0       30120 1       16161 0       35024 1       56116 1       54003 0
  6160        74350 1       26116 0       50020 0       36242 0       34351 1       70020 1       66171 0       10000 0
  6170        16202 0    C: 77767 1       66061 0       10000 0       50000 1       46213 0       16204 0       50163 0

  6200        46211 1       16204 0       50163 0       46213 0       26166 1       54116 0       50020 0       76242 1
  6210     C: 00002 0    C: 00006 1    C: 00006 1    C: 00002 0    C: 00003 1    C: 00006 1       10020 1       16232 0
  6220     C: 77722 0       24164 1       50164 1       30000 1       54117 1       35042 1       54004 1       70020 1
  6230        50000 1       16303 0       54004 1       10020 1       50000 1       12000 1       10163 1       12017 1

  6240        12017 1       12121 0    C: 00122 0       16454 0       17040 0       17611 1       17335 1       16652 1
  6250        16437 0       16021 0       17560 1       16450 1       16567 1       16472 1       17270 1       16526 1
  6260        16575 1       17273 1       17552 0       17530 1       17533 1       17537 0       17555 1       16720 0
  6270        16716 0       17005 1       17265 0       17414 0       17361 0       16754 0       17031 0       16744 1

  6300        16300 0       17526 0       17547 1       12341 1       12346 0       12351 0       12355 1       12361 0
  6310        12367 0       12403 0       12412 0       12375 0       12406 0       12464 1       12471 0       12444 0
  6320        12504 0       12513 0       12454 1       30165 0       54004 1       24164 1       50164 1       40000 0
  6330        67702 0       54116 0       74347 1       56116 1       77656 1       00006 1       74764 1       57000 1

  6340        16341 0       06371 1       16030 0       06363 1       16030 0       06366 1       16030 0       06371 1
  6350        16427 1       06371 1       16113 0       06371 1       16432 0       06371 1       16435 1       06371 1
  6360        35002 0       54020 1       16221 1       50120 1       40046 1       16370 1       50120 1       40047 0
  6370        26116 0       40116 0       65006 1       10000 0       30120 1       16402 0       35024 1       56116 1
```

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OCTAL LISTING FOR PARAGRAPH # 015,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

 6400      54003 0     74350 1     26116 0     00006 1     30155 0     50116 1     52001 1     10163 1
 6410      16423 0     00002 0     00006 1     30160 0     50116 1     52003 0     00006 1     50162 1
 6420      50116 1     52005 0     00002 0     30156 0     50116 1     54002 1     00002 0     37665 0
 6430      54020 1     16055 0     34752 0     54020 1     16055 0     36056 1     16114 1     50116 1

 6440      30002 0     54156 1     00006 1     50116 1     30001 0     52155 1     34770 0     16027 0
 6450      22007 0     50116 1     30000 1     16024 0     00006 1     50116 1     30001 0     52155 1
 6460      00006 1     50116 1     30003 1     52160 1     00006 1     50116 1     30005 1     52162 0
 6470      44770 1     16027 0     00006 1     50116 1     30001 0     52155 1     50166 0     52001 1

 6500      50163 0     36213 1     26166 1     10163 1     16521 0     16517 0     54163 1     54156 1
 6510      52160 1     50166 0     51775 0     52162 0     50166 0     51777 1     16030 0     54156 1
 6520      16030 0     54163 1     56156 0     50166 0     53777 0     16030 0     00006 1     50116 1
 6530      30001 0     52155 1     50166 0     52001 1     50163 0     36213 1     26166 1     10163 1

 6540      16557 1     16460 1     00006 1     50116 1     30003 1     52160 1     50166 0     51775 0
 6550      00006 1     50116 1     30005 1     52162 0     50166 0     51777 1     16030 0     00006 1
 6560      50116 1     30003 1     52160 1     30156 0     50166 0     53777 0     16464 0     24164 1
 6570      50164 1     30000 1     50116 1     54000 0     16030 0     24164 1     50164 1     30000 1

 6600      50116 1     60000 1     54004 1     75041 0     50000 1     32000 0     54117 1     30165 0
 6610      74344 1     64344 0     60164 1     50120 1     54052 1     30117 0     77675 0     00006 1
 6620      16631 1     30165 0     54006 0     30117 0     54004 1     75041 0     64756 1     54164 0
 6630      16011 0     30117 0     66220 1     10000 0     30117 0     16644 0     30120 1     60117 0

 6640      50000 1     30000 1     54117 1     16616 1     54003 0     74350 1     50000 1     31400 1
 6650      54117 1     16616 1     50164 1     30001 0     50116 1     60000 1     54004 1     75041 0
 6660      50000 1     32000 0     54117 1     16616 1     30165 0     54004 1     50164 1     30001 0
 6670      54117 1     16616 1     10154 0     00002 0     16676 1     16710 0     10155 1     00002 0

 6700      16702 0     16710 0     10156 1     00002 0     16706 1     16710 0     50002 0     00001 0
 6710      50002 0     00002 0     30165 0     54006 0     50164 1     00001 0     34752 0     16721 1
 6720      34346 1     26116 0     00006 1     50116 1     00003 1     20160 1     00006 1     16731 0
 6730      06763 0     00006 1     50116 1     00005 1     20162 0     00006 1     16740 0     06760 0

 6740      00006 1     50116 1     00001 0     16747 1     00006 1     50116 1     30001 0     20155 1
 6750      00006 1     16030 0     06766 0     16030 0     00006 1     50116 1     40001 1     16747 1
 6760      54001 1     34773 0     16765 1     54001 1     36214 0     56001 0     50000 1     44751 1
 6770      54130 1     00006 1     24000 1     50001 0     26155 1     54007 1     34772 1     60130 0
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OCTAL LISTING FOR PARAGRAPH # 016,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

  7000        50001 0     26154 0     54007 1     00002 0     17121 0     00006 1     50116 1     30003 1
  7010        52160 1     00006 1     40001 1     20160 1     00006 1     17017 1     06763 0     00006 1
  7020        50116 1     30005 1     52162 0     00006 1     40001 1     20162 0     00006 1     17031 0
  7030        06760 0     00006 1     50116 1     30001 0     52155 1     00006 1     40001 1     16747 1

  7040        00006 1     50116 1     30002 0     20156 1     50116 1     60000 1     60154 1     54154 0
  7050        16030 0     16752 0     50002 0     30000 1     24002 0     54116 0     50116 1     30001 0
  7060        54156 1     34772 1     56155 0     54135 1     00006 1     70156 1     56156 0     00006 1
  7070        70154 0     20156 1     50116 1     30000 1     56135 0     00006 1     70135 1     20156 1

  7100        56154 1     00006 1     70135 1     20155 1     00002 0     34772 1     54163 1     56156 0
  7110        60000 1     54001 1     00002 0     60155 0     54155 1     00002 0     60154 1     54154 0
  7120        00002 0     54121 1     00002 0     34767 0     54136 1     00006 1     22137 1     07056 0
  7130        52160 1     52155 1     52131 0     30156 0     54132 0     30136 0     26116 0     07056 0

  7140        52156 1     20132 0     60154 1     60130 0     54130 1     17147 0     54121 1     52162 0
  7150        52155 1     30136 0     26116 0     07056 0     52132 0     20156 1     60154 1     60130 0
  7160        54154 0     00137 1     06766 0     00137 1     00006 1     22141 0     54117 1     22140 1
  7170        17201 1     50002 0     30000 1     54140 0     60000 1     60002 0     54117 1     64773 0

  7200        54141 1     36242 0     54116 0     00006 1     50117 0     30004 0     52155 1     52123 0
  7210        17214 0     54140 0     44767 1     26117 1     07056 0     00006 1     50117 0     30002 0
  7220        20155 1     10140 0     17211 0     00141 0     34772 1     54156 1     22002 0     06672 1
  7230        17234 1     17254 1     44750 0     17235 0     34750 1     54002 1     00006 1     24000 1

  7240        60156 0     54156 1     34772 1     60002 0     60155 0     54155 1     34772 1     60002 0
  7250        60154 1     54154 0     54155 1     00001 0     54156 1     17251 1     54135 1     00006 1
  7260        70156 1     54156 1     34772 1     56155 0     17075 0     07123 0     34772 1     16027 0
  7270        34767 0     54140 0     17276 1     44355 1     54140 0     36211 0     54136 1     07466 1

  7300        07125 0     00006 1     30123 1     52155 1     52134 0     00006 1     30125 1     52160 1
  7310        00006 1     30127 0     52162 0     30140 1     26116 0     07125 0     52123 0     52155 1
  7320        52125 0     52160 1     52127 1     52162 0     30140 1     26116 0     07125 0     52134 0
  7330        52155 1     52162 0     52125 0     52160 1     16030 0     10163 1     17364 0     17364 0

  7340        07056 0     07107 0     52160 1     52155 1     52160 1     07056 0     07107 0     52162 0
  7350        52155 1     52162 0     07056 0     07107 0     52155 1     52162 0     52160 1     52155 1
  7360        16030 0     07123 0     44766 0     26116 0     00006 1     30155 0     52160 1     07056 0
  7370        07107 0     34767 0     26116 0     00006 1     30160 0     52155 1     52160 0     07056 0
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OCTAL LISTING FOR PARAGRAPH # 017,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

 7400        07107 0     34767 0     26116 0     52160 1     52155 1     52160 1     07056 0     07107 0
 7410        52155 1     52162 0     52155 1     16470 0     00006 1     30162 1     52155 1     52123 0
 7420        07056 0     00006 1     40160 1     52155 1     52125 0     07056 0     34767 0     26116 0
 7430        00006 1     40162 0     52155 1     52162 0     07056 0     00006 1     30123 1     52155 1

 7440        52127 1     07056 0     34767 0     26116 0     00006 1     40123 0     52155 1     20162 0
 7450        00006 1     17453 0     06760 0     07056 0     52125 0     52160 1     52155 1     20160 1
 7460        00006 1     17463 0     06763 0     07056 0     52127 1     16747 1     00006 1     30155 0
 7470        52123 0     00006 1     30160 0     52125 0     00006 1     30162 1     52127 1     00002 0

 7500        10000 0     17505 1     00002 0     17515 0     00002 0     56001 0     64753 1     64753 1
 7510        54000 0     17513 0     24001 0     56001 0     00002 0     56001 0     64752 0     67702 0
 7520        54000 0     17523 0     24001 0     56001 0     40000 0     00002 0     07056 0     16030 0
 7530        07056 0     07106 1     16030 0     00006 1     50116 1     30001 0     17543 0     00006 1

 7540        50116 1     30001 0     52155 1     52131 0     34772 1     54004 1     12353 1     30116 1
 7550        54166 1     16032 1     34772 1     54004 1     12172 0     36043 0     54004 1     12214 0
 7560        10163 1     17572 1     17572 1     00006 1     50116 1     30001 0     52131 0     34772 1
 7570        54004 1     12653 1     00006 1     50116 1     30003 1     52160 1     00006 1     50116 1

 7600        30005 1     52162 0     44770 1     54163 1     00006 1     50116 1     30001 0     52155 1
 7610        17566 1     50116 1     10000 0     16030 0     17616 0     17624 1     50116 1     10001 1
 7620        16030 0     16030 0     17624 1     16030 0     00006 1     40155 1     52155 1     10163 1
 7630        17641 1     17641 1     00006 1     40160 1     52160 1     00006 1     40162 0     52162 0

 7640        16030 0     40156 1     54156 1     16030 0  C: 22000 1  C: 24000 1  C: 24100 0  C: 25000 0
 7650     C: 26000 0  C: 27000 1  C: 31000 0  C: 31103 1  C: 32000 0  C: 33000 1  C: 34000 0  C: 35000 1
 7660     C: 37000 0  C: 37766 1  C: 37774 1  C: 37776 0  C: 40010 1  C: 40014 0  C: 40015 1  C: 40040 1
 7670     C: 40200 1  C: 47777 0  C: 65552 0  C: 70000 0  C: 73777 1  C: 74000 1  C: 74056 1  C: 77700 0

 7700     C: 77774 0  C: 77775 1  C: 77776 1     05255 0  C: 00764 1     05276 1     00004 0     30002 0
 7710        55363 1     04636 0  C: 40000 0     51363 0     30000 1     05676 0  C: 40400 1     00004 0
 7720        34767 0     60005 1     54017 0     50017 1     04655 0  C: 12712 0  C: 07726 0  C: 07727 1
 7730   CKSM 41360 1        @           @           @           @           @           @           @

 7740           @           @           @           @           @           @           @           @
 7750           @           @           @           @           @           @           @           @
 7760           @           @           @           @           @           @           @           @
 7770           @           @           @           @           @           @           @           @
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OCTAL LISTING FOR PARAGRAPH # 020,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,2000          13206 1        13525 1        13514 0        13605 0        13607 1        13173 0        12116 1        17624 1
00,2010          13231 0        13022 0        13175 0        13244 1        16323 1        13273 0        13246 0        36211 0
00,2020          70020 1        54021 0        10020 1        12101 1     C: 00024 1        50021 1        34753 1        54135 1
00,2030          10020 1        02050 0        16027 0        30135 0        00006 1        70156 1        54156 1        30135 0

00,2040          00306 1        70154 0        52155 1        30135 0        00006 1        70001 1        20156 1        16030 0
00,2050          30156 0        00006 1        70135 1        56155 0        00006 1        70135 1        56155 0        50001 0
00,2060          60000 1        54156 1        12064 0        26155 1        34772 1        54156 1        56154 1        00006 1
00,2070          70135 1        20155 1        00002 0        30135 0        00006 1        70155 1        54155 1        56001 0

00,2100          12060 1        30021 1        54135 1        00006 1        30156 0        20156 1        60154 1        60154 1
00,2110          54154 0        12113 1        54121 1        10135 1        12102 1        10020 1        07105 1        16030 0
00,2120          16030 0        34774 1        70020 1        54135 1        10020 1        12145 1     C: 00176 1        50135 0
00,2130          34753 1        54135 1        02073 1        52155 1        52160 1        52155 1        02073 1        52155 1

00,2140          52162 0        52155 1        02073 1        17354 0        54135 1        00006 1        30155 0        20155 1
00,2150          00006 1        12153 0        06766 0        00006 1        30160 0        20160 1        00006 1        12161 1
00,2160          06763 0        00006 1        30162 1        20162 0        00006 1        12167 1        06760 0        10135 1
00,2170          12144 0        16030 0        54135 1        06672 1        12176 1        12212 0        07226 0        30154 1

00,2200          12207 1        24135 0        00006 1        30156 0        20156 1        60154 1        26154 0        60000 1
00,2210          54000 0        12201 1        40135 1        16572 0        70116 0        10000 0        12224 0        34757 0
00,2220          70116 0        10000 0        07105 1        16030 0        54135 1        34761 0        00006 1        70116 0
00,2230          76214 1        50000 1        12233 0        12332 0        12342 1        12336 1        10163 1        12277 0

00,2240          12277 0        30135 0        63726 1        00006 1        62127 1        67702 0        54135 1        34772 1
00,2250          54001 1        56154 1        56155 0        02272 1        20155 1        56157 1        56160 0        02272 1
00,2260          20160 1        56161 1        56162 1        02272 1        20162 0        10135 1        54135 1        12242 0
00,2270       C: 04604 1        16030 0        60000 1        54156 1        34772 1        56001 0        00002 0        30135 0

00,2300          63726 1        00006 1        62322 0        67702 0        54135 1        34772 1        56154 1        56155 0
00,2310          54156 1        10135 1        54135 1        02300 0     C: 22650 1        34757 0        70116 0        10000 0
00,2320          07105 1        16030 0        50135 0        34753 1        54135 1        34757 0        70116 0        10000 0
00,2330          12031 0        12033 1        40135 1        62126 0        54135 1        12236 0        42126 1        60135 0

00,2340          40000 0        54135 1        10163 1        12346 0        12346 0        12145 1        40116 0        00006 1
00,2350          74763 0        54020 1        12103 0        44770 1        54136 1        54137 0        54140 0        10130 1
00,2360          12515 0        12363 1        12530 1        07225 0        10154 0        12413 1        12370 0        12412 0
00,2370          56131 1        56130 0        56155 0        56154 1        10130 1        12421 0        12400 0        12415 1
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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971                    PAGE 1601

OCTAL LISTING FOR PARAGRAPH # 021,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,2400        40154 0      00006 1      62404 0      24136 0      34750 1      54154 0      02627 0      34770 0
00,2410        54121 1      06030 1      24136 0      40131 0      12401 1      00006 1      40131 0      52131 0
00,2420        24136 0      10154 0      12436 0      12425 1      12432 1      10155 1      12436 0      16030 0
00,2430        12432 1      16030 0      00006 1      40155 1      52155 1      24136 0      40154 0      67702 0

00,2440        60130 0      10000 0      12504 0   C: 60001 0      12445 1      34753 1      60000 1      60155 0
00,2450        54155 1      34772 1      64750 1      26154 0      34753 1      60000 1      60131 1      54131 0
00,2460        34772 1      64750 1      26130 1      40154 0      60130 0      10000 0      12504 0   C: 00133 0
00,2470        12404 1      54140 0      40155 1      60131 1      00006 1      62404 0      12504 0      30006 1

00,2500        24137 1      00006 1      30131 1      20131 0      30130 0      60000 1      54000 0      12477 0
00,2510        52155 1      50137 1      02564 1      54156 1      16030 0      10000 0      12421 0      40131 0
00,2520        00006 1      62421 1      34753 1      60000 1      26131 0      34772 1      54130 1      12363 1
00,2530        10000 0      12415 1      30131 1      00006 1      62415 0      44753 0      12523 0      22021 1

00,2540        00006 1      74753 0      56001 0      60021 1      56001 0      12570 0      20001 1      20001 1
00,2550        20001 1      20001 1      20001 1      20001 1      20001 1      20001 1      20001 1      20001 1
00,2560        20001 1      20001 1      20001 1      52155 1      10140 0   C: 06552 0      12641 1      52155 1
00,2570        60006 1      10130 1      52155 1      40154 0      00006 1      70131 0      60155 0      54000 0

00,2600        12605 1      00006 1      60130 0      24154 1      12607 0      00006 1      62617 0      00006 1
00,2610        60130 0      00006 1      12615 0      00006 1      62623 1      24154 1      12624 1      00006 1
00,2620        12627 1      00006 1      26154 0      60130 0      22007 0      00006 1      10130 1      54155 1
00,2630        10136 1      00002 0      00002 0      00002 0      00006 1      40155 1      52155 1      34772 1

00,2640        00002 0      40154 0      60130 0      00006 1      12646 0      12567 0      34750 1      54154 0
00,2650        40131 0      60155 0      12623 0      44770 1      54137 0      54127 1      03007 0      52131 0
00,2660        07500 0      52131 0      10130 1      12720 1      12666 1      12714 0      56131 1      56130 0
00,2670        56155 0      56154 1      00006 1      12675 0      12404 1      56160 0      56157 1      00006 1

00,2700        12702 1      12404 1      56162 1      56161 1      00006 1      12707 1      12404 1      10130 1
00,2710        12720 1      12404 1      12714 0      12404 1      00006 1      40131 0      52131 0      24127 0
00,2720        00006 1      30131 1      52134 0      12731 1      00006 1      24137 1      00006 1      30131 1
00,2730        20131 0      30130 0      60000 1      54000 0      12724 0      02747 1      52160 1      52155 1

00,2740        52160 1      02747 1      52162 0      52155 1      52162 0      02747 1      17354 0      30127 0
00,2750        54136 1      10154 0      12766 0      12755 0      12762 1      10155 1      12766 0      00002 0
00,2760        12762 1      00002 0      00006 1      40155 1      52155 1      24136 0      44770 1      54140 0
00,2770        40154 0      60133 0      10000 0      13003 0      12776 1      12404 1      54140 0      40155 1
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OCTAL LISTING FOR PARAGRAPH # 022,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "&" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,3000          60134 1     00006 1     62404 0     52155 1     50137 1     12564 0  C: 32506 0     56002 0
00,3010          52155 1     07500 0     52155 1     52160 1     07500 0     52160 1     52162 0     07500 0
00,3020          52162 0     00000 1     03007 0     07466 1     34772 1     56121 0     54141 1     03316 0
00,3030          30141 0     56121 0     00006 1     13035 0     12404 1     00006 1     30155 0     50120 1

00,3040          52043 1     03342 1     10154 0     13050 0     54001 1     50120 1     52045 1     12404 1
00,3050          44321 1     60135 0     10000 0     40000 0     13132 0     13064 1     44776 1     54135 1
00,3060          30154 1     54001 1     34772 1     13111 1     10135 1     13073 1     42024 1     54135 1
00,3070          00006 1     30155 0     13111 1     40000 0     54135 1     40000 0     50000 1     34753 1

00,3100          54130 1     00006 1     70155 1     56130 0     00006 1     70154 0     56001 0     60130 0
00,3110          56001 0     50120 1     52045 1     44770 1     54140 0     52123 0     52155 1     52131 0
00,3120          03150 0     52125 0     52155 1     52160 1     03150 0     52127 1     52155 1     52162 0
00,3130          03150 0     17354 0     54135 1     34772 1     56123 1     56122 0     56125 1     56124 0

00,3140          56127 0     56126 1     40135 1     50000 1     34753 1     00006 1     70154 0     13061 1
00,3150          10154 0     13167 0     13154 0     13161 0     10155 1     13167 0     00002 0     13161 0
00,3160          00002 0     44772 0     54136 1     00006 1     40155 1     50135 0     12563 1     54136 1
00,3170          52155 1     50135 0     12563 1     03277 0     16030 0     10163 1     13225 0     13225 0

00,3200          03316 0     22163 0     00006 1     30155 0     50120 1     52043 1     03342 1     10135 1
00,3210          13212 1     16030 0     63726 1     00006 1     63220 1     22007 0     22116 1     12303 1
00,3220          50135 0     34752 0     54135 1     34772 1     12036 1     06672 1     16030 0     16030 0
00,3230          17624 1     44766 0     26166 1     00006 1     50000 1     30003 1     52160 1     00006 1

00,3240          50166 0     30001 0     52162 0     16470 0     03316 0     17266 0     00006 1     30155 0
00,3250          50166 0     52001 1     50163 0     36213 1     26166 1     10163 1     13271 1     16030 0
00,3260          00006 1     30160 0     50166 0     51775 0     00006 1     30162 1     50166 0     51777 1
00,3270          16030 0     30156 0     16523 1     50120 1     30052 0     54117 1     16621 0     30155 0

00,3300          00006 1     70000 0     54156 1     34772 1     56155 0     00006 1     70154 0     20001 1
00,3310          20156 1     56154 1     00006 1     70000 0     20155 1     00002 0     00006 1     22137 1
00,3320          03277 0     52160 1     52155 1     52131 0     30156 0     54132 0     03277 0     52156 1
00,3330          20132 0     60154 1     60130 0     54130 1     13336 0     54121 1     52162 0     52155 1

00,3340          03277 0     17154 1     34772 1     54135 1     10154 0     13403 1     13350 0     13372 0
00,3350          56156 0     56155 0     54154 0     34774 1     54135 1     10154 0     13403 1     13361 1
00,3360          13375 1     56155 0     54154 0     34774 1     26135 1     10154 0     13403 1     00002 0
00,3370          13375 1     13450 1     10000 0     13401 0     10155 1     34772 1     13450 1     13401 0
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OCTAL LISTING FOR PARAGRAPH # 023,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,3400          13450 1      05726 1   C: 21302 0      62443 0      00006 1      63453 0      52155 1      22021 1
00,3410          00006 1      74753 0      52155 1      56021 1      26155 1      32314 0      00006 1      70154 0
00,3420          62565 0      54130 1      30154 1      00006 1      74753 0      00006 1      10130 1      26130 1
00,3430          00006 1      74753 0      52155 1      00006 1      10130 1      54131 0      34772 1      56001 0

00,3440          00006 1      10130 1      54001 1      30131 1      20155 1      00006 1      13452 0      34750 1
00,3450          54154 0      54155 1      00002 0      64754 0      00006 1      63477 0      52155 1      22021 1
00,3460          00006 1      74753 0      52155 1      56021 1      26155 1      33006 1      00006 1      70154 0
00,3470          62270 0      13421 1      00006 1      30156 0      20156 1      60154 1      26154 0      24135 0

00,3500          00006 1      30156 0      20156 1      60154 1      26154 0      60000 1      54022 0      10022 0
00,3510          10022 0      13472 1      13415 0      13465 1      06672 1      13520 1      13523 1      13523 1
00,3520          00006 1      40155 1      52155 1      34754 0      26154 0      52155 1      20001 1      54000 0
00,3530          13533 0      00006 1      40001 1      52155 1      30154 1      60000 1      54001 1      13550 0

00,3540          50000 1      34752 0      60000 1      00006 1      60154 1      54154 0      40155 1      54155 1
00,3550          00006 1      30155 0      52134 0      03277 0      07171 1   C: 00003 1   C: 14441 0   C: 37325 1
00,3560       C: 53250 0   C: 60764 1   C: 12146 1   C: 21276 1   C: 75466 1   C: 71471 0   C: 00236 0   C: 32757 0
00,3570          32467 0      07055 0      00006 1      30156 0      20156 1      60154 1      26154 0      00006 1

00,3600          30156 0      20156 1      60154 1      26154 0      16030 0      33626 0      13610 1      33710 1
00,3610          54136 1      06672 1      13622 0      13724 1      00006 1      40155 1      52155 1      33727 0
00,3620          56136 0      54137 0      44753 0      60154 1      10000 0      13716 0      13704 0      13637 1
00,3630          10155 1      34772 1      13634 1      13637 1      54155 1      54154 0      00136 0      00006 1

00,3640          40155 1      64753 1      52155 1      52134 0      03342 1      10135 1      13711 1      52155 1
00,3650          52134 0      52155 1      07171 1   C: 00006 1   C: 13240 0   C: 23630 0   C: 74721 0   C: 47775 1
00,3660       C: 02440 0   C: 20237 0   C: 75067 1   C: 70742 1   C: 03436 0   C: 26756 1   C: 74037 0   C: 57640 1
00,3670       C: 03046 0   C: 07143 0   C: 76654 1   C: 42244 0      32467 0      07055 0      00136 0      00006 1

00,3700          40155 1      64753 1      52155 1      00137 1      00006 1      40155 1      64754 0      52155 1
00,3710          16030 0      50000 1      34753 1      54135 1      02073 1      13647 0      00006 1      13634 1
00,3720          05671 1   C: 01301 1      34772 1      13634 1      34754 0      13635 0   C: 77763 0      13677 0
00,3730          35016 0      00004 0      54002 1      36214 0      54070 1      50000 1      31000 0      00006 1

00,3740          13745 0      10070 1      13734 0      07706 1   C: 31104 0      33765 0      54061 1      30004 0
00,3750          60070 0      54001 1      33766 0      15243 0      04665 0      50070 0      55000 1      05163 0
00,3760          34772 1      50006 1      57000 0      05167 1      05314 1   C: 03752 1   C: 03760 0   C: 03767 1
00,3770       C: 03770 1 CKSM 45537 1         @            @            @            @            @            @
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OCTAL LISTING FOR PARAGRAPH # 024,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,2000        00044 1      00010 0      00044 1      00027 1      00044 1      00054 0      00074 1      00120 1
01,2010        00226 1      00244 0      00311 1      00321 1   C: 00170 1   C: 75141 1   C: 45711 1   C: 10000 0
01,2020     C: 02502 1   C: 34066 0   C: 10000 0   C: 02170 0   C: 56066 1   C: 10000 0   C: 02157 0   C: 74066 1
01,2030     C: 10000 0   C: 02374 0   C: 74066 1   C: 02730 1   C: 75075 1   C: 26063 0   C: 05000 1   C: 02711 1

01,2040     C: 26063 0   C: 10000 0   C: 02625 1   C: 70067 1   C: 14000 1   C: 03532 0   C: 62067 1   C: 10000 0
01,2050     C: 02516 1   C: 56067 0   C: 77777 0   C: 75456 1   C: 37710 0   C: 01750 1   C: 75446 0   C: 37710 0
01,2060     C: 20000 0   C: 02534 1   C: 34067 1   C: 76347 0   C: 74754 1   C: 27710 1   C: 22000 1   C: 02115 0
01,2070     C: 70065 0   C: 22000 1   C: 02250 1   C: 70063 0   C: 22000 1   C: 02024 0   C: 70063 0   C: 01672 0

01,2100     C: 75466 1   C: 40067 1   C: 77777 0   C: 75152 0   C: 27710 1   C: 47777 0   C: 03730 0   C: 50067 0
01,2110     C: 77777 0   C: 75152 0   C: 27710 1   C: 05664 0   C: 74160 0   C: 27711 0   C: 77777 0   C: 75152 0
01,2120     C: 27710 1   C: 04700 1   C: 75143 0   C: 27710 1   C: 00050 1   C: 75053 0   C: 27711 0   C: 00240 1
01,2130     C: 75022 0   C: 27711 0   C: 00764 1   C: 75126 0   C: 27711 0   C: 77777 0   C: 75126 0   C: 27711 0

01,2140     C: 47777 0   C: 03411 0   C: 50066 1   C: 16000 0   C: 02000 0   C: 66065 1   C: 16000 0   C: 03132 1
01,2150     C: 66105 0   C: 01672 0   C: 75212 1   C: 50067 0   C: 12000 1   C: 02523 1   C: 50067 0   C: 24000 1
01,2160     C: 02002 1   C: 30060 1   C: 77777 0   C: 75113 0   C: 27711 0   C: 13000 0   C: 02622 0   C: 30065 1
01,2170     C: 04064 1   C: 75402 0   C: 23711 1   C: 65777 0   C: 03174 0   C: 50066 1   C: 00764 1   C: 75175 0

01,2200     C: 27710 1   C: 17000 1   C: 02511 0   C: 54066 0   C: 76003 0   C: 75210 0   C: 23711 1   C: 13000 0
01,2210     C: 02604 1   C: 54066 0   C: 17000 1   C: 03013 0   C: 52066 0   C: 77777 0   C: 75462 0   C: 07711 1
01,2220     C: 47777 0   C: 03322 1   C: 50066 1   C: 64777 1   C: 02456 1   C: 54067 1   C: 76105 1   C: 74101 1
01,2230     C: 27710 1   C: 76317 0   C: 74140 1   C: 11710 1   C: 32000 0   C: 03154 1   C: 76067 1   C: 00310 0

01,2240     C: 74555 1   C: 01711 1   C: 20000 0   C: 03010 0   C: 76067 1   C: 00310 0   C: 74555 1   C: 01711 1
01,2250     C: 00310 0   C: 74555 1   C: 01711 1   C: 77777 0   C: 75120 0   C: 01711 1   C: 20000 0   C: 02232 0
01,2260     C: 66065 1   C: 77777 0   C: 75421 1   C: 11712 0   C: 20000 0   C: 02303 0   C: 66065 1   C: 20000 0
01,2270     C: 03100 0   C: 66065 1   C: 77777 0   C: 75170 0   C: 01710 0   C: 22000 1   C: 02412 1   C: 66065 1

01,2300     C: 77777 0   C: 75376 1   C: 11712 0   C: 20000 0   C: 03111 0   C: 66065 1   C: 20000 0   C: 03057 0
01,2310     C: 66065 1   C: 77777 0   C: 75037 1   C: 01711 1   C: 20000 0   C: 03134 1   C: 66065 1   C: 77777 0
01,2320     C: 75422 1   C: 37711 1   C: 00144 0   C: 74552 0   C: 27710 1   C: 00144 0   C: 74552 0   C: 27710 1
01,2330     C: 30000 1   C: 03575 0   C: 56063 1   C: 50777 0   C: 03365 1   C: 50066 1   C: 76052 1   C: 75714 1

01,2340     C: 45711 1      02436 1      30117 0      50130 0      54046 1      16030 0      02436 1      40117 1
01,2350        02343 1      02424 1      50117 0      30000 1      12343 0      02424 1      50117 0      40000 0
01,2360        12343 0      02424 1      50130 0      30046 0      50117 0      54000 0      16030 0      02424 1
01,2370        50117 0      30000 1      50130 0      56046 0      12364 0      02424 1      50117 0      30000 1
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OCTAL LISTING FOR PARAGRAPH # 025,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,2400       50130 0      26046 1      16030 0      02436 1      30117 0      12400 0      02424 1      50117 0
01,2410       40000 0      12400 0      02436 1      50130 0      40050 0      50130 0      60046 0      00076 1
01,2420       66030 1      50130 0      56046 0      16615 1      40117 1      65006 1      10000 0      30120 1
01,2430       12435 0      35024 1      56117 0      54003 0      74350 1      26117 1      30120 1      54130 1

01,2440       10020 1      24130 0      00002 0      00002 0      10020 1      30117 0      04641 0      10154 0
01,2450       16030 0      16615 1      16030 0      16615 1      10121 1      12457 1      16030 0      54121 1
01,2460       10020 1      12445 1   C: 00360 1      16615 1      10020 1      06672 1      16030 0      16615 1
01,2470       16030 0      10020 1      12500 1   C: 12000 1      06672 1      16030 0      16030 0      16615 1

01,2500       06672 1      16615 1      16615 1      16030 0      10020 1      16607 1      12507 0      02424 1
01,2510       50120 1      30052 0      12364 0      34777 1      70117 1      50000 1      34752 0      54131 0
01,2520       34762 0      00006 1      70117 1      54130 1      00004 0      50000 1      30074 1      54002 1
01,2530       34756 1      00006 1      70117 1      73024 0      50000 1      12536 1      30131 1      00006 1

01,2540       04002 1      12550 1      30131 1      00006 1      06002 0      12550 1      40131 0      70002 1
01,2550       50130 0      54074 0      00003 1      34754 0      00006 1      70117 1      73024 0      50000 1
01,2560       12561 0      40002 1      70131 0      10000 0      12574 1      16664 1      12574 1      12570 0
01,2570       12571 1      30002 0      12562 0      12574 1      24164 1      16030 0      54061 1      10400 1

01,2600       12613 0      10454 0      12613 0      10530 0      12613 0      10604 1      12613 0      10660 0
01,2610       12613 0      07706 1   C: 31201 0      64767 0      22007 0      50000 1      21777 0      26063 0
01,2620       34772 1      54064 1      32627 0      54062 1      50064 0      10167 0      12667 0   C: 00006 1
01,2630       12667 0      30063 1      50064 0      54167 0      75021 0      50064 0      54166 1      10064 1

01,2640       12654 0      54121 1      30166 0      54120 0      10067 1      12654 0      12647 1      12650 1
01,2650       54067 1      52066 0      52165 1      15210 0      52066 0      50064 0      52165 1      50067 0
01,2660       40167 0      60063 1      00006 1      65210 1      30064 0      54067 1      15210 0      33024 1
01,2670       26064 1      10062 1      12623 0      07706 1   C: 31202 0      22164 1      30165 0      00004 0

01,2700       00006 1      04007 1      56001 0      50067 0      52165 1      52165 1      30165 0      00006 1
01,2710       01007 1      52155 1      50067 0      52155 1      52155 1      52157 0      50067 0      52157 0
01,2720       52157 0      52161 0      50067 0      52161 0      52161 0      52163 1      50067 0      52163 1
01,2730       52163 1      34772 1      56121 0      00006 1      12737 1      40166 1      54166 1      52167 0

01,2740       50067 0      52167 0      52167 0      35021 1      70167 0      54120 0      10166 1      34772 1
01,2750       12755 0      40166 1      54166 1      34770 0      56121 0      54067 1      00003 1      52165 1
01,2760       00006 1      62763 1      52006 0      40000 0      64770 0      54164 0      16017 0      00004 0
01,2770       40167 0      54167 0      36043 0      70006 0      00006 1      04007 1      54165 1      44772 0
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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971                  PAGE 1606

OCTAL LISTING FOR PARAGRAPH # 026,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,3000          54131 0      13111 1      00004 0      10067 1      13007 1      00003 1      13201 0      34767 0
01,3010          00006 1      05011 1      52165 1      12703 0      54061 1      34772 1      54064 1      32627 0
01,3020          54062 1      50064 0      10167 0      13026 1   C: 00014 1      13035 0      33024 1      26064 1
01,3030          10062 1      13020 1      44770 1      54064 1      15210 0      40065 0      50064 0      60164 1

01,3040          00006 1      13043 1      13026 1      50064 0      40167 0      54063 0      50064 0      54167 0
01,3050          44344 1      70065 0      64756 1      56065 1      74344 1      50064 0      60165 0      54066 0
01,3060          10064 1      12654 0      12644 1      54164 0      34772 1      54130 1      35021 1      70167 0
01,3070          60063 1      54167 0      40000 0      13000 0      00004 0      44772 0      54131 0      56167 1

01,3100          75021 0      54001 1      45213 0      60001 0      00006 1      63111 0      10001 1      50000 1
01,3110          54000 0      10203 1      03156 0   C: 66102 1      13115 0      10217 1      03156 0   C: 40201 0
01,3120          13121 1      10233 1      03156 0   C: 67610 1      13125 0      10247 1      03156 0   C: 03724 0
01,3130          13131 0      10263 1      03156 0   C: 03502 0      13135 1      10277 1      03156 0   C: 05332 0

01,3140          13141 1      10131 0      53301 0      05214 0      13146 0      13171 1      10130 1      13151 0
01,3150          12755 0      50000 1      27777 0      63123 1      54067 1      12675 0      54132 0      60131 1
01,3160          10000 0      40132 0      13165 1      13164 0      16710 0      54131 0      30002 0      54130 1
01,3170          16710 0      44772 0      54067 1      00003 1      44767 1      00006 1      03011 1      10067 1

01,3200          13002 1      34767 0      13207 0      31361 1      54001 1      33113 1      15215 0      00006 1
01,3210          05011 1      52165 1      15214 1      54062 1      40026 1      64761 0      10000 0      66056 1
01,3220          40000 0      63117 0      60002 0      10000 0      61400 1      13267 0      13227 1      40002 1
01,3230          64753 1      64753 1      56026 0      64752 0      60002 0      00006 1      22007 0      57400 1

01,3240          57401 0      57402 0      57403 1      57404 0      57405 1      57406 1      57407 0      30063 1
01,3250          50002 0      13252 0      53411 0      53413 1      53415 1      53417 0      53421 0      53423 1
01,3260          53425 1      53427 0      53431 1      65274 0      00006 1      15251 0      13342 0      10000 0
01,3270          61401 0      13275 0      64770 0      03347 1   C: 00001 0      10000 0      61402 0      13303 0

01,3300          64770 0      03347 1   C: 00002 0      10000 0      61403 1      13311 0      64770 0      03347 1
01,3310       C: 00003 1      10000 0      61404 0      13317 0      64770 0      03347 1   C: 00004 0      10000 0
01,3320          61405 1      13325 1      64770 0      03347 1   C: 00005 1      10000 0      61406 1      13333 0
01,3330          64770 0      03347 1   C: 00006 1      10000 0      61407 0      13341 0      64770 0      03347 1

01,3340       C: 00007 0      10000 0      07706 1   C: 31203 1      64770 0      03347 1   C: 00010 0      54064 1
01,3350          50002 0      30000 1      54002 1      34770 0      60064 0      50002 0      27377 1      40064 1
01,3360          50002 0      13237 0      00006 1      04007 1      54016 1      00006 1      22012 1      34751 0
01,3370          57407 0      57406 1      57405 1      57404 0      57403 1      57402 0      57401 0      57400 1
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OCTAL LISTING FOR PARAGRAPH # 027,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,3400        64750 1      26026 1      55137 1      44772 0      55137 1      00006 1      45275 0      53431 1
01,3410        53427 0      53425 1      53423 1      53421 0      53417 0      53415 1      53413 1      53411 0
01,3420        56001 0      00006 1      01007 1      56001 0      52006 0      23435 1      34767 0      26002 1
01,3430        55434 1      11304 0      13440 0      13435 1      15247 1      31305 0      00006 1      65247 0

01,3440        00006 1      43452 0      21305 1      11305 1      13462 0      13446 0      13447 1      11304 0
01,3450        13462 0   C: 00000 1   C: 20000 0      34753 1      27305 1      05223 1   C: 03142 0      35313 0
01,3460        53435 0      52006 0      34753 1      05233 0   C: 03440 1   C: 02063 0      13457 0      30161 1
01,3470        60000 1      54155 1      33127 0      54157 0      33526 0      54707 0      30154 1      75024 0

01,3500        10000 0      13512 0      10154 0      10000 0      13612 0      35053 1      05135 0   C: 03263 0
01,3510     C: 20063 0      03526 0      75024 0      10000 0      13563 0      00006 1      50155 0      31437 0
01,3520        52706 1      30154 1      74774 0      67701 0      10000 0      13675 1      04651 1      13531 1
01,3530        13576 1      33463 0      54704 0      50155 0      31260 1      10000 0      24000 1      13542 0

01,3540        15470 0      13561 1      40000 0      54001 1      50155 0      41257 1      00006 1      60025 0
01,3550        10000 0      40000 0      67663 0      64770 0      60001 0      10000 0      34772 1      13561 1
01,3560        13561 1      64770 0      00704 1      33526 0      54157 0      33133 0      54707 0      30154 1
01,3570        76043 1      54154 0      00006 1      50155 0      31437 0      52706 1      50155 0      31260 1

01,3600        54704 0      00006 1      63606 1      33506 1      56704 1      00704 1      35310 0      56704 1
01,3610        40000 0      00704 1      54020 1      10020 1      13615 1      13713 0      33526 0      54707 0
01,3620        30154 1      54021 0      60021 1      50155 0      62001 1      54156 1      00006 1      50156 0
01,3630        32002 1      22706 0      10000 0      24000 1      13707 0      24000 1      54705 1      33463 0

01,3640        54704 0      30706 0      74757 1      10000 0      13702 0      50156 0      32000 0      15477 1
01,3650        53305 1      00006 1      40025 1      21305 1      00006 1      31303 0      21305 1      11304 0
01,3660        13670 1      13663 0      13556 0      11305 1      13670 1      13666 0      13556 0      13561 1
01,3670        33137 1      54704 0      00006 1      31305 0      00704 1      33463 0      54704 0      50155 0

01,3700        41260 0      15477 1      40706 1      54706 1      50156 0      32000 0      13535 0      56705 0
01,3710        50156 0      32000 0      13600 0      30157 1      54707 0      50155 0      32000 0      60154 1
01,3720        60154 1      60154 1      54156 1      13626 1      36214 0      26156 1      33526 0      54707 0
01,3730        13626 1      34754 0      70077 0      10000 0      03745 1      31333 0      74760 0      00006 1

01,3740        13742 1      44765 0      63750 0      05770 1      04103 1      05547 1   C: 00007 0      14651 0
01,3750     C: 00220 1   C: 03751 1   C: 03752 1 CKSM 67773 0         @            @            @            @
01,3760           @            @            @            @            @            @            @            @
01,3770           @            @            @            @            @            @            @            @
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OCTAL LISTING FOR PARAGRAPH # 040,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,2000         02767 0      05531 0      04112 1      32006 0      05535 1      02003 0   C: 11343 0      55200 0
04,2010         05561 0   C: 00236 0      05561 0   C: 00226 1      05561 0   C: 00215 1      04606 0      37702 0
04,2020         55722 0      40077 0      74754 1      10000 0      12044 1      31200 1      62031 1      10000 0
04,2030         12375 0   C: 77660 1      12035 1      31200 1      12410 1      31200 1      62406 1      00006 1

04,2040         62044 0      63770 1      00006 1      62407 0      34346 1      54365 0      34772 1      54740 0
04,2050         54741 1      54735 1      54736 1      05561 0   C: 00210 1      31333 0      74763 0      10000 0
04,2060         12125 1      34762 0      70101 0      10000 0      12071 1      40102 0      74076 0      00006 1
04,2070         62116 0      04611 0      04636 0   C: 51045 1      04714 1   C: 13313 1      33054 0      04714 1

04,2100      C: 42043 0      04714 1   C: 51161 0      34772 1      55200 0      00003 1      34773 0      04636 0
04,2110      C: 01731 0      34772 1      00006 1      01005 0      00006 1      01006 0      31200 1      00006 1
04,2120         12151 1      40076 1      74770 1      10000 0      12132 1      05671 1   C: 01520 1      04432 0
04,2130         04655 0   C: 21275 1      33173 1      54155 1      50155 0      33124 0      76043 1      40000 0

04,2140         61200 1      10000 0      10155 1      12133 0      12375 0      30155 0      55177 0      05547 1
04,2150      C: 00055 1      40103 1      74763 0      10000 0      12162 1      00004 0      44770 1      70075 1
04,2160         54075 1      15205 1      33053 1      54373 1      05402 1   C: 00014 1      06006 1   I: 77624 1
04,2170      C: 27516 0   I: 77776 1      45024 0      00006 1      03011 1      33046 0      00006 1      03012 1

04,2200         43047 0      00006 1      03013 0      02767 0      05527 1      34772 1      54304 1      05561 0
04,2210      C: 00020 0      04415 0      05561 0   C: 00037 0      11200 0      12352 0      04432 0      35047 1
04,2220         55262 1      00004 0      44770 1      70076 1      54076 1      34773 0      54001 1      40000 0
04,2230         53160 0      34761 0      64762 0      40000 0      70074 0      54074 0      44760 0      70104 0

04,2240         54104 0      34772 1      54332 1      34764 0      64757 0      64762 0      40000 0      55275 1
04,2250         70075 1      54075 1      44767 1      70104 0      54104 0      04714 1   C: 12550 1      11200 0
04,2260         12270 1      04714 1   C: 12542 1      03002 0      31200 1      55214 0      04655 0   C: 13015 1
04,2270         41200 0      64124 1      00006 1      12275 1      12311 1      41200 0      61214 1      00006 1

04,2300         12321 1      30104 1      74760 0      10000 0      12333 1      30074 1      74762 1      10000 0
04,2310         12340 0      30104 1      74760 0      10000 0      12325 0      34762 0      70074 0      10000 0
04,2320         12330 1      00006 1      34772 1      53156 0      03002 0      00006 1      34772 1      53160 0
04,2330         33352 0      54373 1      12266 0      34773 0      54001 1      40000 0      53160 0      12343 0

04,2340         40075 1      74762 1      26075 1      40075 1      74764 1      26075 1      00006 1      34772 1
04,2350         53164 1      12264 1      34762 0      70074 0      10000 0      12364 0      34760 1      70104 0
04,2360         10000 0      12364 0      05561 0   C: 00007 0      51177 1      33124 0      54022 0      40022 0
04,2370         40022 0      56022 1      74774 0      00004 0      12242 0      04362 1      12127 0   C: 00051 0
```

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OCTAL LISTING FOR PARAGRAPH # 041,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,2400     C: 00114 0   C: 00064 0   C: 00044 1   C: 00043 0   C: 00117 0   C: 00126 1   C: 77741 0      62405 1
04,2410        55113 1      34760 1      70104 0      00006 1      12421 0      05561 0   C: 00031 0      05561 0
04,2420     C: 00176 1      40074 0      74762 1      00006 1      12431 1      05547 1   C: 00236 0      34124 1
04,2430        02507 1      31113 0      55200 0      02044 0      30002 0      55012 1      45011 0      61200 1

04,2440        05347 1      04432 0      34777 1      04636 0   C: 21067 0      14103 0      02452 0      05561 0
04,2450     C: 00236 0      01012 0      30107 1      74761 1      10000 0      12470 1      05547 1   C: 00254 1
04,2460        22007 0      40106 1      74756 0      00006 1      12467 1      00006 1      33760 0      53353 1
04,2470        40101 0      74770 1      00006 1      12500 1      05547 1   C: 00240 1      05547 1   C: 00241 0

04,2500        05547 1   C: 00215 1      05561 0   C: 00244 0      05547 1   C: 00236 0      01012 0      00006 1
04,2510        23356 0      55200 0      05402 1   C: 04024 0      31356 0      55012 1      02044 0      00006 1
04,2520        23356 0      06006 1   I: 51575 1   C: 03405 0   I: 51025 1   C: 10536 0   C: 10532 1   I: 77776 1
04,2530        32377 0      02511 0   I: 77776 1      35004 0      02511 0   C: 00002 0   C: 27311 1      02434 0

04,2540        34342 0      02507 1      02517 0      02724 1      12546 0      02434 0      05561 0   C: 00256 0
04,2550        34763 1      02507 1      02517 0      02724 1      35046 0      54003 0      31765 1      67701 0
04,2560        55414 0      05402 1   C: 04024 0      31414 1      55765 0      67701 0      40000 0      00006 1
04,2570        62572 0      12607 0      05547 1   C: 00256 0      06006 1   I: 77745 1   C: 02351 1   C: 02463 1

04,2600     I: 77776 1      31765 1      67701 0      00006 1      62540 1      02546 1      02434 0      32402 0
04,2610        02507 1      06006 1   I: 51575 1   C: 03405 0   I: 77454 1   C: 10642 0      32401 0      02507 1
04,2620        40106 1      74770 1      00006 1      12637 0      02517 0      02724 1      05547 1   C: 00226 1
04,2630        34124 1      02507 1      05561 0   C: 00226 1      32401 0      02507 1      02647 0      32377 0

04,2640        02507 1      02644 0   I: 77414 0   C: 05065 1      02724 1      02647 0      02434 0      35003 1
04,2650        02507 1      02517 0      05547 1   C: 00050 1      02724 1      12657 0      02434 0      34260 1
04,2660        02507 1      02517 0      02724 1      12665 1      02434 0      32403 1      02507 1      02517 0
04,2670        02724 1      32403 1      02507 1      02517 0      02724 1      32404 0      02432 0      05547 1

04,2700     C: 00226 1      05547 1   C: 00031 0      34772 1      54001 1      53740 1      32715 0      55012 1
04,2710        12452 1      32714 1      55012 1      05205 0   C: 02716 0   C: 02711 1      35047 1      05135 0
04,2720     C: 02564 1   C: 66104 1      04655 0   C: 74207 1      00006 1      23356 0      35051 0      05135 0
04,2730     C: 02000 0   C: 56067 0      05205 0   I: 77776 1      32400 1      02511 0      00004 0      35052 0

04,2740        55266 0      54063 0      51177 1      33124 0      55264 1      00006 1      74761 1      74774 0
04,2750        54001 1      51177 1      33055 1      55265 0      74344 1      26001 1      31265 1      75041 0
04,2760        64756 1      05146 1      31264 0      76043 1      05347 1      04432 0      05205 0      00004 0
04,2770        34775 0      54154 0      50154 1      43032 1      50154 1      70074 0      50154 1      54074 0
```

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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971                     PAGE 1610

OCTAL LISTING FOR PARAGRAPH # 042,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,3000        10154 0      12771 0      00006 1      22155 0      00004 0      34764 0      70075 1      10000 0
04,3010        13024 0      04611 0      04463 1      30105 0      74755 0      10000 0      13022 0      04636 0
04,3020     C: 51203 1      13024 0      04636 0   C: 51217 1      00003 1      37702 0      55323 0      00155 0
04,3030        03002 0      06030 1   C: 00001 0   C: 00040 0   C: 06400 0   C: 20400 1   C: 05000 1   C: 05100 0

04,3040     C: 10000 0   C: 16000 0   C: 00000 1   C: 42000 1   C: 00000 1   C: 00000 1   C: 44571 1   C: 00600 1
04,3050     C: 00300 1   C: 01120 0   C: 10741 1   C: 10171 1   C: 37312 0   C: 10606 0   C: 10664 1   C: 10656 0
04,3060     C: 10646 1   C: 10545 1   C: 10537 1   C: 10677 0   C: 26071 0   C: 26071 0   C: 72212 0   C: 72002 0
04,3070     C: 11575 0   C: 11405 0   C: 54321 0   C: 54234 0   C: 30002 0   C: 31414 1   C: 30002 0   C: 31414 1

04,3100     C: 51662 1   C: 51563 0   C: 50214 0   C: 74476 1   C: 45334 1   C: 72206 0   C: 72000 1   C: 11573 0
04,3110     C: 11403 0   C: 11303 1   C: 73433 1   C: 60000 1   C: 26254 0   C: 62444 1   C: 60153 0   C: 76000 0
04,3120     C: 74016 0   C: 67455 1   C: 55654 0   C: 66001 0   C: 21526 0   C: 21525 0   C: 21524 1   C: 21523 0
04,3130     C: 21522 1   C: 21521 1   C: 21717 0   C: 21715 1   C: 21714 0   C: 21113 1   C: 21112 0   C: 21111 0

04,3140     C: 21110 1   C: 11476 1   C: 31475 0   C: 01266 1   C: 01265 1   C: 01264 0   C: 01263 1   C: 31657 1
04,3150     C: 31451 0   C: 31450 1   C: 21645 0   C: 21044 1   C: 21043 0   C: 21042 1   C: 21041 1   C: 21040 0
04,3160     C: 21037 0   C: 21636 1   C: 21635 1   C: 41230 0   C: 21627 1   C: 41626 0   C: 21025 0   C: 21424 0
04,3170     C: 31617 0   C: 01006 0   C: 01201 0   C: 00046 0   C: 00465 0   C: 32324 0   C: 00333 1   C: 01733 1

04,3200     I: 53575 0   C: 03570 0   I: 77676 0   C: 00023 0   I: 53435 0   C: 03576 0   C: 00015 0   I: 53435 0
04,3210     C: 00023 0   C: 24007 0   C: 00001 0   I: 76521 0   C: 00007 0   C: 03405 0   I: 77616 0   I: 77160 0
04,3220     C: 00002 0   C: 00000 1   I: 77614 1   C: 04343 1   C: 11230 0   I: 77160 0   C: 00012 1   C: 00002 0
04,3230     I: 66143 1   C: 22305 1   C: 03745 1   C: 23752 0   C: 22277 0   I: 54214 1   C: 04343 1   C: 11241 0

04,3240     C: 20607 1   C: 03750 0   I: 43134 0   C: 03746 1   C: 01271 1   I: 52014 0   C: 05316 0   C: 45343 1
04,3250     C: 73027 0      34765 1      00006 1      02013 1      00006 1      13276 0      13257 0      00006 1
04,3260        00004 0      61063 0      64753 1      64753 1      56001 0      33301 0      61064 1      00006 1
04,3270        60001 0      00006 1      63276 1      63302 0      00006 1      63256 0      30071 1      22002 0

04,3300        52005 0   C: 00440 1   C: 77754 1      04553 0      04572 0      06006 1   I: 45014 0   C: 05671 1
04,3310     C: 11546 0   I: 74014 1   C: 04343 1   C: 11315 0   C: 00012 1   I: 51575 1   C: 01555 0   I: 62606 0
04,3320     C: 22301 0   C: 27746 1   C: 01563 0   I: 57236 1   C: 03746 1   I: 52405 1   I: 74421 0   C: 33416 1
04,3330     I: 41471 0   I: 55366 1   C: 33430 0   I: 65205 0   C: 03752 1   I: 65301 0   C: 00047 1   I: 56257 1

04,3340     C: 20172 1   I: 77621 1   C: 02463 1   C: 03413 1   I: 77776 1      35026 0      05535 1      06006 1
04,3350     I: 77624 1   C: 11217 0   I: 71214 0   C: 05470 1   C: 02463 1   I: 77624 1   C: 11441 0   I: 77775 1
04,3360     C: 11762 1   C: 17405 0   C: 02633 0   I: 57215 0   C: 02370 1   C: 11376 0   I: 45061 1   C: 20206 1
04,3370     C: 24005 1   I: 77624 1   C: 73027 0   I: 77650 1   C: 11352 0   C: 56574 1   C: 47556 1   C: 13434 0
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OCTAL LISTING FOR PARAGRAPH # 043,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,3400     C: 16163 1   C: 22407 1   C: 36673 0      04553 0      03424 0      04565 0      03424 0   I: 77734 1
04,3410     C: 03664 0   I: 77740 1   C: 03664 0   I: 77533 1   C: 13270 0      30154 1      05770 1      35023 0
04,3420        04636 0   C: 20743 0      04103 1      03417 0      04572 0      06006 1   I: 45014 0   C: 05710 1
04,3430     C: 11306 1   C: 11546 0   I: 71214 0   C: 05671 1   C: 02463 1   C: 37413 0   C: 11217 0   I: 77745 1

04,3440     C: 03413 1   I: 77624 1   C: 76560 0   I: 77201 1   C: 00001 0   C: 03512 1   I: 65315 0   C: 03756 0
04,3450     C: 02463 1   I: 65325 0   C: 03663 1   C: 33430 0   I: 41512 1   I: 77624 1   C: 72740 1   I: 77624 1
04,3460     C: 45314 0   I: 77624 1   C: 15672 0   I: 43214 1   C: 05610 0   C: 11357 0   C: 26731 0   C: 03656 1
04,3470     I: 43014 0   C: 01311 0   C: 11474 0   C: 00470 1   I: 77745 1   C: 02547 0   C: 02547 0   I: 51025 1

04,3500     C: 13267 0   C: 11476 1   I: 77745 1   C: 03656 1   C: 03656 1   I: 51025 1   C: 13267 0   C: 11504 0
04,3510     I: 77414 0   C: 05310 0   C: 11516 0      34605 0      05535 1      06006 1   I: 77624 1   C: 76537 1
04,3520     I: 77775 1   C: 02453 1   C: 36541 1   C: 32050 0   I: 64375 1   C: 03667 0   C: 00001 0   I: 77772 0
04,3530     C: 03540 0   I: 77414 0   C: 05310 0   C: 11537 0      33545 0      05535 1      06006 1   I: 77745 1

04,3540     C: 03663 1   C: 36465 0   C: 73027 0   I: 77650 1   C: 11437 1   C: 01522 0   I: 71220 1   C: 02551 1
04,3550     C: 11400 0   C: 17754 1   C: 11402 1   C: 03744 0   I: 67214 1   C: 05711 0   C: 11561 0   C: 33433 0
04,3560     C: 03766 0   I: 77776 1      34603 0      05535 1      34533 0      05535 1      34532 1      05535 1
04,3570        06006 1   I: 77650 1   C: 02551 1      04553 0      03576 0      04565 0      04572 0      34604 1

04,3600        05535 1      06006 1   I: 77745 1   C: 02465 1   C: 17663 1   C: 02461 0   C: 37413 0   C: 11217 0
04,3610     I: 45145 0   C: 03413 1   C: 76560 0   I: 77624 1   C: 56674 1   C: 02445 0   I: 77201 1   C: 00001 0
04,3620     C: 03546 0   I: 45115 0   C: 02453 1   C: 63615 0   I: 77624 1   C: 45304 1   I: 77201 1   C: 00001 0
04,3630     C: 02617 0   I: 45115 0   C: 02625 1   C: 63615 0   I: 77624 1   C: 45314 0   I: 43145 0   C: 11762 1

04,3640     C: 03461 1   C: 36355 1   C: 72251 1   I: 77454 1   C: 24035 1      05671 1   C: 00611 1      35023 0
04,3650        04636 0   C: 20743 0      04103 1      03655 1      03576 0      06006 1   I: 77745 1   C: 11762 1
04,3660     C: 36355 1   C: 24035 1   I: 51025 1   C: 13267 0   C: 11662 0   I: 77615 0   C: 13267 0   C: 16547 0
04,3670     C: 03663 1   I: 41425 1   C: 02465 1   I: 45246 0   C: 13267 0   I: 43244 1   C: 11673 0   C: 13267 0

04,3700     I: 45565 0   C: 74121 0   I: 77414 0   C: 05310 0   C: 11710 1      34605 0      05535 1      06006 1
04,3710     I: 77624 1   C: 76537 1   I: 77624 1   C: 73027 0   I: 77650 1   C: 11610 0   I: 77624 1   C: 47432 1
04,3720     I: 75160 1   C: 02713 0   C: 01733 1   I: 45014 0   C: 01662 1   C: 34730 1   I: 77414 0   C: 01462 0
04,3730        04103 1   I: 77620 0   C: 03373 0   I: 43205 1   C: 11752 1   C: 03733 0   C: 37606 0   C: 46223 0

04,3740     I: 77624 1   C: 11744 0   I: 77650 1   C: 03373 0   I: 50375 0   C: 03542 1   C: 03474 0   I: 65512 1
04,3750     I: 77616 0   C: 00052 0   C: 05716 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 20000 0
04,3760     C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 77777 0
04,3770     C: 77771 0   C: 77763 0   C: 37777 1   C: 37777 1   C: 37777 1   C: 37777 1   C: 03776 1 CKSM 40022 0
```

```
OCTAL LISTING FOR PARAGRAPH # 044,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,2000       C: 77340 0     C: 32043 1     C: 24337 0     C: 32052 1     C: 14337 0     C: 32057 1     C: 03412 0     C: 03422 0
05,2010       C: 13414 1     C: 03427 0     C: 01104 0     C: 11314 1     C: 03023 0     C: 03223 1     C: 03702 1     C: 12444 0
05,2020       C: 25733 1     C: 32061 1     C: 00024 1     C: 32063 0     C: 24337 0     C: 32052 1     C: 14337 0     C: 32057 1
05,2030       C: 32075 1     C: 03743 1     C: 03753 0     C: 00007 0     C: 00106 0     C: 01021 0     C: 03223 1     C: 01337 1

05,2040       C: 32101 0     C: 13720 0     C: 64111 1     C: 76746 0     C: 01033 0     C: 01035 0     C: 01037 1     C: 01041 0
05,2050       C: 01043 1     C: 76750 1     C: 77743 1     C: 03133 0     C: 03135 0     C: 03137 1     C: 77745 1     C: 07076 1
05,2060       C: 70605 0     C: 20074 0     C: 52551 1     C: 76056 0     C: 01723 0     C: 01725 0     C: 01727 1     C: 01731 0
05,2070       C: 01642 0     C: 76060 0     C: 00775 1     C: 01516 1     C: 07172 1     C: 01432 0     C: 34076 1     C: 04374 0

05,2100       C: 73741 1     C: 03072 1     C: 03065 1     C: 07167 0     C: 13125 0     C: 05306 1     C: 01333 0     C: 34011 0
05,2110       C: 34013 1     C: 34030 0     C: 43745 0     C: 32043 1     C: 24337 0     C: 32052 1     C: 14337 0     C: 32057 1
05,2120       C: 03412 0     C: 00302 0     C: 17674 1     C: 17460 0     C: 06342 1     C: 03023 0     C: 13720 0     C: 25733 1
05,2130       C: 32061 1     C: 00024 1     C: 32063 0     C: 24337 0     C: 32052 1     C: 14337 0     C: 32072 0     C: 12757 1

05,2140       C: 00106 0     C: 01021 0     C: 02633 0     C: 01337 1     C: 32101 0     C: 52551 1     C: 32043 1     C: 24337 0
05,2150       C: 32052 1     C: 14337 0     C: 32057 1     C: 03412 0     C: 03422 0     C: 13414 1     C: 01007 1     C: 17674 1
05,2160       C: 00771 0     C: 03662 0     C: 03424 0     C: 02636 0     C: 06460 0     C: 03655 1     C: 13404 0     C: 06311 1
05,2170       C: 32061 1     C: 00024 1     C: 32063 0     C: 24337 0     C: 32052 1     C: 14337 0     C: 32072 0     C: 02632 1

05,2200       C: 03753 0     C: 00007 0     C: 13645 1     C: 01337 1     C: 32101 0     C: 02315 1     C: 07400 1     C: 07756 1
05,2210       C: 77671 1     C: 32043 1     C: 24337 0     C: 32052 1     C: 14337 0     C: 32057 1     C: 07300 0     C: 03635 1
05,2220       C: 24304 0     C: 14320 0     C: 04300 0     C: 03313 0     C: 13675 1     C: 07400 1     C: 03265 0     C: 32061 1
05,2230       C: 00324 1     C: 32260 1     C: 24337 0     C: 32052 1     C: 14337 0     C: 00775 1     C: 01516 1     C: 13167 0

05,2240       C: 07300 0     C: 24304 0     C: 14320 0     C: 03072 1     C: 03065 1     C: 03314 1     C: 01337 1     C: 13125 0
05,2250       C: 05306 1     C: 01333 0     C: 32107 0     C: 01432 0     C: 34076 1     C: 04374 0     C: 00106 0     C: 74017 1
05,2260       C: 76463 1     C: 01316 1     C: 01320 1     C: 03726 1     C: 03724 0     C: 03756 0     C: 76673 1     C: 32043 1
05,2270       C: 24337 0     C: 32052 1     C: 14337 0     C: 32057 1     C: 32340 1     C: 24337 0     C: 32347 0     C: 24337 0

05,2300       C: 32356 0     C: 10337 1     C: 03751 1     C: 00007 0     C: 00007 0     C: 00007 0     C: 32061 1     C: 00024 1
05,2310       C: 32335 0     C: 04337 1     C: 00007 0     C: 00007 0     C: 00007 0     C: 00007 0     C: 32052 1     C: 14337 0
05,2320       C: 32072 0     C: 03747 0     C: 00106 0     C: 12025 0     C: 00007 0     C: 01337 1     C: 32101 0     C: 00007 0
05,2330       C: 00007 0     C: 00007 0     C: 00007 0     C: 00007 0     C: 77770 1     C: 77027 1     C: 00752 1     C: 77031 0

05,2340       C: 74236 0     C: 03543 0     C: 03545 0     C: 03547 1     C: 03551 0     C: 03553 1     C: 74240 1     C: 74220 1
05,2350       C: 03561 0     C: 03563 1     C: 03565 1     C: 03567 0     C: 03571 1     C: 74222 0     C: 74202 1     C: 03577 1
05,2360       C: 03601 0     C: 74204 1     C: 02113 0     C: 02211 1     C: 02146 0     C: 02001 1     C: 02267 0        00004 0
05,2370          03046 0        12376 0        34753 1        05135 0     C: 77777 0     C: 77777 0        31241 1        75004 1
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OCTAL LISTING FOR PARAGRAPH # 045,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,2400      64752 0     55241 0     34772 1     55365 1     54375 1     54376 1     54377 0     55306 1
05,2410      00006 1     01077 0     44664 0     55322 1     34772 1     55360 1     55362 0     55501 0
05,2420      00006 1     01005 0     00006 1     01006 0     00006 1     01011 0     00006 1     01012 0
05,2430      00006 1     01013 1     00006 1     01014 0     55331 0     54332 1     54370 1     55275 1

05,2440      54772 1     54771 1     55247 0     54735 1     54736 1     54740 0     54741 1     41241 0
05,2450      75004 1     10000 0     02456 1     35004 0     00006 1     05012 1     02536 0     44772 0
05,2460      55214 0     34346 1     54365 0     33247 0     55333 1     37702 0     55323 0     33251 1
05,2470      55337 0     35055 1     55334 0     00006 1     33231 1     52113 0     33252 1     54074 0

05,2500      30075 0     74755 0     63253 0     54075 1     33254 1     54076 1     30077 1     74754 1
05,2510      63255 0     54077 0     00006 1     33257 1     52101 0     00006 1     33261 1     52103 1
05,2520      30104 1     72562 0     63262 1     54104 0     33263 0     54105 1     34756 1     70106 1
05,2530      63264 1     54106 1     33265 0     54107 0     04655 0  C: 03173 1     00004 0     00006 1

05,2540      34772 1     53160 0     00006 1     34772 1     53164 1     00006 1     34772 1     53156 0
05,2550      00006 1     34772 1     53162 1     00006 1     34772 1     53166 0     00006 1     34772 1
05,2560      53170 1     00002 0  C: 06200 0     25306 0     22002 0     00006 1     04007 1     53433 0
05,2570      04636 0  C: 40000 0     34752 0     00006 1     03033 1     00006 1     12604 0     34753 1

05,2600      00006 1     02033 0     00006 1     13044 0     03023 0     34344 0     71360 1     00006 1
05,2610      12612 1     13044 0     41360 1     00006 1     12631 0     61377 0     00006 1     12621 1
05,2620      13044 0     31374 0     54003 0     00006 1     31376 1     51377 0     52001 1     34772 1
05,2630      55360 1     03046 0     30102 1     74076 0     00006 1     74766 0     76211 1     00006 1

05,2640      50000 1     33231 1     52113 0     44753 0     70106 1     54106 1     31337 1     75001 1
05,2650      64762 0     55337 0     34763 1     71334 0     65055 1     55334 0     34772 1     54740 0
05,2660      54741 1     33250 0     71241 0     64752 0     57241 1     74765 0     00006 1     12676 0
05,2670      04714 1  C: 17070 0     36211 0     05233 0  C: 03064 0  C: 16063 0     33240 1     71333 1

05,2700      67660 0     55333 1     40101 0     74762 1     10000 0     12730 0     34754 0     00006 1
05,2710      05011 1     12730 0     00004 0     03023 0     03054 0     44753 0     70106 1     54106 1
05,2720      40102 0     74076 0     00006 1     62730 1     35011 1     05233 0  C: 03037 0  C: 34066 0
05,2730      30102 1     74076 0     00006 1     62744 1     34764 0     70075 1     10000 0     12744 0

05,2740      04611 0     04463 1     35024 1     54003 0     34773 0     54161 0     60000 1     00006 1
05,2750      50000 1     31156 1     00006 1     06001 0     10000 0     13012 0     13012 0     13012 0
05,2760      10161 0     12745 1     54162 0     05350 1     00004 0     34773 0     54161 0     60000 1
05,2770      50000 1     11156 0     12774 0     13001 1     54154 0     24154 1     24162 1     04636 0
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OCTAL LISTING FOR PARAGRAPH # 046,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,3000   C: 03467 1     10161 0     12766 0     10162 0     12534 0     34752 0     71214 0     00006 1
05,3010      14103 0     12534 0     05671 1  C: 01107 0     12414 0     00004 0     03054 0     44753 0
05,3020      70106 1     54106 1     12744 0     34762 0     00006 1     02016 1     00006 1     13043 1
05,3030      34342 0     00006 1     02016 1     63246 1     00006 1     13044 0     00006 1     00015 0

05,3040      63246 1     00006 1     13044 0     00002 0     03046 0     12414 0     33241 0     54334 1
05,3050      37662 1     54030 0     64770 0     54027 0     33244 0     00006 1     03011 1     34750 1
05,3060      54026 1     33245 1     00006 1     03013 0     34753 1     64755 1     64757 0     40000 0
05,3070      70076 1     64757 0     54076 1     44765 0     70075 1     54075 1     44765 0     70074 0

05,3100      54074 0     35024 1     54003 0     34751 0     55407 1     55406 0     55405 0     55404 1
05,3110      55403 0     55402 1     55401 1     55400 0     45274 1     55410 1     55412 0     55414 0
05,3120      55416 1     55420 1     55422 0     55424 0     55426 1     55430 0     45275 0     55411 0
05,3130      55413 1     55415 1     55417 0     55421 0     55423 1     55425 1     55427 0     55431 1

05,3140      44772 0     54167 0     54203 1     54217 1     54233 1     54247 1     54263 1     54277 1
05,3150      55322 1     54067 1     33243 1     54400 1     65005 1     54454 0     65005 1     54530 0
05,3160      65005 1     54604 1     65005 1     54660 0     34355 0     54154 0     44755 0     50154 1
05,3170      55226 1     10154 0     13165 1     55000 1     55001 0     55002 0     55003 1     54045 1

05,3200      55201 1     55245 1     55216 1     55220 1     55215 1     55223 1     55224 0     55204 1
05,3210      55205 0     55246 1     55335 1     55324 1     54100 1     54301 1     55247 0     34775 0
05,3220      55221 0     33242 0     55361 0     44351 0     55202 1     00002 0     30001 0     15326 1
05,3230   C: 03226 1  C: 12066 1  C: 02123 0  C: 42066 1  C: 03222 0  C: 34066 0  C: 02000 0  C: 54066 0

05,3240   C: 00435 0  C: 03446 1  C: 03270 1  C: 00400 0  C: 77603 1  C: 74777 0  C: 77755 0  C: 37411 1
05,3250   C: 00450 0  C: 00130 0  C: 00000 1  C: 00000 1  C: 00000 1  C: 00000 1  C: 00000 1  C: 00200 0
05,3260   C: 00004 0  C: 00000 1  C: 00000 1  C: 00000 1  C: 00000 1  C: 00006 1  C: 00025 0  C: 37100 1
05,3270   C: 00600 1  C: 00601 0  C: 00602 0  C: 00603 1  C: 00604 0  C: 00605 1  C: 00606 1  C: 00003 1

05,3300   C: 34661 1  C: 00606 1  C: 04467 0  C: 00601 0  C: 33216 1  C: 00000 1  C: 01177 1  C: 77754 1
05,3310   C: 57611 0  C: 00116 1  C: 00730 0     34322 0     55506 1     31465 1     74754 1     00006 1
05,3320      13324 0     51506 0     33410 1     13334 1     31472 1     60000 1     00006 1     51506 0
05,3330      73432 0     20001 1     51506 0     63420 1     51506 0     55511 1     11506 1     13314 0

05,3340      11465 0     13347 0     13347 0     53522 1     21513 0     33445 1     27520 0     34767 0
05,3350      55506 1     55507 0     31473 0     63444 0     60000 1     55510 0     00006 1     63362 0
05,3360      37701 0     55506 1     51506 0     31516 1     00006 1     71510 0     60000 1     51507 1
05,3370      61511 0     51507 1     55467 1     11507 0     13404 0     31465 1     74753 0     10000 0
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OCTAL LISTING FOR PARAGRAPH # 047,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,3400      31472 1      61473 0      55475 1      00002 0      55507 0      00006 1      27506 1      13362 1
05,3410   C: 00616 0   C: 02526 1   C: 02352 1   C: 01471 1   C: 00634 0   C: 00612 1   C: 03706 0   C: 04425 0
05,3420   C: 00644 1   C: 03710 1   C: 04246 0   C: 02011 0   C: 77501 0   C: 00612 1   C: 04656 0   C: 10372 0
05,3430   C: 77126 1   C: 76261 0   C: 00767 1   C: 15624 0   C: 03054 0   C: 04532 1   C: 10433 1   C: 00000 1

05,3440   C: 22070 0   C: 03204 1   C: 77266 0   C: 02476 0   C: 70364 1   C: 75420 0      37702 0      54336 0
05,3450      54335 0      33574 1      54334 1      13467 0      10335 0      03607 0   C: 77753 0      13460 1
05,3460      10336 0      13622 0   C: 74001 0      30333 1      00006 1      63467 1      13474 1      50332 0
05,3470      32362 1      54333 0      40332 1      13711 1      50333 1      30000 1      10000 0      24333 1

05,3500      13504 1      56333 1      40000 0      56333 1      24000 1      54335 0      63456 0      10000 0
05,3510      13514 0   C: 47777 0      13514 0      03536 1      30335 1      63511 1      00006 1      63607 0
05,3520      67674 0      00006 1      63545 0      00006 1      50335 1      44000 1      54001 1      00006 1
05,3530      50335 1      43777 1      54335 0      37702 0      56335 1      13635 0      00006 1      22070 0

05,3540      04542 0      44762 1      00006 1      03013 0      00070 0      50335 1      00000 1      10000 0
05,3550      30335 1      13621 0      56335 1      54336 0      34772 1      56335 1      54003 0      74350 1
05,3560      00006 1      50000 1      31402 0      50335 1      52340 1      24335 1      24335 1      24336 1
05,3570      50336 1      00000 1      10000 0      13556 0   C: 03454 1      54336 0      37702 0      54335 0

05,3600      56336 1      54003 0      74350 1      00006 1      50000 1      31402 0      13635 0      30335 1
05,3610      54003 0      74350 1      54001 1      33462 1      26335 0      00006 1      50001 0      31401 0
05,3620      13635 0      54336 0      50336 1      00000 1      10000 0      24336 1      13632 1      54336 0
05,3630      37702 0      56336 1      24000 1      54335 0      13515 1      00006 1      01034 1      30001 0

05,3640      00006 1      01035 0      15323 1      34772 1      54335 0      03706 0      33655 1      54334 1
05,3650      30025 0      56001 0      30335 1      13635 0   C: 03656 1   C: 03670 0      34767 0      26335 0
05,3660      74350 1      10000 0      13672 0      30335 1      74754 1      00006 1      13645 1      13446 0
05,3670      33654 0      54334 1      30335 1      54003 0      74350 1      54002 1      34771 1      54001 1

05,3700      50002 0      71401 1      56001 0      50002 0      71400 0      13635 0      00006 1      22334 0
05,3710      35041 1      54061 1      03536 1      32000 0      56001 0      30061 0      13635 0   I: 77656 1
05,3720   C: 16714 1   C: 00045 0   C: 26722 1   I: 77656 1   C: 02724 1   I: 72441 0   C: 02714 1   I: 77725 1
05,3730   C: 00045 0   C: 24041 1   C: 02724 1   I: 76435 1   C: 02714 1   I: 75214 1   C: 03705 0   C: 13751 0

05,3740   C: 02675 1   I: 40056 0   C: 13747 1   C: 16676 1   C: 00045 0   I: 43565 0   C: 02675 1   I: 52162 0
05,3750   C: 13743 0   I: 75246 0   C: 02675 1   I: 77616 0   C: 00000 1   C: 00003 1   I: 77414 0   C: 04674 0
05,3760      24773 1      03671 1   C: 01703 1      06006 1   I: 77745 1   C: 13771 1   C: 03466 0   I: 77616 0
05,3770   C: 00000 1   C: 02342 0   C: 00000 1   C: 01060 0   C: 03774 0   C: 03775 1 CKSM 66070 0         @
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OCTAL LISTING FOR PARAGRAPH # 050,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,2000          54016 1      00006 1      22012 1      11322 1      12010 0      12007 0      12132 1      36214 0
06,2010          54070 1      55322 1      11241 0      02063 0      02063 0      57241 1      74347 1      55241 0
06,2020          64076 1      00006 1      01010 1      02072 0      55221 0      44772 0      54073 1      57201 0
06,2030          64771 1      55201 1      51201 0      11226 1      11201 1      12030 1      12047 1   C: 22400 0

06,2040          10073 1   C: 37764 0      55221 0      00002 0      54073 1      34355 0      12031 0      64770 0
06,2050          51201 0      55226 1      74347 1      54073 1      34344 0      51201 0      74063 1      60073 0
06,2060          00006 1      01010 1      16706 1      30101 1      74752 1      00006 1      12126 1      11221 0
06,2070          02024 0      12126 1      42037 0      27322 1      37663 0      54027 0      31334 1      00006 1

06,2100          06032 0      74753 0      00006 1      12116 1      23334 1      00006 1      06001 0      55334 0
06,2110          74753 0      10000 0      12116 1      05120 1   C: 03311 1   C: 60102 1      50070 0      12120 1
06,2120          12124 0      13001 1      12124 0      12167 1      04714 1   C: 20000 0      00006 1      01010 1
06,2130          32041 0      12075 0      34753 1      71322 1      00006 1      12163 0      11221 0      02024 0

06,2140          12150 0      44753 0      27322 1      37663 0      54027 0      34760 1      27322 1      05323 0
06,2150          00006 1      01010 1      37663 0      26027 0      34760 1      27322 1      11322 1      05323 0
06,2160       C: 37737 0      02152 0      05323 0      00006 1      01010 1      34753 1      12142 0      31333 0
06,2170          00006 1      06030 1      72764 1      00006 1      12224 0      54070 1      23333 0      00006 1

06,2200          06001 0      55333 1      44770 1      56070 0      00006 1      62517 0      12210 1      64770 0
06,2210          24070 0      60000 1      54000 0      12210 1      56071 1      50070 0      34753 1      71333 1
06,2220          50070 0      02760 1      10071 0      12207 1      41333 1      74762 1      10000 0      12366 1
06,2230          34761 0      71333 1      10000 0      12237 1      34761 0      27333 1      12366 1      34761 0

06,2240          64762 0      40000 0      71333 1      55333 1      74753 0      10000 0      12342 1      41333 1
06,2250          74760 0      10000 0      12255 0      05671 1   C: 00213 1      02740 0      33670 0      05233 0
06,2260       C: 02265 1   C: 14063 1      12366 1      33670 0      05260 0      44767 1      71333 1      57333 0
06,2270          74767 1      00006 1      12305 1      34753 1      71333 1      00006 1      12263 0      40074 0

06,2300          74761 1      10000 0      15314 0      04655 0   C: 17625 0      34752 0      00006 1      05012 1
06,2310          04714 1   C: 17207 1      05511 1      45001 1      00006 1      03012 1      35025 0      05260 0
06,2320          34763 1      64765 1      64766 1      40000 0      71333 1      55333 1      44763 0      71334 0
06,2330          55334 0      02706 1      44752 1      00006 1      03012 1      35020 0      05233 0   C: 03175 1

06,2340       C: 16063 0      15314 0      34765 1      00006 1      02012 0      10000 0      12366 1      34761 0
06,2350          70074 0      10000 0      12366 1      02751 0      04714 1   C: 17207 1      34764 0      00006 1
06,2360          05012 1      05511 1      34763 1      05223 1   C: 02312 0      12366 1      31334 1      75055 0
06,2370          54001 1      35055 1      00006 1      03033 1      00006 1      66001 0      00006 1      12426 1
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OCTAL LISTING FOR PARAGRAPH # 051,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,2400      54070 1     23334 1     00006 1     06001 0     55334 0     34772 1     56070 0     60000 1
06,2410      12413 1     64770 0     24070 0     60000 1     54000 0     12412 0     56071 1     50070 0
06,2420      34754 0     71334 0     50070 0     02766 1     10071 0     12411 0     10034 1     12433 0
06,2430      12471 0     12433 0     12471 0     62516 1     00006 1     62470 0     63557 0     00076 1

06,2440      62466 1     34765 1     00006 1     02012 0     10000 0     12466 0     35045 0     54003 0
06,2450      41465 0     74346 0     10000 0     12460 0     34770 0     70075 1     10000 0     12466 0
06,2460      04714 1  C: 17070 0     36211 0     05233 0  C: 03064 0  C: 16063 0     34763 1     12471 0
06,2470      34772 1     61241 1     74763 0     00006 1     15323 1     71241 0     10000 0     12513 0

06,2500      34763 1     71333 1     10000 0     15323 1     41241 0     74763 0     64752 0     57241 1
06,2510      72160 0     27241 0     15323 1     02771 1     15323 1     12504 0  C: 63434 1     74750 0
06,2520      54071 0     31333 0     74752 1     00006 1     12531 0     34765 1     00006 1     05011 1
06,2530      12222 0     02771 1     12222 0     44765 0     00006 1     03011 1     12222 0     34767 0

06,2540      71333 1     10000 0     12222 0     34753 1     71333 1     00006 1     12562 0     34752 0
06,2550      00006 1     02012 0     00006 1     12555 1     12222 0     34767 0     27333 1     05671 1
06,2560   C: 00207 1     12222 0     41333 1     74762 1     27333 1     12222 0     10000 0     12354 0
06,2570      35021 1     00006 1     03014 1     42774 0     00006 1     03012 1     44762 1     70101 0

06,2600      54101 0     44754 1     00006 1     03011 1     02746 0     04714 1  C: 17121 0     44772 0
06,2610      54050 0     54051 1     54052 1     54047 0     42777 0     00006 1     03014 1     12222 0
06,2620      00006 1     12646 0     41334 0     74763 0     27334 0     04714 1  C: 17121 0     44760 0
06,2630      70104 0     54104 0     34762 0     64761 0     40000 0     70074 0     56074 1     40000 0

06,2640      74761 1     10000 0     12222 0     05671 1  C: 00214 0     12222 0     34767 0     71333 1
06,2650      10000 0     12222 0     12562 0     10000 0     34757 0     57333 0     73000 0     27333 1
06,2660      02706 1     41333 1     74770 1     10000 0     12424 0     31333 0     72776 1     10000 0
06,2670      12424 0     05671 1  C: 00212 0     12424 0     10000 0     12424 0     05671 1  C: 01105 1

06,2700      12424 0     10000 0     12424 0     05671 1  C: 01106 1     12424 0     34776 0     71333 1
06,2710      00006 1     74757 1     31333 0     00006 1     04001 1     40000 0     75054 1     10000 0
06,2720      12731 1     34770 0     71334 0     10000 0     00002 0     44770 1     00006 1     03011 1
06,2730      00002 0     00006 1     22066 1     05770 1     34770 0     00006 1     05011 1     00066 1

06,2740      47667 0     00006 1     03012 1     35001 0     00006 1     05012 1     41241 0     77664 0
06,2750      27241 0     41333 1     75012 0     27333 1     41334 0     74763 0     27334 0     00002 0
06,2760      12537 0     12706 0     12706 0     12566 1  C: 76400 1     12620 0     12653 1     12674 1
06,2770      12701 1     41334 0     74770 1     15651 1  C: 00272 0  C: 00300 1  C: 01720 0  C: 00740 1
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OCTAL LISTING FOR PARAGRAPH # 052,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,3000      C: 76777 1     31337 1     00006 1     06030 1     74762 1     54070 1     10000 0     03221 0
06,3010         11323 0     13015 1     13015 1     03256 0     15323 1     31337 1     00006 1     06033 1
06,3020         75001 1     26070 1     23337 1     00006 1     06001 0     55337 0     30374 1     75001 1
06,3030         00006 1     13037 1     54001 1     45001 1     71337 0     60001 0     55337 0     41337 0

06,3040         75001 1     00006 1     13047 0     74764 1     10000 0     03047 1     37702 0     55354 0
06,3050         11330 1     03143 1     03115 1     11354 0     03132 1     03071 1     03101 1     03124 0
06,3060         11332 0     03123 1     34770 0     00006 1     05012 1     34124 1     05223 1  C: 03171 0
06,3070         03124 0     03101 1     03154 1     05671 1  C: 00116 1     34775 0     55331 0     03104 1

06,3100         03154 1     34766 1     71337 0     15651 1     34766 1     64767 0     40000 0     71337 0
06,3110         55337 0     44770 1     00006 1     03012 1     00002 0     11354 0     03137 1     03127 0
06,3120         11331 0     03150 0     03146 1     55332 0     31354 1     55330 1     05323 0     11331 0
06,3130         55331 0     03124 0     03101 1     03142 0     05671 1  C: 00116 1     03104 1     34772 1

06,3140         55331 0     55332 0     03154 1     11354 0     03124 0     03154 1     34763 1     55332 0
06,3150         03213 1     04077 0     03257 1     03124 0     11323 0     03161 1     03161 1     03160 0
06,3160         03124 0     34772 1     54740 0     54741 1     03257 1     36211 0     05223 1  C: 03263 0
06,3170         03124 0     34772 1     54036 0     55327 1     43671 0     54035 0     44770 1     00006 1

06,3200         03012 1     34124 1     05260 0     41337 0     74757 1     27337 0     46211 1     71337 0
06,3210         55337 0     03221 0     05314 1     34772 1     55331 0     41337 0     76211 1     27337 0
06,3220         00002 0     34762 0     00006 1     02030 0     10000 0     13247 1     34767 0     71337 0
06,3230         10000 0     00002 0     34761 0     61241 1     74761 1     00006 1     16711 1     54001 1

06,3240         31241 1     00006 1     06001 0     74750 0     64752 0     55241 0     00002 0     34770 0
06,3250         71334 0     10000 0     00002 0     34761 0     71241 0     13235 1     24002 0     44767 1
06,3260         00006 1     03012 1     00002 0     31354 1     00006 1     13267 0     13272 1     34761 0
06,3270         00006 1     05012 1     34767 0     00006 1     05012 1     05314 1     33535 1     56003 1

06,3300         54163 1     11477 0     13305 0     13305 0     13422 1     00004 0     34766 1     77702 1
06,3310         54132 0     50132 1     31453 1     00006 1     50132 1     71314 1     54002 1     30001 0
06,3320         00006 1     74763 0     50132 1     55315 0     30002 0     00006 1     74763 0     50132 1
06,3330         21315 0     50132 1     41452 1     00006 1     71277 0     00006 1     74766 0     50132 1

06,3340         21315 0     10132 0     13307 1     00003 1     55477 0     54130 1     00006 1     41315 0
06,3350         52155 1     31463 1     03425 1     00006 1     41317 1     52155 1     41466 0     03425 1
06,3360         41460 0     03454 1     00006 1     41317 1     52155 1     31464 0     03425 1     00006 1
06,3370         41321 1     52155 1     41467 1     03425 1     41461 1     03454 1     00006 1     41317 1
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OCTAL LISTING FOR PARAGRAPH # 053,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,3400        52155 1     31470 0     03425 1     00006 1     41321 1     52155 1     31465 1     03425 1
06,3410        31462 0     03454 1     11477 0     13415 0     13422 1     35057 0     05121 0  C: 03507 0
06,3420     C: 14063 1     00003 1     30163 0     54003 0     14651 0     56154 1     00006 1     70154 0
06,3430        52123 0     30155 0     00006 1     70154 0     54001 1     34772 1     20123 0     30122 0

06,3440        00006 1     74755 0     50130 0     21472 0     30123 1     00006 1     74755 0     54001 1
06,3450        34772 1     50130 0     21472 0     00002 0     00006 1     22131 1     00006 1     71277 0
06,3460        22155 0     00006 1     74765 0     50130 0     21472 0     30155 0     00006 1     74765 0
06,3470        54001 1     34772 1     50130 0     21472 0     34767 0     60130 0     56130 0     50000 1

06,3500        11471 0     13503 0     00131 1     77702 1     10000 0     55477 0     00131 1     31335 0
06,3510        00006 1     13513 1     15205 1     34766 1     54130 1     50130 0     31472 1     00006 1
06,3520        74761 1     50130 0     55472 0     34772 1     50130 0     57471 1     00006 1     74761 1
06,3530        50130 0     21472 0     10130 1     67702 0     13514 0  C: 01471 1     33535 1     04636 0

06,3540     C: 17244 0     04636 0  C: 17644 1     13544 0     34766 1     54130 1     50130 0     31472 1
06,3550        00006 1     74761 1     50130 0     23472 1     10130 1     67702 0     13545 1  C: 75252 0
06,3560        15205 1     11477 0     13565 0     13565 0     15205 1     00004 0     30076 0     74752 1
06,3570        00006 1     15205 1     30025 0     57277 1     00003 1     40000 0     61277 1     10000 0

06,3600        64770 0     13606 0     13604 1     15205 1     40000 0     64750 1     00006 1     74757 1
06,3610        52123 0     00006 1     30123 1     52155 1     34772 1     55477 0     54130 1     41460 0
06,3620        03636 1     00006 1     40123 0     52155 1     31461 0     03636 1     00006 1     40123 0
06,3630        52155 1     41462 1     03636 1     11477 0     13513 1     15205 1     56002 0     54131 0

06,3640        30002 0     00006 1     70154 0     50130 0     21472 0     30002 0     00006 1     70155 1
06,3650        54001 1     34772 1     50130 0     21472 0     13474 1     04636 0  C: 17214 0     11477 0
06,3660        13663 0     13663 0     15205 1     37652 1     57277 1     40000 0     61105 1     13577 0
06,3670     C: 21450 0  C: 16037 1  I: 43014 0  C: 05660 1  C: 05461 1  I: 43014 0  C: 05662 0  C: 05463 0

06,3700     I: 77745 1  C: 11762 1  C: 03764 1  C: 03665 1  I: 77201 1  C: 00001 0  C: 02541 0  I: 41446 1
06,3710     I: 70501 1  C: 00050 1  I: 51515 1  C: 03554 0  I: 55301 0  C: 00047 1  I: 53664 0  C: 00046 0
06,3720     C: 57175 0  I: 41215 1  C: 33412 0  I: 65301 0  C: 00047 1  C: 03750 0  I: 56342 1  I: 75457 0
06,3730     C: 20172 1  I: 53515 0  C: 02541 0  I: 47315 0  C: 02611 0  I: 77656 1  I: 72441 0  C: 03504 0

06,3740     I: 45421 1  C: 60315 0  C: 13300 0  C: 03464 1  I: 43345 1  C: 03764 1  C: 33432 1  C: 03764 1
06,3750     I: 77025 0  C: 33417 0  C: 00006 1  I: 52044 0  C: 63566 1  C: 24050 1  I: 77620 0  C: 02356 0
06,3760     I: 57575 1  C: 02601 1  C: 15736 1  C: 02603 0  C: 03407 1  I: 51414 1  C: 05356 1  C: 45550 0
06,3770     I: 51025 1  C: 13306 0  C: 45550 0  I: 77775 1  C: 11762 1  C: 37405 1  C: 45550 0  CKSM 04275 0
```

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OCTAL LISTING FOR PARAGRAPH # 054,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

07,2000        02062 1     05354 0  C: 00030 1     12005 1     12010 0     05354 0  C: 00026 0     12015 0
07,2010        34772 1     55747 0     55753 0     34773 0     12016 0     34770 0     54301 1     04665 0
07,2020        55336 1     04636 0  C: 20575 1     32061 1     04636 0  C: 20604 1     12031 0     12042 1
07,2030        12052 0     05527 1     02073 1     05354 0  C: 00003 1     12037 0     02040 1     04103 1

07,2040        04655 0  C: 67370 1     37645 1     05121 0  C: 05524 1  C: 04067 1     35052 0     05176 1
07,2050        31336 0     04660 0     10301 1     12021 1     34321 0     55250 0     32060 0     12024 1
07,2060     C: 14431 1  C: 14600 1     36211 0     71247 0     10000 0     12071 1     34767 0     27247 0
07,2070        00002 0     07706 1  C: 31211 1     00004 0     37702 0     55323 0     34772 1     54301 1

07,2100        44765 0     70075 1     54075 1     00003 1     00002 0     54016 1     30035 1     54361 1
07,2110        30036 1     54357 1     30033 1     54356 0     30034 0     54360 0     30032 0     54362 1
07,2120        00006 1     30025 0     52355 0     00006 1     30355 1     52014 0     56002 0     54012 0
07,2130        34763 1     00006 1     02016 1     10000 0     02154 0     34762 0     00006 1     02016 1

07,2140        10000 0     02344 0     34342 0     00006 1     02016 1     00006 1     12151 1     04655 0
07,2150     C: 17675 0     05671 1  C: 00113 1     05323 0     11341 1     12160 0     12160 0     34772 1
07,2160        64770 0     05233 0  C: 02165 1  C: 16067 1     15323 1     34753 1     70105 1     10000 0
07,2170        12204 1     31341 0     00006 1     62204 0     44770 1     54353 0     30362 0     02325 1

07,2200        30356 1     02325 1     30360 1     02325 1     34753 1     70076 1     10000 0     12314 1
07,2210        34755 1     70101 0     10000 0     12304 0     10301 1     12221 0     05671 1  C: 00114 0
07,2220        05314 1     54301 1     05547 1  C: 00032 0     05354 0  C: 00030 1     12235 0     24301 0
07,2230        05547 1  C: 00061 0     05547 1  C: 00052 0     12240 1     05354 0  C: 00026 0     12314 1

07,2240        25747 1     00006 1     30355 1     51753 1     53540 0     00006 1     30357 0     51753 1
07,2250        53542 1     00006 1     30361 0     51753 1     53544 1     30362 0     51753 1     55545 0
07,2260        05354 0  C: 00030 1     12273 1     44172 0     61753 1     00006 1     12270 1     12273 1
07,2270        34772 1     55753 0     12275 1     34774 1     27753 0     10301 1     15314 0     37644 0

07,2300        05135 0  C: 02052 1  C: 16067 1     15314 0     36211 0     05607 0  C: 00354 0  C: 01674 0
07,2310        35047 1     05121 0  C: 02230 1  C: 76067 1     36211 0     05607 0  C: 00354 0  C: 01722 1
07,2320        34753 1     70076 1     10000 0     15314 0     12275 1     24353 1     00006 1     50353 1
07,2330        20032 1     10000 0     12336 1     00002 0     12336 1     00002 0     67701 0     00006 1

07,2340        62335 0     05671 1  C: 00121 0     15314 0     34753 1     70076 1     00006 1     12367 0
07,2350        31722 1     00006 1     12355 1     00006 1     62360 0     37702 0     55722 0     05323 0
07,2360        34762 0     70105 1     00006 1     15323 1     05547 1  C: 00231 1     05323 0     34765 1
07,2370        70075 1     10000 0     02376 1     05671 1  C: 00110 1     05323 0     05561 0  C: 00032 0
```

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OCTAL LISTING FOR PARAGRAPH # 055, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

07,2400     05354 0   C: 00030 1      12422 0      05561 0   C: 00052 0      11753 0      12411 0      34172 1
07,2410     12413 1      44774 0      61753 1      54070 1      00006 1      50070 0      41540 0      50070 0
07,2420     53540 0      12433 0      24301 0      05354 0   C: 00026 0      12433 0      44770 1      27747 0
07,2430     44774 0      27753 0      12413 1      37644 0      05135 0   C: 02023 1   C: 16067 1      15323 1

07,2440  I: 74345 0   I: 76455 1   C: 00023 0   I: 50206 0   C: 03540 0   I: 41552 0   I: 72316 0   C: 00155 0
07,2450  I: 50315 0   C: 03540 0   C: 03540 0   I: 57551 1   C: 00155 0   I: 50315 0   C: 03554 0   C: 03554 0
07,2460  I: 76371 0   I: 71244 0   C: 16500 0   C: 03764 1   I: 77025 0   C: 33432 1   C: 00001 0   I: 77654 0
07,2470  C: 11407 1   I: 70545 1   C: 03464 1   C: 03464 1   I: 77621 1   C: 03470 1   C: 37462 0   C: 15744 1

07,2500  I: 41566 1   I: 45276 0   C: 00007 0   C: 14013 0   I: 45425 0   C: 77762 1   I: 77646 0   C: 14017 1
07,2510  C: 00013 0   I: 45246 0   C: 00017 1   I: 71240 1   C: 50123 1   C: 00015 0   C: 34013 1   C: 50123 1
07,2520  I: 41406 0   I: 74241 0   C: 02611 0   C: 02611 0   I: 51352 1   I: 63256 0   I: 74246 1   I: 43572 0
07,2530  I: 45345 1   C: 02347 0   C: 00364 0   I: 77634 0   C: 45636 0   I: 77612 1   C: 14772 0   C: 02347 0

07,2540  C: 00364 0   I: 77545 0   C: 01771 1      30772 0      56771 0      22007 0      30155 0      00006 1
07,2550     10771 1      56001 0      31773 0      00006 1      21313 0      00006 1      70001 1      55657 0
07,2560     22007 0      30154 1      00006 1      10771 1      56001 0      30330 1      00006 1      21312 1
07,2570     00006 1      70001 1      55656 1      34770 0      54772 1      50772 0      31656 0      00006 1

07,2600     62610 1      62626 1      00006 1      62617 0      42626 0      50772 0      55656 1      12617 1
07,2610     40000 0      62626 1      00006 1      62617 0      32626 1      50772 0      55656 1      10772 1
07,2620     12574 1      06006 1   I: 77745 1   C: 02657 1   C: 34736 1   C: 31161 0   C: 77177 0      00004 0
07,2630     41241 0      75004 1      10000 0      12637 0      05671 1   C: 00206 0      13622 0      03616 0

07,2640     41334 0      74763 0      27334 0      40000 0      74764 1      27334 0      41333 1      74765 0
07,2650     27333 1      40000 0      74766 0      27333 1      45004 1      00006 1      03012 1      03207 1
07,2660     34764 0      00006 1      05012 1      05511 1      34763 1      05223 1   C: 02677 0      41333 1
07,2670     74760 0      10000 0      12675 0      05671 1   C: 00210 1      00003 1      14651 0      03606 1

07,2700     05511 1      44764 1      00006 1      03012 1      35025 0      05260 0      03606 1      34765 1
07,2710     64766 1      40000 0      71333 1      55333 1      34763 1      64764 0      40000 0      71334 0
07,2720     55334 0      04714 1   C: 14706 0      13563 0      00004 0      03616 0      03070 0      36211 0
07,2730     05233 0   C: 02734 0   C: 16063 0      12675 0      03606 1      34763 1      00006 1      05012 1

07,2740     34767 0      55474 0      51474 1      31307 1      00006 1      51474 1      20032 1      00006 1
07,2750     74754 1      56001 0      60000 1      54061 1      12756 0      26001 1      51474 1      23471 1
07,2760     11474 0      02741 1      34767 0      05260 0      03606 1      54061 1      34767 0      55474 0
07,2770     51474 1      11471 0      02776 0      03005 1      03043 0      03005 1      63663 1      00006 1
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OCTAL LISTING FOR PARAGRAPH # 056,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

07,3000        63053 1        51474 1        55471 0        43664 1        24061 0        64771 1        51474 1        54057 0
07,3010        11474 0        02767 0        10061 1        13057 1        05255 0     C: 00226 1        34767 0        54061 1
07,3020        50000 1        30032 0        00006 1        50061 0        21307 0        10000 0        13034 1        13031 1
07,3030        13034 1        10061 1        13017 0        13563 0        63042 1        00006 1        63031 0        05671 1

07,3040     C: 00211 0        13625 1     C: 77511 1        63663 1        00006 1        63053 1        40000 0        51474 1
07,3050        55471 0        33664 0        03004 0        34772 1        51474 1        57471 1        03004 0        37673 1
07,3060        00006 1        05014 1        33665 1        12763 0        34763 1        00006 1        05012 1        05314 1
07,3070        34765 1        00006 1        02012 0        10000 0        00002 0        44763 0        00006 1        03012 1

07,3100        44757 1        00006 1        03014 1        44772 0        54047 0        34765 1        00006 1        05012 1
07,3110        41241 0        77664 0        27241 0        41334 0        74763 0        27334 0        41333 1        74765 0
07,3120        27333 1        44764 1        70075 1        54075 1        44752 1        70076 1        54076 1        44754 1
07,3130        70077 0        54077 0        00002 0        00004 0        03616 0        45001 1        00006 1        03012 1

07,3140        44763 0        71334 0        55334 0        03207 1        34757 0        05223 1     C: 03155 0        35017 1
07,3150        05223 1     C: 03153 0        12675 0        03606 1        13563 0        03613 0        15314 0        34765 1
07,3160        00006 1        02012 0        10000 0        15314 0        41333 1        74754 1        27333 1        44765 0
07,3170        71333 1        55333 1        04714 1     C: 14706 0        15314 0        03613 0        15314 0        41333 1

07,3200        74757 1        27333 1        41334 0        74754 1        27334 0        44764 1        13170 0        47664 0
07,3210        71241 0        64752 0        55241 0        00002 0        44772 0        54037 1        54040 1        54041 0
07,3220        03613 0        14651 0        00004 0        44770 1        71333 1        55333 1        04714 1     C: 14706 0
07,3230        12675 0        00004 0        41333 1        74770 1        27333 1        74757 1        10000 0        12675 0

07,3240        05671 1     C: 00212 0        00004 0        13226 0        54161 0        03616 0        11324 1        03307 0
07,3250        34763 1        00006 1        05014 1        34766 1        05233 0     C: 03324 1     C: 16063 0        30161 1
07,3260        56003 1        56161 1        55324 1        74350 1        54061 1        34767 0        54157 0        60000 1
07,3270        60061 0        54160 1        00006 1        50000 1        31401 0        52155 1        07224 1        52155 1

07,3300        50160 0        53401 1        10157 0        13266 1        30161 1        54003 0        12675 0        00006 1
07,3310        30134 1        52155 1        33323 0        15163 1        11324 1        13312 0        00006 1        30155 0
07,3320        52134 0        34770 0        13254 0     C: 17314 1        43560 0        00006 1        03014 1        03575 0
07,3330        31324 0        00006 1        74765 0        50000 1        13335 0        03352 0     C: 00202 1        03352 0

07,3340     C: 00302 0        03350 1     C: 00100 0        34772 1        55324 1        33323 0        05167 1        13153 1
07,3350        44766 0        27324 1        50002 0        30000 1        54064 1        74774 0        64754 0        27324 1
07,3360        54003 0        74350 1        54061 1        44774 0        70064 1        54064 1        00006 1        50061 0
07,3370        31401 0        52071 0        10070 1        13406 1        13376 1        13541 0        10071 0        13403 1
```

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OCTAL LISTING FOR PARAGRAPH # 057,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

07,3400         13330 0      13536 0      13330 0      63437 1      00006 1      63330 1      60006 1      33562 0
07,3410         20071 0      30064 0      00006 1      05014 1      36043 0      70071 0      56071 1      00006 1
07,3420         74761 1      54062 1      30070 0      00006 1      74760 0      54070 1      30001 0      00006 1
07,3430         74753 0      26062 1      00006 1      30071 1      67702 0      10000 0      13503 0   C: 77601 0

07,3440         13444 1      34753 1      26062 1      34772 1      50061 0      53401 1      30062 0      54047 0
07,3450         03570 0      30047 1      00006 1      74757 1      66214 0      05223 1   C: 03467 1      03463 0
07,3460         15314 0      34767 0      54047 0      34757 0      00006 1      05014 1      00002 0      44760 0
07,3470         00006 1      03014 1      03461 1      34770 0      05223 1   C: 03324 1      34760 1      00006 1

07,3500         05014 1      03461 1      15314 0      50061 0      53401 1      34753 1      60062 0      54047 0
07,3510         00006 1      74757 1      67700 1      05223 1   C: 03516 0      13457 0      03570 0      31324 0
07,3520         54003 0      74350 1      54061 1      50061 0      11400 0      13531 1      34753 1      26047 0
07,3530         13450 1      50061 0      55400 0      34753 1      26047 0      13510 1      63437 1      00006 1

07,3540         63330 1      00006 1      43562 1      20071 0      30064 0      64760 1      00006 1      05014 1
07,3550         40070 1      54070 1      40071 0      76043 1      40000 0      56071 1      40000 0      13417 1
07,3560      C: 01700 1   C: 00000 1   C: 00034 0      00006 1      00011 1      74770 1      67702 0      13626 1
07,3570         34765 1      00006 1      02012 0      10000 0      13601 1      41333 1      74763 0      10000 0

07,3600         00002 0      34772 1      55324 1      33323 0      05167 1      13625 1      34763 1      71333 1
07,3610         10000 0      13625 1      00002 0      41333 1      74763 0      15651 1      41333 1      74763 0
07,3620         10000 0      00002 0      44772 0      55335 1      12675 0      44772 0      54072 0      11335 1
07,3630         13632 1      13641 0      34772 1      57335 0      05167 1      40072 0      50064 0      26164 0

07,3640         15314 0      30072 1      55335 1      15314 0      11335 1      13661 1      13656 0      13652 1
07,3650         55335 1      12675 0      10000 0      13661 1      24133 0      13650 0      04665 0      55335 1
07,3660         15163 1      05726 1   C: 21210 1   C: 77500 1   C: 77477 0   C: 00074 1      54016 1      56002 0
07,3670         54012 0      04366 0      34342 0      00006 1      02015 1      54073 1      40101 0      74752 1

07,3700         26101 0      05120 1   C: 02000 0   C: 60102 1      30073 0      50064 0      54154 0      05323 0
07,3710         54016 1      56002 0      54012 0      04366 0      34772 1      56045 0      54073 1      30075 0
07,3720         74755 0      10000 0      13726 0      30073 0      27116 1      25117 1      34766 1      00006 1
07,3730         05011 1      34342 0      70073 1      56073 0      00006 1      74757 1      55137 1      74342 1

07,3740         63774 0      03771 0      34757 0      00006 1      71137 1      74342 1      40000 0      03771 0
07,3750         45000 0      60073 0      00006 1      13761 0      34765 1      70103 1      10000 0      05323 0
07,3760         03701 1      44765 0      70103 1      54103 1      03701 1      40103 1      74765 0      20103 1
07,3770         05323 0      60073 0      10000 0      03765 0   C: 77740 1      03765 0      00002 0   CKSM 65667 0
```

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OCTAL LISTING FOR PARAGRAPH # 060,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,2000       30036 1      54001 1      10000 0      67673 1      12006 1      12003 1      00006 1      62016 1
10,2010       31327 0      00006 1      12014 1      12020 0      56001 0      12017 1      34772 1      55327 1
10,2020       11323 0      02025 1      02025 1      04077 0      05323 0      31354 1      00006 1      12226 1
10,2030       00006 1      65323 0      34757 0      71337 0      10000 0      02040 1      05671 1   C: 00120 1

10,2040       34767 0      00006 1      02012 0      00006 1      12204 1      34770 0      55323 0      51323 1
10,2050       31312 0      00006 1      51323 1      20035 0      00006 1      74754 1      56001 0      60000 1
10,2060       54061 1      12063 1      26001 1      51323 1      23325 1      11323 0      12140 1      54061 1
10,2070       10036 0      64751 0      12074 1      12071 1      00006 1      62124 1      31327 0      00006 1

10,2100       12124 0      74752 1      54001 1      31326 1      74752 1      00006 1      06001 0      10000 0
10,2110       12124 0      11313 0      64751 0      12115 1      12112 0      00006 1      62120 0      12124 0
10,2120       41326 0      55326 0      34772 1      54736 1      31354 1      00006 1      12212 0      04077 0
10,2130       34770 0      55323 0      50000 1      11325 0      02153 1      02160 1      02170 0      02160 1

10,2140       55323 0      40035 0      61312 0      54002 1      02047 0      10000 0      34750 1      02151 0
10,2150       44750 0      54001 1      02063 0      62211 1      00006 1      62175 0      42210 1      24061 0
10,2160       64771 1      51323 1      54053 0      11323 0      02131 0      10061 1      12200 0      05323 0
10,2170       62211 1      00006 1      62175 0      32210 0      12157 1      51323 1      57325 1      12157 1

10,2200       35050 1      00006 1      05014 1      05323 0      34767 0      00006 1      05012 1      05323 0
10,2210    C: 77654 0   C: 77655 1      40741 1      60736 0      64771 1      54001 1      40740 0      60735 0
10,2220       64771 1      52054 1      00006 1      30736 0      52741 1      02200 1      34761 0      00006 1
10,2230       02012 0      00006 1      12234 1      02032 1      34761 0      00006 1      05012 1      05323 0

10,2240    I: 43414 1   C: 04756 1   C: 20243 0   I: 53775 1   C: 01521 0   C: 57605 0   I: 53655 1   C: 01535 0
10,2250    C: 57576 1   C: 25030 0   C: 01527 0   I: 53257 1   C: 57602 1   C: 01543 1   I: 77657 0   C: 57576 1
10,2260    C: 15036 0   C: 01517 0   C: 01044 0   I: 77616 0   I: 53775 1   C: 01521 0   C: 57605 0   I: 53655 1
10,2270    C: 01535 0   C: 57576 1   C: 25720 0   C: 01527 0   I: 53257 1   C: 57602 1   C: 01543 1   I: 77657 0

10,2300    C: 57576 1   C: 01726 0   I: 77616 0      04474 1      04714 1   C: 45165 1      31307 1      55646 0
10,2310       04463 1      35053 1      05135 0   C: 02141 1   C: 56066 1      05314 1   I: 43025 1   C: 03464 1
10,2320    C: 05661 0   C: 37462 0   C: 15744 1   I: 43014 0   C: 05702 1   C: 20347 0   C: 05703 0   C: 20347 0
10,2330    I: 75345 1   C: 13310 1   C: 00005 1   I: 77765 0   C: 03466 0   C: 03464 1   I: 43276 0   C: 03462 1

10,2340    C: 17462 1   C: 00001 0   I: 43014 0   C: 05463 0   C: 05462 1   C: 37466 1   C: 24050 1   I: 60345 0
10,2350    C: 00005 1   C: 00050 1   I: 54065 0   C: 00001 0   C: 00047 1   I: 77657 0   C: 20601 1   C: 17464 1
10,2360    C: 00001 0   C: 03466 0   I: 51545 1   C: 03464 1   I: 45206 1   C: 13306 0   I: 71240 1   C: 20404 0
10,2370    I: 50025 0   C: 13312 0   C: 20377 0   I: 75345 1   C: 13312 0   C: 03464 1   C: 03464 1   I: 45345 1
```

```
OCTAL LISTING FOR PARAGRAPH # 061,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,2400      C: 03462 1    C: 03464 1    C: 37462 0    C: 15744 1    I: 77145 1    C: 03460 0    C: 00002 0    I: 52150 1
10,2410      C: 03745 1    C: 63535 1    I: 67201 0    C: 00001 0    C: 03012 1    I: 41542 1    I: 65346 0    I: 65356 1
10,2420      C: 03316 0    I: 74346 0    C: 03550 1    I: 73525 1    C: 03316 0    I: 53361 0    C: 03556 1    I: 77772 0
10,2430      C: 02722 1    I: 76435 1    C: 03542 1    I: 65361 0    I: 53361 0    C: 03542 1    I: 77772 0    C: 02714 1

10,2440      I: 76435 1    C: 02722 1    C: 26730 1    C: 01734 0    C: 26672 0    C: 01742 1    C: 26700 1    C: 01750 1
10,2450      C: 02706 1    I: 77650 1    C: 47344 1    I: 75345 1    C: 11760 0    C: 00031 0    C: 14031 0    C: 11762 1
10,2460      I: 77614 1    C: 04032 1    C: 25663 0       00004 0       52071 0       05120 1    C: 03377 1    C: 00102 1
10,2470         52071 0       00003 1       52006 0       22073 0       30065 1       74774 0       60000 1       54061 1

10,2500         30065 1       75056 0       00006 1       74755 0       54062 1       30065 1       74076 0       56065 1
10,2510         75053 0       10000 0       15416 0       30062 0       50061 0       55154 1       10066 0       12533 1
10,2520         12521 1       40072 0       22072 1       50071 1       53154 1       10066 0       12527 1       12533 1
10,2530         40025 1       50071 1       55255 0       10065 0       12547 1       12552 0       40025 1       50061 0

10,2540         55255 0       30065 1       62545 1       10000 0       12545 0    C: 17777 0       12552 0       00006 1
10,2550         30025 0       53303 1       40062 1       50061 0       55153 0       30002 0       22073 0       00003 1
10,2560         52006 0       22073 0       30062 0       50061 0       55154 1       30070 0       50061 0       55256 0
10,2570         00006 1       30064 0       50061 0       53435 0       12516 0       34772 1       54155 1       37664 1

10,2600         12745 1       54155 1       33733 0       12745 1       54155 1       33723 1       12745 1       54155 1
10,2610         37664 1       13103 1       54155 1       33754 1       12745 1       34770 0       03172 0       30100 0
10,2620         73734 0       10000 0       12670 0       30100 0       74760 0       00006 1       12630 1       15205 1
10,2630         44773 1       70100 1       64770 0       54100 1       22007 0       41274 0       74761 1       10000 0

10,2640         12645 0       30367 0       74171 0       54001 1       12651 0       41274 0       74764 1       10000 0
10,2650         12653 1       40367 1       54367 1       34770 0       54164 0       13316 1       30165 0       54156 1
10,2660         50164 1       33740 1       54162 0       50164 1       31273 0       54160 1       54003 0       00002 0
10,2670         30100 0       77646 0       10000 0       13676 1       34766 1       03755 0       13000 0       30367 0

10,2700         74171 0       13350 0       54155 1       34772 1       12745 1       54155 1       34763 1       12745 1
10,2710         54155 1       34772 1       54160 1       34772 1       13105 1       34772 1       54155 1       33722 0
10,2720         12745 1       54155 1       34753 1       12745 1       54155 1       34753 1       12712 0       54155 1
10,2730         33750 0       12745 1       05547 1    C: 00111 0       12744 0       05547 1    C: 00111 0       34765 1

10,2740         54160 1       34772 1       13105 1       54155 1       34765 1       54160 1       03157 1       13012 0
10,2750         54155 1       35013 0       13103 1       54155 1       35013 0       12745 1       34772 1       54164 0
10,2760         03623 0       12766 0       30100 0       73747 1       10000 0       13041 0       30100 0       77716 1
10,2770         00006 1       12774 0       34772 1       13226 0       30100 0       73745 0       00006 1       13002 1
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GAP: ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971                    PAGE 1626

OCTAL LISTING FOR PARAGRAPH # 062,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,3000        34770 0      13226 0      03171 0      03431 1      05167 1      03445 1      30025 0      55005 1
10,3010        34772 1      13062 1      30167 1      77650 1      54163 1      37655 0      05176 1      30160 0
10,3020        73735 1      10000 0      12756 0      13025 1      12615 0      34767 0      54164 0      03623 0
10,3030        13043 1      41275 1      74765 0      10000 0      13043 1      30100 0      73727 1      00006 1

10,3040        13043 1      05726 1   C: 21502 0      03173 1      30163 0      00006 1      04007 1      54365 0
10,3050        30100 0      73730 1      10000 0      13210 0      13056 0      13210 0      03431 1      05167 1
10,3060        03445 1      34767 0      54164 0      13315 1      54155 1      37667 1      12745 1      55250 0
10,3070        33720 1      54155 1      33717 0      12745 1      54775 0      34537 1      54155 1      35775 1

10,3100        12745 1      54155 1      34765 1      54160 1      36214 0      00004 0      54072 0      30167 1
10,3110        77660 1      54063 0      30160 0      74765 0      10000 0      13123 0      30063 1      05121 0
10,3120     C: 03012 1   C: 20067 1      13131 0      30006 1      00006 1      04007 1      54001 1      33744 0
10,3130        05146 1      03157 1      00006 1      30156 0      50064 0      52156 1      00006 1      30160 0

10,3140        50064 0      52160 1      30064 0      54161 0      03164 1      00003 1      14660 1      55250 0
10,3150        33720 1      54155 1      33717 0      13103 1      54155 1      35001 0      13103 1      00004 0
10,3160        45046 1      70160 1      60003 1      54160 1      22002 0      04665 0      54157 0      60072 1
10,3170        00001 0      34772 1      54164 0      30160 0      50164 1      55273 1      75004 1      00006 1

10,3200        13204 0      30157 1      50164 1      54371 0      30155 0      50164 1      54366 0      13454 0
10,3210        50164 1      33740 1      75045 1      03755 0      44770 1      60164 1      54154 0      50154 1
10,3220        33725 1      05167 1      03445 1      50154 1      33725 1      15163 1      54154 0      03431 1
10,3230        05167 1      30154 1      50064 0      54154 0      33752 1      03446 1      50154 1      33741 0

10,3240        73743 0      03762 1      50154 1      34764 0      03755 0      30100 0      74766 0      10000 0
10,3250        02630 0      13002 1      34772 1      54160 1      50160 0      33736 0      03762 1      50160 0
10,3260        33725 1      05167 1      13555 0      31275 0      54003 0      30365 1      00006 1      01007 1
10,3270        77660 1      05176 1      46214 1      60373 0      14660 1      00003 1      31276 0      54156 1

10,3300        30100 0      77673 0      10000 0      13306 0      13713 0      12630 1      05547 1   C: 00105 0
10,3310        34753 1      70100 1      10000 0      13010 1      13061 1      22007 0      02660 0      30160 0
10,3320        74774 0      26001 1      44754 1      50164 1      71273 1      50164 1      55273 1      74761 1
10,3330        10000 0      35044 1      54141 1      30156 0      54165 1      55276 1      50164 1      10366 0

10,3340        13347 0      13455 1      40367 1      54367 1      76043 1      63731 1      60141 0      64770 0
10,3350        04203 1      13467 0      04417 1      02656 0      33732 1      03762 1      30160 0      04264 0
10,3360        13315 1      34764 0      70160 1      10000 0      13407 0      34765 1      70160 1      10000 0
10,3370        13504 1      40160 1      74763 0      10000 0      13401 0      50164 1      30371 1      54157 0
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OCTAL LISTING FOR PARAGRAPH # 063,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,3400        13602 1     50164 1     30366 1     76043 1     00006 1     13504 1     15205 1     30160 0
10,3410        74754 1     10000 0     13365 0     34754 0     50164 1     27273 1     22007 0     00006 1
10,3420        62677 0     74755 0     00006 1     13427 1     40777 1     63746 1     13350 0     33721 0
10,3430        13350 0     44764 1     00006 1     03011 1     30100 0     73732 0     10000 0     34770 0

10,3440        54001 1     34772 1     50001 0     57245 0     00002 0     34170 0     56064 0     00006 1
10,3450        63454 1     56064 0     50064 0     54164 0     15642 0     37654 1     05135 0  C: 04247 1
10,3460     C: 04060 0     13505 0     30100 0     77667 0     00006 1     13041 0     15205 1     11245 1
10,3470        15205 1     13473 0     15205 1     30162 1     73732 0     03755 0     04240 0     04356 0

10,3500        50164 1     33724 0     55246 1     05163 0     04360 0     30164 1     54157 0     30162 1
10,3510        77675 0     03755 0     11245 1     13462 0     13516 1     13462 0     04240 0     33557 0
10,3520        55245 1     05163 0     44354 0     60154 1     00006 1     26000 0     00006 1     13703 1
10,3530        30100 0     74076 0     10000 0     13536 0     13651 1     13640 1     30366 1     00006 1

10,3540        13651 1     40025 1     61005 0     10000 0     40000 0     67663 0     64770 0     63774 0
10,3550        00006 1     63010 0     13651 1     34770 0     13253 1     11217 0     15205 1  C: 21522 1
10,3560        13561 1     30100 0     74767 1     60157 1     66061 0     00006 1     13607 1     31217 1
10,3570        64767 0     50157 1     60371 1     54157 0     30162 1     73751 0     03762 1     46214 1

10,3600        04202 0     13602 1     30163 0     77660 1     05176 1     30157 1     14660 1     05561 0
10,3610     C: 00111 0     31217 1     64770 0     10000 0     37700 1     13571 0     13621 0     44770 1
10,3620        13571 0     33753 0     13573 1     40160 1     74753 0     10000 0     16706 1     40157 0
10,3630        50164 1     60371 1     00006 1     13635 0     00002 0     11215 1     05205 0     00002 0

10,3640        34766 1     03762 1     13555 0     34770 0     55217 0     30100 0     74346 0     10000 0
10,3650        13306 0     30100 0     73736 1     10000 0     13252 0     30100 0     73737 0     10000 0
10,3660        13553 0     34765 1     64763 1     71275 1     10000 0     13555 0     30370 0     00006 1
10,3670        13555 0     35054 0     05121 0  C: 03061 0  C: 20060 0     13555 0     30100 0     73736 1

10,3700        10000 0     15205 1     13210 0     50157 1     30366 1     76043 1     40000 0     60155 0
10,3710        00006 1     13530 0     13275 0     46214 1     04202 0     15205 1     15205 1  C: 00036 1
10,3720     C: 00231 1  C: 14400 0  C: 20010 1  C: 40036 0  C: 21006 1  C: 20630 0  C: 21061 0  C: 11210 1
10,3730     C: 66521 1  C: 01177 1  C: 00700 0  C: 40030 0  C: 34300 0  C: 40100 1  C: 02020 1  C: 01010 1

10,3740     C: 20144 1  C: 42424 0  C: 11254 1  C: 74700 0  C: 03012 1  C: 10200 1  C: 30200 0  C: 20100 1
10,3750     C: 24030 1  C: 74040 0  C: 03217 0  C: 55772 0  C: 40210 0     54001 1     40100 1     70001 1
10,3760        26100 1     00002 0     40000 0     70100 1     54100 1     00002 0     00004 0     54001 1
10,3770        30133 0     55363 1     30134 1     05700 0  C: 77467 1     35023 0     12750 0  CKSM 52742 1
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OCTAL LISTING FOR PARAGRAPH # 064,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

11,2000     I: 77614 1   C: 00475 1   I: 44175 1   C: 03415 1   C: 01023 1   C: 03604 0   I: 46135 1   C: 03747 0
11,2010     C: 22022 1   I: 72575 0   C: 03570 0   C: 27570 0   C: 03576 0   I: 77752 1   C: 27576 0   C: 03604 0
11,2020     I: 77752 1   C: 03604 0   I: 71331 0   C: 03505 1   C: 77776 1   I: 70546 1   C: 17630 1   I: 67154 0
11,2030     C: 00154 1   C: 02703 1   I: 77775 1   C: 03570 0   C: 26657 1   C: 03604 0   C: 16665 0   C: 03423 1

11,2040     C: 02673 1   I: 77201 1   C: 00001 0   C: 03570 0   I: 41456 0   I: 53435 0   C: 03576 0   C: 26676 1
11,2050     C: 03604 0   I: 50256 0   I: 43015 1   C: 03630 1   C: 03665 1   C: 03630 1   I: 43044 0   C: 22101 1
11,2060     C: 03465 0   I: 41575 0   C: 02665 0   I: 63246 1   I: 46206 1   C: 02676 1   I: 51352 1   I: 74256 0
11,2070     I: 77772 0   C: 02665 0   I: 67351 1   C: 11762 1   C: 03505 1   I: 77244 0   C: 22101 1   C: 02665 0

11,2100     C: 03604 0   I: 63345 0   C: 27740 1   C: 02665 0   I: 63256 0   C: 02657 1   I: 41456 0   I: 57435 1
11,2110     C: 00003 1   I: 77606 1   I: 71350 1   C: 03745 1   C: 00023 0   I: 62040 1   C: 22120 1   C: 77767 1
11,2120     I: 67310 1   C: 00012 1   C: 00047 1   I: 77230 0   C: 22126 1   I: 41476 1   I: 77775 1   I: 50235 0
11,2130     I: 71244 0   C: 22133 0   I: 41476 1   I: 67154 0   C: 00000 1   C: 02674 0   I: 45150 1   C: 03745 1

11,2140     C: 25255 1   I: 77214 0   C: 00675 0   C: 02746 0   C: 17612 1   C: 02704 0   I: 45030 0   C: 34003 0
11,2150     C: 27516 0   I: 43135 1   C: 03747 0   C: 00263 0   I: 43030 0   C: 22157 1   C: 00063 1   I: 77775 1
11,2160     C: 03570 0   C: 02657 1   C: 25535 0   C: 03612 1   C: 15543 1   C: 03503 1   C: 01517 0   I: 43015 1
11,2170     C: 03423 1   C: 01673 1   C: 34041 0   C: 27211 0   I: 77775 1   C: 00025 0   C: 02705 1   I: 63154 1

11,2200     C: 03504 0   C: 00001 0   I: 55134 1   C: 03504 0   C: 02703 1   I: 46135 1   C: 00050 1   C: 34000 0
11,2210     I: 52375 1   C: 03604 0   C: 00017 1   I: 77655 1   C: 02665 0   C: 16665 0   C: 03630 1   I: 77650 1
11,2220     C: 22056 1   I: 46135 1   C: 03747 0   C: 22240 1   I: 70575 1   C: 03620 0   C: 27620 0   C: 03612 1
11,2230     I: 77742 0   C: 27612 1   C: 03604 0   I: 77742 0   C: 27604 0   C: 03646 0   I: 77742 0   C: 03646 0

11,2240     I: 77201 1   C: 00001 0   C: 03604 0   C: 03415 1   I: 77614 1   C: 01227 1   C: 01023 1   I: 45020 1
11,2250     C: 00300 1   C: 47530 1   I: 77624 1   C: 34756 1   I: 66370 0   C: 00022 1   C: 00051 0   C: 00006 1
11,2260     I: 61373 1   C: 02736 1   C: 01734 0   I: 77656 1   C: 06736 0   I: 77700 0   C: 22260 0   I: 75160 1
11,2270     C: 00306 1   C: 02671 0   I: 77624 1   C: 34730 1   I: 77624 1   C: 47344 1   I: 77650 1   C: 00300 1

11,2300     C: 22437 1   C: 16067 1   C: 15625 1   C: 21042 1   C: 30276 1   C: 04773 0   C: 25004 1   C: 06702 1
11,2310     C: 16471 1   C: 01352 1   C: 21412 0   C: 20500 0   C: 25477 1   C: 03367 0   C: 27533 1   C: 07571 0
11,2320     I: 77745 1   C: 00041 1   C: 00745 1   I: 52014 0   C: 01753 1   C: 27364 0   C: 27350 1   I: 77420 1
11,2330     C: 03536 1      05402 1   C: 04022 0      06006 1   I: 77650 1   C: 03536 1   I: 40354 1   C: 02150 1

11,2340     C: 00001 0   I: 75543 1   C: 50037 0   I: 53515 0   C: 01535 0   I: 60325 0   C: 00045 0   C: 00047 1
11,2350     I: 77715 1   I: 65241 0   C: 01543 1   C: 02303 0   I: 60225 1   C: 01551 1   C: 00051 0   I: 77742 0
11,2360     I: 65271 0   C: 00003 1   I: 41405 0   C: 00005 1   I: 65316 0   C: 00005 1   I: 64716 0   C: 50037 0
11,2370     I: 40442 1   I: 47515 0   C: 01543 1   I: 44205 0   C: 00045 0   I: 41271 0   C: 00003 1   I: 53605 1
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OCTAL LISTING FOR PARAGRAPH # 065,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

11,2400      C: 23771 1   C: 20176 0   I: 43260 1   C: 00050 1   I: 45257 0   C: 20211 1   I: 41205 0   C: 00001 0
11,2410      C: 00005 1   I: 53657 0   C: 20211 1   C: 20201 0   I: 65215 1   C: 01553 0   I: 53605 1   C: 00001 0
11,2420      C: 20202 0   I: 43204 0   C: 57544 0   I: 77626 0   C: 75500 0   I: 74020 0   C: 02267 0   C: 00012 1
11,2430      I: 74014 1   C: 00303 1   C: 24077 1   C: 00002 0   I: 77650 1   C: 24077 1   I: 66350 1   C: 01500 0

11,2440      C: 00051 0   C: 77762 1   I: 54345 1   C: 02305 0   C: 20612 0   I: 61500 0   C: 22447 0   I: 43206 1
11,2450      C: 01551 1   C: 16303 0   I: 77615 0   C: 01517 0   C: 35517 1   C: 22336 1   I: 73150 1   C: 02150 1
11,2460      C: 02150 1   I: 77775 1   C: 11762 1   C: 26202 0   C: 02152 0   I: 53257 1   C: 57605 0   C: 01535 0
11,2470      C: 02160 1   I: 65014 1   C: 01756 1   C: 22500 1   C: 01500 0   C: 12216 1   I: 77724 0   C: 01500 0

11,2500      I: 53575 0   C: 02152 0   C: 16152 0   C: 00045 0   C: 02301 1   I: 77624 1   C: 22602 0   I: 66175 1
11,2510      C: 02160 1   C: 00051 0   C: 16152 0   C: 02210 0   C: 02301 1   I: 71214 0   C: 00342 1   C: 22754 1
11,2520      C: 01517 0   I: 77624 1   C: 54136 1   I: 72174 0   C: 00002 0   C: 00051 0   I: 77614 1   C: 00343 0
11,2530      C: 22533 1   I: 77076 0   C: 00000 1   C: 02160 1   C: 26262 0   C: 00003 1   C: 02271 1   I: 77214 0

11,2540      C: 01756 1   C: 22554 0   C: 02152 0   I: 53761 1   C: 02301 1   C: 57175 0   I: 65051 0   C: 02160 1
11,2550      C: 01500 0   C: 12224 0   I: 77724 0   C: 01500 0   I: 62175 0   C: 02262 0   C: 00004 0   I: 43014 0
11,2560      C: 04260 1   C: 00343 0   C: 22567 0   I: 53261 1   C: 20612 0   C: 02271 1   C: 02271 1   I: 77624 1
11,2570      C: 22602 0   I: 62174 1   C: 00004 0   C: 00004 0   I: 77775 1   C: 02271 1   C: 36160 0   C: 22602 0

11,2600      I: 77650 1   C: 22754 1   I: 74575 0   C: 02160 1   I: 40236 1   C: 00001 0   I: 61501 1   C: 00040 0
11,2610      I: 60325 0   C: 02301 1   C: 00041 1   I: 63342 1   C: 02160 1   I: 77656 1   C: 16160 1   C: 00045 0
11,2620      C: 02210 0   I: 55301 0   C: 00042 1   I: 41562 0   I: 77743 1   C: 27732 1   C: 00051 0   I: 57124 1
11,2630      C: 00050 1   C: 00040 0   I: 71264 1   C: 00041 1   C: 00003 1   I: 65057 0   C: 57177 1   C: 00050 1

11,2640      I: 74406 0   I: 50315 0   C: 02152 0   C: 02160 1   I: 44372 1   I: 57206 1   C: 00005 1   I: 77752 1
11,2650      I: 43206 1   C: 33412 0   I: 75406 1   I: 41475 1   C: 00013 0   I: 43352 1   C: 33412 0   I: 43325 1
11,2660      C: 00013 0   C: 11760 0   I: 72475 1   C: 00011 1   I: 56215 1   C: 23747 1   C: 00017 1   I: 74275 1
11,2670      C: 00007 0   C: 02160 1   I: 64515 1   C: 02152 0   I: 41455 0   I: 41345 0   C: 00001 0   C: 00015 0

11,2700      I: 61501 1   C: 00037 0   I: 40665 0   C: 00003 1   C: 50037 0   I: 74276 1   I: 57124 1   C: 00050 1
11,2710      C: 00051 0   I: 55064 0   C: 00036 1   C: 00037 0   I: 77600 1   C: 22716 1   I: 65057 0   C: 57177 1
11,2720      C: 00050 1   I: 77655 1   C: 02202 0   C: 02202 0   I: 43400 1   C: 22726 1   I: 51575 1   C: 01521 0
11,2730      I: 77654 0   C: 22751 1   I: 54345 1   C: 02212 1   C: 20612 0   I: 44206 0   C: 01551 1   C: 16303 0

11,2740      C: 01517 0   I: 45425 0   C: 42260 0   C: 22336 1   I: 77624 1   C: 23420 0   I: 77614 1   C: 04020 1
11,2750      C: 27364 0   I: 77776 1      05726 1   C: 20430 1   I: 71354 0   C: 02150 1   C: 02301 1   I: 44601 0
11,2760      C: 00001 0   C: 50007 0   I: 43044 0   C: 23212 1   C: 00343 0   C: 23221 1   I: 65375 0   C: 02152 0
11,2770      C: 01517 0   I: 45125 0   C: 23745 0   C: 55370 0   C: 24017 1   C: 11754 1   I: 45006 0   C: 23227 1
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OCTAL LISTING FOR PARAGRAPH # 066,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

11,3000      I: 77715 1    C: 11760 0    I: 45006 0    C: 23227 1    I: 77772 0    C: 24041 1    I: 77772 0    C: 14025 0
11,3010      C: 00023 0    I: 65275 1    C: 23755 1    C: 00023 0    I: 57316 1    C: 23757 0    I: 41425 1    C: 23753 1
11,3020      I: 41275 1    C: 00023 0    C: 23763 1    I: 65372 1    C: 00001 0    I: 44275 1    C: 23771 1    I: 57206 1
11,3030      C: 00023 0    I: 65275 1    C: 23765 1    C: 00003 1    I: 44275 1    C: 23767 0    I: 56203 0    C: 50033 1

11,3040      C: 02301 1    I: 56615 0    C: 00005 1    C: 50027 1    I: 43271 1    C: 02301 1    C: 00003 1    I: 77761 1
11,3050      C: 02152 0    C: 14033 1    I: 70403 1    C: 50033 1    I: 43271 1    C: 02301 1    I: 50473 1    C: 50027 1
11,3060      I: 43271 1    C: 02301 1    I: 76561 1    C: 00025 0    I: 77645 0    C: 00033 1    C: 14033 1    C: 02301 1
11,3070      I: 63501 0    C: 00047 1    I: 60316 0    C: 00051 0    I: 54606 0    C: 50023 0    I: 40161 0    C: 00033 1

11,3100      C: 23101 0    I: 56070 0    C: 00046 0    C: 00046 0    I: 53670 0    C: 00050 1    C: 20153 1    I: 40055 0
11,3110      C: 02202 0    C: 22726 1    C: 16202 0    C: 00017 1    I: 41414 0    C: 00343 0    C: 23212 1    I: 65316 0
11,3120      C: 00021 1    I: 45316 1    I: 74205 0    C: 27756 0    C: 02152 0    I: 65332 0    I: 53361 0    C: 00041 1
11,3130      I: 47315 0    C: 00041 1    C: 00025 0    I: 74372 1    C: 00021 1    I: 41455 0    I: 77745 1    C: 00023 0

11,3140      I: 41516 0    I: 65205 0    C: 27756 0    I: 43302 1    C: 00011 1    I: 41221 0    C: 33416 1    C: 00017 1
11,3150      I: 74205 0    C: 27756 0    C: 02152 0    I: 65272 0    I: 74225 1    C: 33416 1    C: 00041 1    I: 53372 1
11,3160      I: 41325 0    C: 00017 1    C: 00023 0    I: 74205 0    C: 27756 0    C: 00025 0    I: 53352 0    I: 60325 0
11,3170      C: 02301 1    C: 00050 1    I: 67206 1    C: 01770 0    I: 74271 0    I: 63257 1    C: 57601 1    I: 67206 1

11,3200      C: 01767 0    I: 53361 0    I: 70257 0    C: 20146 0    I: 40055 0    C: 02202 0    C: 22726 1    C: 02202 0
11,3210      I: 77754 1    C: 02150 1    I: 72135 0    C: 01501 1    C: 00154 1    I: 73205 1    C: 27760 0    C: 00155 0
11,3220      C: 23234 0    I: 77745 1    C: 02156 1    C: 24023 0    C: 11754 1    I: 77650 1    C: 23007 1    I: 57435 1
11,3230      C: 02012 0    I: 77655 1    I: 43505 0    C: 00025 0    C: 23445 0    C: 23451 0    C: 23462 0    I: 45014 0

11,3240      C: 00342 1    C: 23245 0    C: 23317 0    I: 77640 0    C: 23354 1    I: 51575 1    C: 01521 0    I: 77600 1
11,3250      C: 23273 0    I: 51025 1    C: 23761 0    C: 23273 0    I: 53615 0    C: 23761 0    C: 57605 0    I: 45271 1
11,3260      C: 00013 0    C: 27762 1    I: 77244 0    C: 23273 0    C: 01527 0    I: 45246 0    C: 23761 0    I: 77600 1
11,3270      C: 23273 0    I: 77640 0    C: 23275 0    I: 77624 1    C: 23420 0    I: 77775 1    C: 01527 0    C: 24763 0

11,3300      C: 01521 0    C: 00755 0    I: 77614 1    C: 00261 1    I: 66375 0    C: 00755 0    C: 01501 1    C: 00000 1
11,3310      C: 16152 0    C: 11762 1    C: 02212 1    I: 52014 0    C: 00301 0    C: 23664 1    C: 22456 0    I: 43020 1
11,3320      C: 02267 0    C: 04340 1    C: 23332 1    I: 45145 0    C: 01517 0    C: 54141 1    I: 57414 1    C: 00343 0
11,3330      C: 23331 1    C: 02262 0    I: 77354 0    C: 02150 1    C: 01521 0    I: 53257 1    C: 57605 0    C: 01535 0

11,3340      I: 51414 1    C: 00343 0    C: 23347 0    I: 44302 0    C: 27764 1    I: 77650 1    C: 02267 0    I: 51451 0
11,3350      C: 02262 0    I: 52025 1    C: 27764 1    C: 02267 0    I: 77624 1    C: 23360 0    I: 77650 1    C: 23275 0
11,3360      I: 45020 1    C: 02267 0    C: 23420 0    I: 53775 1    C: 01535 0    C: 57576 1    I: 53651 0    C: 02262 0
11,3370      C: 57574 0    C: 01503 0    C: 15535 0    C: 01517 0    I: 77624 1    C: 54144 1    I: 57414 1    C: 00343 0
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OCTAL LISTING FOR PARAGRAPH # 067,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

11,3400     C: 23401 0    I: 53715 1    C: 01543 1    C: 57576 1    I: 77651 0    I: 77657 0    C: 57574 0    C: 01511 0
11,3410     C: 01543 1    I: 67154 0    C: 02267 0    C: 00052 0    I: 52014 0    C: 00303 1    C: 27011 1    C: 27016 0
11,3420     I: 77354 0    C: 02150 1    C: 01521 0    I: 53257 1    C: 57605 0    C: 01535 0    C: 01503 0    C: 25535 0
11,3430     C: 01527 0    I: 53257 1    C: 57602 1    C: 01543 1    C: 01511 0    C: 25543 1    C: 11762 1    C: 01521 0

11,3440     C: 15527 0    C: 11762 1    C: 01551 1    C: 01553 0    I: 77616 0    I: 64575 1    C: 02202 0    C: 36166 0
11,3450     C: 23625 1    I: 74575 0    C: 02202 0    I: 53206 0    C: 02166 1    C: 26174 1    I: 53362 0    C: 02166 1
11,3460     C: 36166 0    C: 23625 1    I: 57345 1    C: 02212 1    C: 23771 1    I: 74206 0    C: 02166 1    I: 53372 1
11,3470     C: 00763 0    I: 53361 0    C: 02212 1    C: 00755 0    C: 24755 0    C: 02202 0    I: 53322 1    C: 02174 1

11,3500     I: 76561 1    I: 77655 1    C: 00763 0    C: 00763 0    I: 45014 0    C: 00341 1    C: 23556 0    C: 22327 1
11,3510     I: 77354 0    C: 00770 1    C: 00763 0    I: 77732 1    C: 12467 1    I: 77775 1    C: 00755 0    I: 40132 0
11,3520     C: 23650 0    C: 12401 1    I: 77624 1    C: 22327 1    I: 66354 0    C: 00770 1    C: 00052 0    C: 00000 1
11,3530     I: 67114 1    C: 00006 1    C: 00754 1    I: 45104 0    C: 23621 0    C: 22327 1    I: 67154 0    C: 00754 1

11,3540     C: 00770 1    I: 77624 1    C: 22327 1    I: 76754 0    C: 00770 1    C: 75376 1    I: 77722 0    C: 00755 0
11,3550     I: 76173 0    C: 75310 1    C: 00000 1    I: 77722 0    C: 34763 1    C: 23304 1    I: 77200 0    C: 22726 1
11,3560     C: 00763 0    C: 25527 0    C: 00755 0    C: 01521 0    I: 43014 0    C: 04715 0    C: 27656 1    C: 01756 1
11,3570     C: 27364 0    I: 77776 1       05402 1    C: 04022 0       05547 1    C: 00230 0       06006 1    I: 77731 1

11,3600     C: 00053 1    C: 23606 0    I: 52014 0    C: 01714 1    C: 26761 0    C: 27034 0    I: 66214 0    C: 00061 0
11,3610     C: 00771 0    C: 77741 0    I: 66214 0    C: 01755 1    C: 23541 0    C: 00771 0    C: 77717 0    I: 77650 1
11,3620     C: 23541 0    I: 77745 1    C: 00745 1    C: 34041 0    C: 27243 1    I: 43345 1    C: 02305 0    C: 02212 1
11,3630     I: 66110 1    C: 77763 0    C: 01500 0    C: 02212 1    I: 74561 0    C: 02202 0    I: 74255 0    C: 00763 0

11,3640     C: 02212 1    I: 77655 1    C: 00755 0    C: 02152 0    I: 52014 0    C: 00301 0    C: 23664 1    C: 22436 0
11,3650     I: 43014 0    C: 01676 1    C: 01671 0    I: 77614 1    C: 02676 1    I: 77414 0    C: 01472 1       05671 1
11,3660     C: 00421 0       06006 1    I: 77650 1    C: 27364 0    I: 70754 0    C: 02150 1    C: 50037 0    C: 36210 1
11,3670     C: 23712 1    C: 02202 0    I: 62014 0    C: 00342 1    C: 23212 1    C: 77771 0    I: 70744 1    C: 02150 1

11,3700     C: 50041 1    C: 36210 1    C: 23712 1    I: 50414 0    C: 00303 1    C: 23706 1    I: 77655 1    C: 02202 0
11,3710     C: 36202 1    C: 23212 1    I: 60575 0    C: 02152 0    I: 53513 0    C: 02216 0    I: 46315 1    C: 02152 0
11,3720     I: 52361 1    C: 23761 0    I: 60325 0    C: 00045 0    C: 00052 0    I: 63406 0    I: 77605 1    I: 65301 0
11,3730     C: 00043 0    C: 02210 0    I: 56342 1    I: 77761 1    I: 57154 0    C: 00051 0    C: 00051 0    I: 57074 0

11,3740     C: 00051 0    C: 00042 1    I: 43457 0    C: 57606 0    C: 04631 1    C: 23146 0    C: 14000 1    C: 00000 1
11,3750     C: 02314 0    C: 31463 1    C: 01400 1    C: 00000 1    C: 03000 1    C: 00000 1    C: 36000 1    C: 00000 1
11,3760     C: 30000 1    C: 00000 1    C: 22525 0    C: 12525 0    C: 22000 1    C: 00000 1    C: 01200 1    C: 00000 1
11,3770     C: 25252 0    C: 25253 1    C: 03772 0    C: 03773 1 CKSM 43450 1         @             @             @
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OCTAL LISTING FOR PARAGRAPH # 070,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

12,2000       05167 1      44756 0      50064 0      26164 0      00072 1   I: 77620 0   C: 02551 1   C: 17405 0
12,2010    C: 03413 1   C: 34041 0   C: 45236 1   I: 43014 0   C: 01311 0   C: 24017 1   C: 00470 1   I: 77775 1
12,2020    C: 03546 0   C: 27640 0   C: 03540 0   C: 37632 1   C: 15756 1   I: 77624 1   C: 72721 0   I: 61375 1
12,2030    C: 03405 0   C: 00001 0   I: 77772 0   C: 37646 1   C: 02551 1   I: 43014 0   C: 01311 0   C: 24041 1

12,2040    C: 00470 1   I: 43345 1   C: 02355 0   C: 03663 1   C: 03663 1   I: 52025 1   C: 02461 0   C: 11662 0
12,2050    I: 77601 0   C: 00001 0   I: 51545 1   C: 03462 1   I: 50025 0   C: 13302 1   C: 45406 1   I: 43174 1
12,2060    C: 00007 0   C: 05700 0   C: 63566 1   I: 43014 0   C: 05742 0   C: 24070 0   C: 05703 0   C: 63566 1
12,2070    I: 71214 0   C: 05460 0   C: 13304 1   I: 77765 0   C: 03462 1   C: 37462 0   C: 45406 1   I: 77624 1

12,2100    C: 24577 1   I: 53575 0   C: 01503 0   C: 16647 0   C: 00045 0   C: 24041 1   C: 01503 0   I: 76441 1
12,2110    C: 01511 0   I: 76405 1   C: 00023 0   C: 24043 0   C: 01511 0   I: 57236 1   C: 00017 1   I: 52405 1
12,2120    C: 00041 1   I: 61425 0   C: 33410 1   C: 00045 0   I: 74421 0   C: 33410 1   I: 77671 1   C: 00041 1
12,2130    C: 00011 1   I: 71244 0   C: 24141 0   C: 33426 1   I: 40071 0   C: 00011 1   C: 24145 1   I: 52166 1

12,2140    C: 24145 1   I: 55366 1   C: 33430 0   I: 77600 1   C: 24145 1   C: 00013 0   I: 65205 0   C: 00023 0
12,2150    C: 00011 1   I: 65301 0   C: 00047 1   I: 56257 1   C: 20173 0   I: 50000 1   C: 24172 0   C: 24172 0
12,2160    I: 51525 1   C: 02303 0   I: 50025 0   C: 00001 0   C: 24172 0   I: 77765 0   C: 02303 0   C: 16303 0
12,2170    I: 77650 1   C: 24160 0   I: 71201 1   C: 00001 0   C: 02277 1   C: 00025 0   I: 53165 0   C: 02303 0

12,2200    C: 24347 1   I: 51440 0   C: 24347 1   I: 51025 1   C: 00013 0   C: 24347 1   I: 51145 0   C: 02303 0
12,2210    C: 24217 0   I: 57545 1   C: 00013 0   C: 14015 0   C: 11762 1   C: 34013 1   C: 24222 0   I: 77745 1
12,2220    C: 11762 1   C: 00015 0   I: 57345 1   C: 02303 0   C: 33421 0   I: 77646 0   C: 15026 1   C: 01553 0
12,2230    I: 77621 1   C: 00025 0   C: 02643 1   I: 63545 0   C: 00025 0   I: 41501 0   C: 00047 1   I: 53605 1

12,2240    C: 00011 1   C: 21573 0   C: 34031 1   C: 24462 1   I: 44200 0   C: 24355 1   C: 02303 0   C: 02645 1
12,2250    I: 44246 1   C: 01026 1   I: 71244 0   C: 24375 0   C: 00037 0   I: 60225 1   C: 01551 1   C: 00047 1
12,2260    I: 60325 0   C: 02643 1   C: 00050 1   I: 41260 0   C: 00047 1   C: 02645 1   I: 56257 1   C: 21202 1
12,2270    I: 41542 1   I: 71244 0   C: 24313 0   C: 00025 0   C: 00013 0   I: 45221 1   C: 00015 0   I: 51000 0

12,2300    C: 24305 1   C: 24305 1   I: 52145 0   C: 00001 0   C: 24325 0   I: 45345 1   C: 00015 0   C: 00025 0
12,2310    I: 52075 1   C: 33424 0   C: 24325 0   I: 77745 1   C: 00025 0   C: 00015 0   I: 45221 1   C: 00013 0
12,2320    I: 50000 1   C: 24341 1   C: 24341 1   I: 77745 1   C: 00001 0   C: 02643 1   I: 43254 0   C: 24375 0
12,2330    C: 00025 0   C: 14025 0   C: 00037 0   C: 01551 1   I: 46034 1   C: 24716 1   C: 24375 0   I: 77650 1

12,2340    C: 24233 0   I: 45345 1   C: 00013 0   C: 00025 0   I: 52075 1   C: 33424 0   C: 24325 0   I: 70545 1
12,2350    C: 00013 0   I: 77765 0   C: 02303 0   C: 34025 1   C: 24206 0   I: 50145 1   C: 00025 0   C: 24373 0
12,2360    C: 00013 0   I: 70545 1   C: 02643 1   C: 02643 1   I: 44254 1   C: 02267 0   C: 00025 0   C: 14025 0
12,2370    C: 01551 1   C: 34037 1   C: 24334 0   C: 34015 1   C: 24361 0   I: 44545 0   C: 00041 1   I: 74225 1
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OCTAL LISTING FOR PARAGRAPH # 071,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

12,2400     C: 00035 1   C: 02647 0   I: 65372 1   C: 00025 0   I: 60316 0   C: 00047 1   I: 57275 0   C: 00023
12,2410     C: 00025 0   I: 53605 1   C: 00033 1   C: 21572 1   I: 77621 1   C: 00037 0   I: 74352 0   C: 01511 0
12,2420     I: 53372 1   I: 77712 0   C: 01535 0   I: 60246 1   C: 00050 1   C: 16655 0   C: 00031 0   I: 45275 0
12,2430     C: 00033 1   C: 33406 0   I: 76405 1   C: 00021 1   I: 53605 1   C: 00025 0   C: 56601 0   I: 74271 0

12,2440     C: 02655 0   C: 02647 0   I: 65372 1   C: 00035 1   I: 56257 1   C: 56602 0   C: 02655 0   I: 74221 0
12,2450     C: 33422 0   C: 01511 0   I: 42455 0   I: 77626 0   C: 62234 0   C: 00037 0   C: 15551 1   C: 00025 0
12,2460     C: 35553 1   C: 02267 0   I: 77776 1      07171 1   C: 00010 0   C: 02525 1   C: 12526 0   C: 67356 0
12,2470     C: 75666 0   C: 15001 1   C: 23771 1   C: 64342 0   C: 43674 0   C: 06563 1   C: 04645 1   C: 75173 0

12,2500     C: 52672 0   C: 00656 1   C: 14331 0   C: 77633 1   C: 40512 0   C: 00023 0   C: 11210 1   C: 77774 0
12,2510     C: 67506 0      06006 1   C: 14033 1   C: 00031 0   I: 77776 1      07171 1   C: 00010 0   C: 01000 0
12,2520     C: 00000 1   C: 72525 0   C: 52506 0   C: 13301 1   C: 15337 1   C: 62776 0   C: 54733 1   C: 11176 1
12,2530     C: 13267 0   C: 73410 0   C: 51674 0   C: 01446 0   C: 33641 1   C: 77451 1   C: 65233 0   C: 00055 1

12,2540     C: 37266 1   C: 77767 1   C: 52336 0      06006 1   I: 53605 1   C: 00001 0   C: 21574 1   C: 00035 1
12,2550     I: 72405 0   C: 00043 0   I: 65234 1   C: 45657 1   I: 53605 1   C: 00033 1   C: 21574 1   I: 72405 0
12,2560     C: 00045 0   I: 65234 1   C: 45657 1   C: 00041 1   I: 76261 0   C: 20607 1   I: 41301 0   C: 00047 1
12,2570     C: 00025 0   I: 76257 0   C: 20576 1   I: 57232 0   C: 00023 0   C: 00037 0   I: 77616 0   I: 40001 1

12,2600     C: 00001 0   C: 24602 0   I: 76731 0   C: 00027 1   C: 00024 1   C: 22301 0   C: 00017 1   I: 77616 0
12,2610     I: 71214 0   C: 00614 1   C: 24660 1   C: 00037 0   I: 60225 1   C: 02764 0   C: 00047 1   I: 60325 0
12,2620     C: 00015 0   C: 00050 1   I: 41260 0   C: 00047 1   C: 02762 0   I: 56257 1   C: 21202 1   I: 43142 1
12,2630     C: 04351 1   C: 24634 0   I: 75246 0   C: 02762 0   I: 51006 0   C: 24672 1   I: 43145 0   C: 03770 1

12,2640     C: 04311 0   C: 24643 0   C: 00017 1   I: 45221 1   C: 00011 1   I: 51000 0   C: 24652 0   C: 24652 0
12,2650     I: 77650 1   C: 24704 1   I: 45345 1   C: 00011 1   C: 03770 1   I: 52005 0   C: 33424 0   C: 24706 0
12,2660     I: 41335 1   C: 00051 0   C: 00011 1   I: 67206 1   C: 00051 0   I: 45205 1   C: 00017 1   I: 52165 1
12,2670     C: 02762 0   C: 24634 0   I: 43145 0   C: 03770 1   C: 04311 0   C: 24677 1   C: 00011 1   I: 45221 1

12,2700     C: 00017 1   I: 50000 1   C: 24710 1   C: 24710 1   I: 77745 1   C: 00001 0   C: 00015 0   I: 77616 0
12,2710     I: 45345 1   C: 00017 1   C: 03770 1   I: 52005 0   C: 33424 0   C: 24706 0      44770 1      50120 1
12,2720        26026 1      54154 0      06030 1   I: 44545 0   C: 00041 1   I: 74225 1   C: 00035 1   C: 02724 1
12,2730     I: 65372 1   C: 00025 0   I: 60316 0   C: 00047 1   I: 57275 0   C: 00023 0   C: 00025 0   I: 53605 1

12,2740     C: 00033 1   C: 21572 1   I: 77621 1   C: 00037 0   I: 74352 0   C: 02746 0   I: 53372 1   I: 41512 1
12,2750     I: 77646 0   I: 77701 1   C: 00047 1   C: 16722 1   C: 00031 0   I: 45205 1   C: 00033 1   C: 33406 0
12,2760     I: 76405 1   C: 00021 1   I: 53605 1   C: 00025 0   C: 21176 1   I: 74271 0   C: 02722 1   C: 02724 1
12,2770     I: 65372 1   C: 00035 1   I: 56257 1   C: 21175 1   C: 02722 1   I: 77621 1   C: 33422 0   I: 53361 0
```

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OCTAL LISTING FOR PARAGRAPH # 072,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

12,3000      C: 02746 0    I: 43412 1    I: 45020 1    C: 02712 1    C: 25763 1    I: 77624 1    C: 37727 1    I: 45000 0
12,3010      C: 25027 0    C: 25032 1    I: 43145 0    C: 00031 0    C: 04310 1    C: 25760 1    I: 45014 0    C: 04273 0
12,3020      C: 24462 1    I: 45014 0    C: 03706 0    C: 02712 1    C: 24723 1    I: 77650 1    C: 02712 1    I: 77614 1
12,3030      C: 04033 0    C: 25760 1    I: 66374 1    C: 00003 1    C: 00052 0    C: 00001 0    I: 77614 1    C: 04276 0

12,3040      I: 65366 1    C: 02734 0    I: 44342 1    C: 33412 0    I: 54325 1    C: 02732 0    C: 21607 0    I: 77671 1
12,3050      I: 77600 1    C: 25165 1    I: 41225 1    C: 03770 1    I: 40132 0    C: 25165 1    I: 63406 0    I: 65351 0
12,3060      C: 00155 0    C: 02744 1    I: 76202 0    I: 75440 0    C: 25250 1    I: 43306 0    I: 61000 0    C: 25163 1
12,3070      C: 25056 0    I: 40065 0    C: 33406 0    C: 25250 1    I: 41440 1    C: 25250 1    I: 77716 1    I: 41301 0

12,3100      C: 00047 1    C: 02744 1    I: 77457 1    C: 21567 0       07171 1    C: 00005 1    C: 20000 0    C: 00000 1
12,3110      C: 72525 0    C: 52471 1    C: 03146 1    C: 15003 0    C: 75556 0    C: 45210 0    C: 01615 1    C: 13553 0
12,3120      C: 76371 0    C: 63777 0    C: 01232 0    C: 27367 0       06006 1    I: 76405 1    I: 43006 0    C: 04316 1
12,3130      C: 25235 1    I: 60316 0    C: 00047 1    I: 53605 1    C: 02744 1    C: 21565 1    C: 14031 0    C: 00041 1

12,3140      I: 75542 0    I: 41306 1    I: 77632 0    C: 00025 0    I: 60316 0    C: 00047 1    I: 41325 0    C: 02742 1
12,3150      C: 00041 1    I: 75452 0    I: 56405 0    C: 03770 1    C: 14043 0    C: 02744 1    I: 43021 0    C: 33410 1
12,3160      C: 04270 0    C: 00045 0    I: 77616 0    I: 77774 0    C: 00003 1    I: 51001 1    C: 00001 0    C: 25172 1
12,3170      I: 77614 1    C: 04076 1    I: 75545 1    C: 02742 1    I: 41325 0    C: 02732 0    C: 03770 1    I: 65352 0

12,3200      C: 02734 0    I: 43202 0    C: 33416 1    I: 41225 1    I: 55301 0    C: 00047 1    C: 02732 0    I: 51457 0
12,3210      C: 21174 0    I: 63406 0    C: 14043 0    C: 33414 0    I: 63406 0    I: 65234 1    C: 45657 1    C: 02744 1
12,3220      I: 40405 1    C: 00043 0    I: 77771 0    I: 75440 0    C: 25250 1    I: 77615 0    I: 60304 0    C: 25214 1
12,3230      C: 00347 1    I: 77665 1    I: 52057 1    C: 21172 0    C: 25074 0    I: 50145 1    C: 02744 1    C: 25250 1

12,3240      I: 60366 1    C: 00047 1    I: 53665 1    C: 33430 0    C: 20176 0    I: 41425 1    I: 77650 1    C: 25131 0
12,3250      I: 40001 1    C: 00001 0    C: 25253 1    I: 43414 1    C: 04070 1    I: 45020 1    C: 02712 1    C: 24577 1
12,3260      I: 57345 1    C: 02673 1    C: 33415 1    C: 03772 0    I: 77214 0    C: 00474 0    C: 02657 1    I: 45115 0
12,3270      C: 02665 0    C: 13717 1    C: 16732 0    C: 02722 1    I: 65301 0    C: 00047 1    C: 00041 1    I: 56342 1

12,3300      I: 65257 1    C: 20173 0    I: 77626 0    C: 75043 1    I: 44342 1    C: 33412 0    C: 02736 1    I: 53106 0
12,3310      C: 25524 0    I: 65301 0    C: 00047 1    C: 00001 0    I: 56342 1    I: 75457 0    C: 20176 0    I: 54325 1
12,3320      C: 02732 0    C: 20607 1    I: 43271 1    C: 02736 1    I: 77626 0    C: 77760 0    I: 50000 1    C: 25334 1
12,3330      C: 25337 1    I: 50025 0    C: 33434 1    C: 25337 1    I: 77745 1    C: 33434 1    C: 00017 1    I: 54345 1

12,3340      C: 02734 0    C: 20607 1    I: 45425 0    C: 61037 1    C: 02675 1    I: 71240 1    C: 25543 1    C: 02740 0
12,3350      I: 56352 0    C: 02732 0    I: 77600 1    C: 25543 1    C: 00011 1    I: 66214 0    C: 00715 1    C: 25530 0
12,3360      C: 00051 0    C: 00001 0    I: 77745 1    C: 03770 1    I: 77605 1    C: 02732 0    I: 45342 0    C: 02740 0
12,3370      I: 65301 0    C: 00047 1    C: 02736 1    I: 56257 1    C: 20170 0    I: 53040 0    C: 25462 0    C: 25462 0
```

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OCTAL LISTING FOR PARAGRAPH # 073,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

12,3400     C: 16742 1   C: 03770 1   I: 43316 1   C: 33420 1   I: 41301 0   C: 00047 1   C: 02742 1   I: 44257 1
12,3410     C: 20571 0   C: 33416 1   C: 16744 1   C: 02742 1   I: 45000 0   C: 25465 1   C: 25032 1   I: 77745 1
12,3420     C: 00037 0   C: 16764 0   C: 00031 0   I: 45014 0   C: 04310 1   C: 25462 0   C: 24462 1   I: 44200 0
12,3430     C: 25501 1   C: 02673 1   C: 02762 0   I: 44246 1   C: 03772 0   I: 47044 1   C: 25546 1   C: 24716 1

12,3440     I: 43030 0   C: 25511 0   C: 00714 0   C: 25451 0   I: 45345 1   C: 00037 0   C: 02764 0   I: 77654 0
12,3450     C: 25511 0   I: 77624 1   C: 24610 0   I: 53145 1   C: 00155 0   C: 25511 0   I: 77615 0   C: 03770 1
12,3460     C: 37770 0   C: 25364 1   I: 51145 0   C: 00015 0   C: 25504 1   I: 71201 1   C: 00001 0   C: 03770 1
12,3470     C: 00011 1   I: 70545 1   C: 00015 0   C: 00015 0   I: 44254 1   C: 25511 0   C: 03770 1   C: 37770 0

12,3500     C: 25364 1   I: 77745 1   C: 02764 0   C: 00037 0   I: 71201 1   C: 00001 0   C: 03770 1   C: 34017 0
12,3510     C: 25471 1   I: 51545 1   C: 02762 0   I: 41325 0   C: 02673 1   C: 33412 0   I: 45215 0   C: 33432 1
12,3520     I: 43044 0   C: 25546 1   C: 02434 0   C: 02712 1   I: 43001 1   C: 00001 0   C: 02434 0   C: 02712 1
12,3530     I: 71331 0   C: 00051 0   C: 10000 0   C: 00011 1   I: 65342 1   C: 00017 1   I: 43342 0   I: 77626 0

12,3540     C: 74007 0   C: 34015 1   C: 25364 1   I: 52145 0   C: 33436 0   C: 25354 1   I: 60345 0   C: 00041 1
12,3550     C: 00047 1   I: 70525 1   C: 02742 1   I: 77671 1   I: 75457 0   C: 20175 0   I: 72405 0   C: 00021 1
12,3560     I: 41206 0   C: 03770 1   I: 74261 1   C: 20206 1   C: 02724 1   I: 77725 1   I: 76561 1   C: 02676 1
12,3570     I: 53235 0   C: 02724 1   I: 43172 1   C: 02674 0   C: 02746 0   I: 53135 0   C: 02704 0   C: 25602 1

12,3600     I: 77650 1   C: 02712 1   I: 45145 0   C: 02722 1   C: 24751 1   C: 36705 0   C: 02712 1   I: 45020 1
12,3610     C: 02712 1   C: 25763 1   I: 77624 1   C: 37727 1   I: 71200 0   C: 25027 0   C: 33416 1   I: 41225 1
12,3620     C: 02744 1   C: 02742 1   I: 41366 1   C: 03770 1   I: 74212 0   C: 02714 1   I: 45325 1   C: 33410 1
12,3630     C: 02744 1   I: 52361 1   C: 02724 1   I: 53512 1   I: 77600 1   C: 25713 0   I: 60325 0   C: 02760 1

12,3640     C: 00047 1   I: 41325 0   C: 00041 1   C: 02742 1   I: 56257 1   C: 20201 0   I: 56225 1   C: 33414 0
12,3650     C: 00045 0   C: 00031 0   I: 63400 0   C: 20453 1   I: 50021 1   C: 33412 0   C: 20453 1   I: 75366 0
12,3660     C: 02757 0   I: 77614 1   C: 04272 1   I: 76561 1   C: 02676 1   I: 63235 0   C: 00001 0   I: 53361 0
12,3670     C: 00031 0   I: 41572 1   I: 56241 0   C: 02724 1   C: 33412 0   I: 40142 1   C: 25677 0   C: 26734 0

12,3700     C: 02724 1   I: 76435 1   I: 72441 0   C: 02676 1   C: 16732 0   C: 02742 1   I: 77624 1   C: 25032 1
12,3710     I: 77614 1   C: 02634 1   C: 25012 0   I: 43001 1   C: 00001 0   C: 02434 0   C: 25760 1   I: 45020 1
12,3720     C: 02712 1   C: 25763 1   I: 77624 1   C: 37727 1   I: 77600 1   C: 25726 0   I: 42405 0   C: 02744 1
12,3730     I: 75421 1   C: 33410 1   C: 02754 0   I: 65215 1   C: 33404 1   C: 00041 1   I: 72405 0   C: 02742 1

12,3740     I: 77671 1   I: 60325 0   C: 02744 1   C: 00047 1   I: 53725 1   C: 00041 1   C: 20174 1   I: 45271 1
12,3750     I: 50000 1   C: 25755 1   C: 25755 1   I: 77650 1   C: 02712 1   I: 52145 0   C: 11773 1   C: 02712 1
12,3760     I: 77776 1      05726 1   C: 20607 1   I: 40001 1   C: 00001 0   C: 25766 1   I: 63375 0   C: 02657 1
12,3770     C: 02746 0   I: 77616 0   C: 03772 0   C: 03773 1 CKSM 76240 0        @            @            @
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OCTAL LISTING FOR PARAGRAPH # 074, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
13,2000     I: 43014 0   C: 01474 1   C: 01751 0   C: 26006 0   I: 77614 1   C: 01476 0   I: 45014 0   C: 01667 1
13,2010     C: 27236 0   I: 71214 0   C: 04307 1   C: 26031 1   C: 01571 0   C: 34041 0   C: 27516 0   I: 45014 0
13,2020     C: 01674 0   C: 26744 1   I: 43014 0   C: 02756 1   C: 26026 1   C: 01476 0   I: 45014 0   C: 01467 0
13,2030     C: 27236 0   I: 77614 1   C: 01236 1   C: 26732 0   I: 43414 1   C: 01474 1      52134 0      53115 1

13,2040        25114 1      30006 1      75041 0      27115 1      51114 1      27777 0      04642 0      02053 0
13,2050        02052 1      25114 1      25114 1      53115 1      52006 0      22164 1      50001 0      50001 0
13,2060        24001 0      24001 0      53115 1      06006 1   I: 77624 1   C: 01114 1   I: 77776 1      23115 0
13,2070        16010 1      31214 1      74770 1      55545 0      00006 1      31450 1      53413 1      35026 0

13,2100        04636 0   C: 20743 0      12234 1      02105 1      02077 0      05402 1   C: 04024 0      51545 1
13,2110        32237 0      04636 0   C: 20743 0      12234 1      02116 0      02107 0      06006 1   I: 43145 0
13,2120     C: 03413 1   C: 01076 1   C: 00041 1   I: 77711 0   C: 03546 0   C: 26241 1   I: 53575 0   C: 00001 0
13,2130     I: 77676 0   C: 00031 0   I: 53435 0   C: 00007 0   C: 00023 0   I: 53435 0   C: 00031 0   C: 00015 0

13,2140     I: 46135 1   C: 03546 0   C: 26146 0   I: 52175 0   C: 03405 0   C: 26150 1   I: 77775 1   C: 03540 0
13,2150     I: 76505 0   C: 00015 0   I: 77655 1   C: 00007 0   C: 00007 0   I: 77624 1   C: 27516 0   I: 77624 1
13,2160     C: 26245 0   I: 53775 1   C: 00007 0   C: 57176 0   C: 25543 1   C: 00001 0   I: 77657 0   C: 57176 0
13,2170     C: 15535 0   C: 03413 1   C: 01517 0   I: 71214 0   C: 01673 1   C: 01571 0   C: 34041 0   C: 27211 0

13,2200     I: 77624 1   C: 27516 0   I: 77624 1   C: 26245 0   I: 77775 1   C: 00017 1   C: 01503 0   C: 15535 0
13,2210     C: 00015 0   C: 25517 0   C: 00025 0   I: 77624 1   C: 23434 0   I: 77776 1      05402 1   C: 04024 0
13,2220        06006 1   I: 62214 1   C: 05062 0   C: 03546 0   C: 26243 0   I: 77624 1   C: 27525 0   I: 77414 0
13,2230     C: 01276 0      37702 0      55722 0      14105 0      37702 0      55722 0      14103 0   C: 01524 0

13,2240     C: 01521 0   C: 27161 1   C: 27145 1   C: 27034 0   C: 26761 0   I: 67214 1   C: 00263 0   C: 00050 1
13,2250     I: 43030 0   C: 26253 1   C: 00063 1   I: 77616 0      30737 1      55131 1      05362 0   C: 00004 0
13,2260     C: 05022 1   C: 13000 0      04636 0   C: 03731 1      06006 1   I: 43014 0   C: 04346 1   C: 26271 1
13,2270     C: 00472 0   I: 43014 0   C: 01274 1   C: 04261 0   I: 43014 0   C: 01671 0   C: 02676 1   I: 76131 0

13,2300     C: 00051 0   C: 00006 1   C: 00044 1   I: 77214 0   C: 04461 0   C: 11762 1   C: 07604 1   I: 43100 1
13,2310     C: 26306 0   C: 01664 1   I: 47014 1   C: 00270 1   C: 51751 0   C: 35062 0   C: 56462 1   I: 77624 1
13,2320     C: 27236 0   I: 43014 0   C: 00462 1   C: 01663 0   I: 43014 0   C: 04343 1   C: 26330 0   C: 01463 1
13,2330     I: 77624 1   C: 60304 0   I: 77776 1      05362 0   C: 00004 0   C: 05022 1   C: 13000 0      06006 1

13,2340     I: 45014 0   C: 00466 0   C: 31005 0   I: 77776 1      04103 1   I: 77620 0   C: 00300 1   C: 36607 0
13,2350     C: 54136 1   C: 26752 0   C: 00003 1   C: 16744 1   C: 02607 1   C: 34041 0   C: 27170 1   I: 61131 0
13,2360     C: 00052 0   C: 00000 1   C: 26405 1   I: 52375 1   C: 02752 0   C: 00001 0   I: 77656 1   C: 26752 0
13,2370     C: 00001 0   I: 57456 1   C: 16736 1   C: 34636 0   I: 77624 1   C: 26445 0   C: 14017 1   C: 34654 1
```

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OCTAL LISTING FOR PARAGRAPH # 075,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

13,2400      C: 24023 0   C: 02744 1   I: 77656 1   C: 36744 0   C: 26432 0   I: 40575 1   C: 02752 0   I: 51362 1
13,2410      C: 02744 1   I: 77656 1   C: 26744 1   C: 02752 0   I: 53455 0   C: 00001 0   I: 77676 0   C: 26736 1
13,2420      C: 00001 0   I: 57456 1   C: 16752 0   C: 34634 1   I: 77624 1   C: 26445 0   C: 14023 0   C: 34654 1
13,2430      C: 24017 1   C: 02744 1   I: 77635 1   C: 34644 0   C: 27452 1   C: 00007 0   I: 53361 0   C: 34642 0

13,2440      C: 03452 1   C: 17452 1   C: 34656 0   C: 34021 0   C: 00300 1   I: 70471 1   C: 00045 0   I: 43316 0
13,2450      C: 34640 1   I: 70546 1   I: 77616 0   I: 40220 0   C: 02241 1   C: 00001 0   C: 24007 0   C: 02152 0
13,2460      I: 51406 1   C: 16301 1   C: 11762 1   I: 71414 0   C: 01743 0   C: 26466 1   I: 77624 1   C: 55370 0
13,2470      I: 77656 1   C: 36152 1   C: 35766 0   I: 77624 1   C: 26654 1   I: 63545 0   C: 02152 0   I: 63525 0

13,2500      C: 02154 0   I: 75415 0   I: 76405 1   C: 00011 1   C: 14021 1   C: 02156 1   C: 34023 1   C: 26614 0
13,2510      C: 14747 0   C: 02152 0   C: 14021 1   C: 02154 0   C: 34023 1   C: 26614 0   C: 14751 1   C: 02301 1
13,2520      I: 77625 0   C: 02240 0   C: 34753 1   C: 02241 1   I: 40220 0   C: 02241 1   C: 00001 0   C: 34007 1
13,2530      C: 35766 0   I: 73545 1   C: 00747 0   I: 65275 1   C: 00011 1   C: 00747 0   I: 65346 0   C: 00751 1

13,2540      I: 57356 0   I: 71525 0   C: 00747 0   I: 71525 0   C: 00751 1   I: 55475 1   I: 41456 0   C: 36152 1
13,2550      C: 26654 1   I: 43145 0   C: 11762 1   C: 01743 0   C: 26556 0   I: 77746 1   I: 77624 1   C: 55345 0
13,2560      C: 16152 0   C: 02240 0   I: 74215 1   C: 00753 0   C: 02152 0   I: 77772 0   C: 36152 1   C: 02241 1
13,2570      I: 63545 0   C: 02156 1   I: 44352 0   C: 11760 0   I: 44275 1   C: 26611 0   C: 11760 0   I: 75465 1

13,2600      C: 26605 0   I: 77622 1   C: 02240 0   I: 77616 0   C: 00446 1   C: 00305 1   C: 17711 0   C: 05254 1
13,2610      C: 00155 0   C: 25250 1   C: 00302 0   C: 17755 0   I: 77600 1   C: 26616 1   I: 63545 0   C: 00023 0
13,2620      I: 63525 0   C: 00021 1   I: 77615 0   I: 75454 0   C: 26642 0   I: 40065 0   C: 00023 0   C: 26647 0
13,2630      I: 67542 0   C: 00025 0   I: 50125 1   C: 00021 1   C: 26636 0   I: 43545 1   I: 57545 1   I: 43244 1

13,2640      C: 26644 0   C: 11760 0   C: 00025 0   I: 77616 0   I: 52025 1   C: 11760 0   C: 26642 0   I: 75345 1
13,2650      C: 33412 0   C: 00023 0   C: 00025 0   I: 77616 0   I: 71220 1   C: 00051 0   C: 26701 0   I: 71214 0
13,2660      C: 01703 1   C: 26671 0   C: 26613 1   I: 45014 0   C: 00742 0   C: 26667 1   C: 26570 1   C: 36240 1
13,2670      C: 00051 0   I: 77214 0   C: 00702 1   C: 26667 1   C: 02026 1   I: 64446 0   I: 77650 1   C: 26667 1

13,2700      C: 00065 1   C: 01265 1      05402 1   C: 00052 0      35047 1      05135 0   C: 02711 1   C: 26063 0
13,2710         05314 1      06006 1   I: 47014 1   C: 04712 1   C: 26753 1   C: 51751 0   C: 00041 1   I: 45014 0
13,2720      C: 04274 1   C: 27516 0   I: 45014 0   C: 01076 1   C: 26744 1   I: 52014 0   C: 01466 1   C: 26000 0
13,2730      C: 00003 1   C: 25140 0   I: 77414 0   C: 01672 0      05402 1   C: 20032 1      00006 1      32731 0

13,2740         05332 0   C: 02702 0   C: 26063 0      05205 0   I: 43014 0   C: 01472 1   C: 01673 1   I: 43014 0
13,2750      C: 01676 1   C: 01675 1   I: 77616 0   I: 77776 1      05402 1   C: 00002 0      05561 0   C: 00221 0
13,2760         05205 0   I: 47020 0   C: 00051 0   C: 26774 1   I: 45014 0   C: 04063 0   C: 20240 0   I: 43014 0
13,2770      C: 00303 1   C: 00051 0   C: 04223 0   C: 00051 0      03140 1      55500 1      51500 0      31502 1
```

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OCTAL LISTING FOR PARAGRAPH # 076,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

13,3000       51500 0      55554 0      11500 1      12775 1      06030 1   I: 43034 1   C: 27023 0   C: 04303 0
13,3010    C: 27016 0   I: 66214 0   C: 00263 0   C: 02151 0   C: 00000 1   I: 77616 0   I: 66214 0   C: 00063 1
13,3020    C: 02151 0   C: 00002 0   I: 77616 0      03140 1      55500 1      51500 0      31554 1      51500 0
13,3030       55502 0      11500 1      13024 0      06030 1   I: 47020 0   C: 00051 0   C: 27047 1   I: 45014 0

13,3040    C: 04064 1   C: 20264 0   I: 43014 0   C: 00303 1   C: 00051 0   C: 04224 1   C: 00051 0      03140 1
13,3050       55500 1      51500 0      31502 1      51500 0      55626 0      11500 1      13050 0      06030 1
13,3060    I: 47014 1   C: 04307 1   C: 27101 1   C: 27070 0   I: 52014 0   C: 04304 1   C: 27015 0   C: 27011 1
13,3070       03140 1      55500 1      51500 0      31626 1      51500 0      55502 0      11500 1      13071 0

13,3100       06030 1   I: 77201 1   C: 00001 0   C: 02026 1   I: 41525 0   C: 00041 1   C: 15517 0   C: 27756 0
13,3110    I: 77624 1   C: 55345 0   C: 25535 0   C: 11754 1   C: 14001 0   C: 01517 0   C: 14007 0   C: 27756 0
13,3120    I: 45014 0   C: 00063 1   C: 55345 0   I: 74235 0   C: 01535 0   C: 27137 1   C: 25543 1   C: 11762 1
13,3130    C: 01521 0   I: 67174 1   C: 00002 0   C: 02150 1   C: 35527 1   C: 27252 1   C: 07112 1   C: 06620 0

13,3140       33144 0      54006 0      33553 1      00002 0   C: 26063 0   I: 45020 1   C: 00046 0   C: 27516 0
13,3150    I: 43130 1   C: 02213 0   C: 01474 1   I: 43014 0   C: 01467 0   C: 01676 1   I: 77614 1   C: 01633 0
13,3160    C: 27240 1   I: 45020 1   C: 00046 0   C: 27516 0   I: 43130 1   C: 02213 0   C: 01634 1   C: 27153 0
13,3170    I: 45020 1   C: 00046 0   C: 27516 0   I: 43130 1   C: 02213 0   C: 01474 1   I: 43014 0   C: 01676 1

13,3200    C: 01433 1   C: 27240 1   I: 45020 1   C: 00046 0   C: 27516 0   I: 43130 1   C: 02213 0   C: 01634 1
13,3210    C: 27176 1   I: 66214 0   C: 01467 0   C: 02151 0   C: 00000 1   I: 66214 0   C: 00343 0   C: 27222 0
13,3220    C: 02151 0   C: 00002 0   I: 77220 1   C: 02213 0   C: 11762 1   C: 01521 0   C: 35527 1   C: 23420 0
13,3230    I: 43014 0   C: 01676 1   C: 04062 1   I: 77614 1   C: 04020 1   C: 22320 0   I: 77620 0   C: 02213 0

13,3240    I: 43014 0   C: 04060 0   C: 04062 1   I: 77731 1   C: 00053 1   C: 22320 0   I: 52014 0   C: 01714 1
13,3250    C: 27005 1   C: 27060 1   I: 45014 0   C: 00342 1   C: 27263 0   C: 23317 0   I: 45044 0   C: 27263 0
13,3260    C: 23360 0   I: 77754 1   C: 02150 1   I: 77414 0   C: 01652 1   C: 27304 0      05402 1   C: 04022 0
13,3270       05547 1   C: 00230 0      06006 1   I: 77731 1   C: 00053 1   C: 27302 0   I: 52014 0   C: 01714 1

13,3300    C: 26761 0   C: 27034 0   I: 77624 1   C: 22327 1   I: 45001 1   C: 00001 0   C: 23420 0   I: 53775 1
13,3310    C: 01503 0   C: 57576 1   I: 53715 1   C: 01511 0   C: 57576 1   I: 63325 0   C: 01517 0   C: 01503 0
13,3320    I: 64715 0   C: 01511 0   C: 50037 0   I: 76006 0   C: 77765 0   I: 76014 0   C: 00303 1   C: 27331 0
13,3330    C: 77775 1   I: 40001 1   C: 00001 0   C: 27334 0   I: 43014 0   C: 04675 1   C: 01672 0   I: 43014 0

13,3340    C: 04676 1   C: 01667 1   I: 77535 1   C: 02214 1      30154 1      50120 1      54032 1      03527 1
13,3350    I: 45345 1   C: 00745 1   C: 01517 0   C: 36303 1   C: 23420 0   I: 77624 1   C: 22336 1   I: 43345 1
13,3360    C: 01551 1   C: 01517 0   C: 35517 1   C: 27304 0   I: 43014 0   C: 04752 0   C: 27371 1   C: 01632 1
13,3370    C: 27331 0   I: 73001 1   C: 00013 0   C: 02150 1   I: 51575 1   C: 01535 0   I: 43006 0   C: 00262 1
```

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OCTAL LISTING FOR PARAGRAPH # 077,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

13,3400     I: 50023 0    C: 66600 1    C: 27405 0    I: 77614 1    C: 00062 0    I: 41345 0    C: 00013 0    C: 00043 0
13,3410     I: 55762 1    C: 50037 0    I: 41366 1    C: 23751 0    I: 40442 1    I: 54345 1    C: 00155 0    C: 20220 0
13,3420     I: 40006 0    C: 27446 1    I: 50021 1    C: 27515 0    C: 27446 1    I: 45345 1    C: 00745 1    C: 01517 0
13,3430     I: 54234 0    C: 45636 0    C: 20211 1    C: 02305 0    I: 51400 1    C: 27452 1    I: 50025 0    C: 00015 0

13,3440     C: 27456 0    I: 75345 1    C: 00015 0    C: 02305 0    C: 36305 1    C: 27456 0    I: 65345 0    C: 27515 0
13,3450     I: 77650 1    C: 27425 1    I: 77634 0    C: 45761 0    C: 36305 1    C: 27441 0    I: 51545 1    C: 02305 0
13,3460     I: 50025 0    C: 27513 0    C: 27252 1    I: 43014 0    C: 01746 0    C: 23237 0    C: 0170[illegible]    C: 23237 0
13,3470     I: 45345 1    C: 02305 0    C: 00015 0    I: 43040 1    C: 27252 1    C: 04242 1    C: 23237 0    I: 45345 1

13,3500     C: 00745 1    C: 01517 0    I: 77640 0    C: 27331 0    I: 40525 1    C: 02305 0    I: 44322 1    I: 52040 1
13,3510     C: 27331 0    C: 23237 0    C: 00000 1    C: 01400 1    C: 14152 1    C: 00000 1    I: 77776 1       30106 0
13,3520        74346 0       00006 1       13561 1       33565 1       05163 0    I: 77776 1       13547 0       40106 1
13,3530        74754 1       10000 0       03547 1       50120 1       30052 0       55261 1       05402 1    C: 04022 0

13,3540        31261 0       50120 1       54052 1       34754 0       70106 1       00006 1       13560 0       33565 1
13,3550        05167 1       10064 1       13547 0    C: 00051 0       44346 0       70106 1       54106 1       00003 1
13,3560        13563 0       34753 1       26106 1       06006 1    I: 77616 0    C: 27517 1    I: 45020 1    C: 00773 1
13,3570     C: 27516 0    I: 43145 0    C: 13771 1    C: 04674 0    C: 37466 1    C: 27612 1    I: 45020 1    C: 00773 1

13,3600     C: 27516 0    I: 47014 1    C: 04474 1    C: 51751 0    I: 44215 1    C: 13771 1    C: 00041 1    I: 45044 0
13,3610     C: 27616 0    C: 13756 1    I: 43234 0    C: 51751 0    C: 03466 0    C: 00041 1    I: 45014 0    C: 01676 1
13,3620     C: 26034 1    I: 43014 0    C: 01673 1    C: 04475 0    I: 77624 1    C: 27236 0    I: 66134 1    C: 03746 1
13,3630     C: 03745 1    I: 67214 1    C: 00275 1    C: 03747 0    I: 43054 1    C: 27637 0    C: 00070 0    I: 77775 1

13,3640     C: 00001 0    C: 25071 0    C: 00007 0    C: 15077 0    C: 00015 0    C: 01105 1    I: 77776 1       00004 0
13,3650        00006 1       40025 1       20155 1       07226 0       30773 1       04660 0    I: 47014 1    C: 04754 0
13,3660     C: 27675 0    C: 51751 0    I: 44215 1    C: 13771 1    C: 00745 1    I: 45044 0    C: 27364 0    C: 13756 1
13,3670     I: 43234 0    C: 51751 0    C: 03466 0    C: 34745 0    C: 27364 0    I: 45345 1    C: 00745 1    C: 01517 0

13,3700     I: 45246 0    C: 13755 1    I: 77644 1    C: 27670 0    I: 44234 1    C: 51751 0    C: 01517 0    I: 51025 1
13,3710     C: 13773 0    C: 27252 1    I: 43345 1    C: 03466 0    C: 13771 1    C: 37466 1    C: 27670 0    C: 77764 1
13,3720     C: 77775 1    C: 77766 0    C: 77771 0    C: 77775 1    C: 77775 1    C: 00000 1    C: 77760 0    C: 77766 0
13,3730     C: 77773 1    C: 77770 1    C: 77771 0    C: 27446 1    C: 14620 0    C: 16471 1    C: 01352 1    C: 22437 1

13,3740     C: 16067 1    C: 00000 1    C: 00000 1    C: 02302 1    C: 24736 0    C: 77651 0    C: 76237 0    C: 77776 1
13,3750     C: 53032 0    C: 10407 0    C: 05344 1    C: 13710 0    C: 35320 0    C: 24000 1    C: 00005 1    C: 74631 0
13,3760     C: 63145 1    C: 00243 1    C: 32703 1    C: 03654 0    C: 21000 1    C: 03654 0    C: 21000 1    C: 04627 0
13,3770     C: 25200 1    C: 03771 0    C: 03772 0  CKSM 45306 0          @             @             @             @
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OCTAL LISTING FOR PARAGRAPH # 100,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

14,2000     I: 43573 1    C: 33776 1       05561 0    C: 00027 1       05561 0    C: 00031 0       04636 0    C: 03731 1
14,2010        06006 1    I: 77414 0    C: 05310 0    C: 30276 1       30104 1       74760 0       00006 1       12025 0
14,2020        11351 0       12023 0       12025 0       05547 1    C: 00031 0       34765 1       70076 1       10000 0
14,2030        02033 0       36214 0       02034 1       34770 0       54776 0       34770 0       04636 0    C: 21074 1

14,2040        04103 1       02043 1       02035 0       40776 0       76214 1       00006 1       12407 1       74770 1
14,2050        00006 1       12167 1       00006 1       34772 1       53251 1       35027 1       05535 1       31250 1
14,2060        00006 1       12063 1       12066 1       00006 1       30025 0       53251 1       30776 1       74767 1
14,2070        10000 0       12145 1       06006 1    I: 43014 0    C: 01463 1    C: 00462 1    I: 77775 1    C: 02026 1

14,2100     C: 14001 0    C: 01251 0    C: 02607 1    C: 34007 1    C: 55345 0    I: 77742 0    C: 16152 0    C: 02607 1
14,2110     I: 77624 1    C: 26453 1    I: 77624 1    C: 62363 0    I: 77776 1       35036 1       05535 1       06006 1
14,2120     I: 77624 1    C: 62371 0    I: 45145 0    C: 02607 1    C: 26524 0    I: 53575 0    C: 02152 0    C: 14307 0
14,2130     C: 02607 1    C: 34041 0    C: 27145 1    I: 47375 0    C: 00001 0    C: 00007 0    I: 53435 0    C: 00307 0

14,2140     C: 00323 0    I: 53435 0    C: 00307 0    C: 34315 1    C: 30170 1       06006 1    I: 77745 1    C: 01251 0
14,2150     C: 34041 0    C: 27145 1    I: 77201 1    C: 00001 0    C: 00001 0    I: 53476 1    C: 24323 0    C: 00007 0
14,2160     I: 53435 0    C: 00001 0    C: 00315 0    I: 53435 0    C: 00323 0    C: 00307 0    I: 77776 1       06006 1
14,2170     I: 77624 1    C: 22247 0    I: 77776 1       35025 0       04636 0    C: 20743 0       04103 1       02201 0

14,2200        02167 0       40106 1       74762 1       00006 1       12320 0       34775 0       04636 0    C: 21067 0
14,2210        14103 0       12334 0       06006 1    I: 64375 1    C: 00307 0    C: 01734 0    I: 77656 1    C: 26714 1
14,2220     C: 00315 0    I: 53521 1    C: 01734 0    C: 26722 1    C: 00323 0    I: 53521 1    C: 01734 0    C: 36730 0
14,2230     C: 47240 1    I: 43014 0    C: 01260 1    C: 01662 1    I: 77776 1       32275 0       04636 0    C: 20710 0

14,2240        33002 0       04636 0    C: 17244 0       04636 0    C: 17644 1       03766 0       05402 1    C: 04024 0
14,2250        06006 1    I: 75160 1    C: 00306 1    C: 01733 1    I: 77624 1    C: 34730 1    I: 43014 0    C: 01273 0
14,2260     C: 01462 0    I: 77234 1    C: 31566 0    C: 11762 1    C: 01472 1    I: 43014 0    C: 01060 0    C: 05350 1
14,2270     C: 30757 1    I: 77614 1    C: 05276 1    I: 77776 1       14105 0    C: 04024 0    I: 74575 0    C: 01734 0

14,2300     I: 74515 0    C: 01742 1    I: 57414 1    C: 05316 0    C: 30305 1    I: 53455 0    I: 77626 0    C: 53470 1
14,2310     C: 01750 1    C: 00323 0    I: 53435 0    C: 00307 0    C: 00315 0    I: 52014 0    C: 01073 1    C: 30170 1
14,2320        34764 0       04636 0    C: 21067 0       04103 1       02212 1       06006 1    I: 77414 0    C: 05316 0
14,2330     C: 30273 1       05671 1    C: 00402 1       02320 1       06006 1    I: 77624 1    C: 22247 0    I: 66234 1

14,2340     C: 34744 1    C: 00051 0    C: 00001 0    I: 40370 1    C: 00003 1    C: 00005 1    I: 70543 1    C: 01313 1
14,2350     I: 70523 1    C: 00005 1    I: 51425 0    I: 45206 1    C: 34743 0    I: 71240 1    C: 30376 0    I: 51025 1
14,2360     C: 34744 1    C: 30376 0    I: 77776 1       05402 1    C: 04024 0       03742 0       06006 1    I: 77234 1
14,2370     C: 31566 0    C: 11762 1    C: 01472 1    I: 52014 0    C: 01060 0    C: 30400 0    I: 77700 0    C: 30346 0
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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971                PAGE 1641

OCTAL LISTING FOR PARAGRAPH # 101,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

14,2400      I: 75160 1   C: 02671 0   C: 01733 1   I: 77624 1   C: 34730 1   I: 77414 0   C: 01462 0      05402 1
14,2410      C: 04024 0      34776 0      04636 0   C: 21067 0      04103 1      02417 1      02622 0      06006 1
14,2420      I: 43234 0   C: 51751 0   C: 34652 1   I: 77624 1   C: 26345 1   I: 77624 1   C: 47530 1   I: 45001 1
14,2430      C: 00001 0   C: 34756 1   I: 71214 0   C: 01465 1   C: 11762 1   C: 24303 1   C: 02714 1   I: 63361 0

14,2440      C: 30575 0   C: 02730 1   I: 74370 0   C: 00344 1   C: 30577 1   I: 77655 1   I: 53505 1   C: 01734 0
14,2450      C: 02760 1   I: 66331 0   C: 00051 0   C: 00006 1   C: 00052 0   C: 00006 1   I: 52100 1   C: 30461 1
14,2460      C: 30606 1   I: 45173 0   C: 33776 1   C: 30552 0   I: 73014 0   C: 01710 0   C: 30458 0   C: 00046 0
14,2470      I: 52104 0   C: 30473 1   C: 30456 0   I: 45173 0   C: 44001 0   C: 30552 0   I: 76614 0   C: 01710 0

14,2500      C: 30470 1   C: 33776 1   I: 45237 0   C: 44001 0   C: 30601 0   I: 43240 0   C: 30470 1   C: 30603 1
14,2510      I: 77644 1   C: 30470 1   I: 50373 0   C: 33776 1   C: 02760 1   I: 50025 0   C: 30605 1   C: 30456 0
14,2520      I: 50373 0   C: 44001 0   C: 02760 1   I: 50025 0   C: 30605 1   C: 30470 1   I: 77614 1   C: 01675 0
14,2530      C: 30545 0   I: 65120 1   C: 00302 0   C: 00303 1   I: 47773 1   C: 33776 1   C: 44001 0   I: 43006 0

14,2540      C: 01545 1   C: 30531 0   I: 45345 1   I: 77644 1   C: 30470 1   I: 67130 1   C: 00302 0   C: 00303 1
14,2550      I: 77650 1   C: 30470 1   I: 51321 0   C: 02736 1   C: 00017 1   I: 77654 0   C: 30571 1   I: 75240 0
14,2560      C: 30571 1   C: 00160 0   I: 75240 0   C: 30571 1   C: 00162 1   I: 43040 1   C: 30571 1   C: 01630 0
14,2570      C: 00052 0   I: 77614 1   C: 01430 1   C: 00052 0   C: 21150 0   C: 25157 0   C: 32766 1   C: 22713 1

14,2600      C: 01736 1   C: 35137 1   C: 73003 0   C: 65403 0   C: 06233 0   C: 26112 1   I: 77414 0   C: 01745 0
14,2610      C: 30621 1      05671 1   C: 00405 0      35023 0      04636 0   C: 20743 0      04103 1      02622 0
14,2620         02407 0   I: 77776 1      34770 0      54304 1      05561 0   C: 00025 0      05402 1   C: 05024 1
14,2630      C: 13000 0      50304 0      30302 0      00006 1      73004 1      55140 1      06006 1   I: 77624 1

14,2640      C: 30761 1   I: 72131 1   C: 00051 0   C: 00000 1   C: 00304 0   I: 77700 0   C: 30651 0   C: 36617 1
14,2650      C: 30652 0   C: 02611 0   I: 54335 0   C: 01215 0   C: 20215 0   I: 45030 0   C: 30753 0   C: 36105 0
14,2660      I: 77624 1   C: 36052 0   C: 02617 0   I: 45145 0   C: 02607 1   C: 31651 1   I: 53521 1   C: 01734 0
14,2670      I: 77776 1      10304 1      02744 1      06006 1   C: 26736 1   C: 02617 0   C: 24007 0   C: 02611 0

14,2700      C: 24015 0   C: 02601 1   C: 36744 0   C: 34657 1   I: 45014 0   C: 00354 0   C: 30757 1   C: 47432 1
14,2710      I: 77624 1   C: 47240 1   I: 77776 1      35040 0      04636 0   C: 20743 0      04103 1      02721 1
14,2720         02734 0      05402 1   C: 00314 1      33002 0      04636 0   C: 17244 0      04636 0   C: 17644 1
14,2730         03766 0      05402 1   C: 05024 1   C: 13000 0      05561 0   C: 00051 0      35775 1      04636 0

14,2740      C: 21067 0      04103 1      02407 0      04103 1      06006 1   C: 26601 1   C: 02617 0   C: 02611 0
14,2750      I: 77776 1      34772 1      12623 0   I: 77624 1   C: 31005 0   I: 77650 1   C: 30660 1   I: 77776 1
14,2760         02736 1   I: 77420 1   C: 02657 1      33003 1      05540 0      02771 1      36211 0      05516 0
14,2770         15205 1      03636 1      04362 1      02763 1      06006 1   I: 45034 1   C: 51751 0   C: 31651 1
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OCTAL LISTING FOR PARAGRAPH # 102,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

14,3000     I: 77650 1   C: 02657 1   C: 02757 0   C: 00306 1   C: 05253 0   I: 77614 1   C: 04265 1   I: 77420 1
14,3010     C: 02576 1      35043 0      56003 1      55577 1      00006 1      30036 1      53313 0      00006 1
14,3020        30025 0      52364 1      06006 1   I: 43131 0   C: 01324 0   C: 00000 1   C: 00271 0   I: 43014 0
14,3030     C: 00705 0   C: 31222 1   C: 03660 1   I: 77776 1      31354 1      00006 1      63245 1      06006 1

14,3040     I: 43234 0   C: 51751 0   C: 31271 1   I: 45214 1   C: 04741 1   C: 31047 0   C: 31273 0   C: 02347 0
14,3050     I: 43014 0   C: 00705 0   C: 31066 0   C: 00706 0   C: 31075 1   I: 72131 1   C: 00051 0   C: 00000 1
14,3060     C: 00304 0   I: 77700 0   C: 31116 0   I: 52175 0   C: 02617 0   C: 31120 0   I: 77745 1   C: 02347 0
14,3070     C: 34041 0   C: 27202 1   I: 52175 0   C: 00001 0   C: 31105 1   I: 71214 0   C: 04305 0   C: 54040 1

14,3100     C: 02347 0   I: 77624 1   C: 26524 0   I: 77775 1   C: 02152 0   C: 16766 1   C: 02347 0   C: 34041 0
14,3110     C: 27170 1   I: 52375 1   C: 02766 1   C: 00001 0   I: 52056 0   C: 31120 0   I: 77775 1   C: 02611 0
14,3120     I: 53521 1   C: 01734 0   C: 02766 1   I: 45001 1   C: 00001 0   C: 47530 1   I: 77624 1   C: 46034 1
14,3130     I: 71214 0   C: 01710 0   C: 31276 0   C: 02776 0   I: 51025 1   C: 31267 0   C: 31241 1   I: 45345 1

14,3140     C: 02776 0   C: 31275 0   I: 77440 1   C: 31241 1      31775 0      54330 0      06006 1   I: 43014 0
14,3150     C: 00705 0   C: 31170 0   C: 04741 1   C: 31161 0   I: 71214 0   C: 04241 1   C: 16530 0   C: 02347 0
14,3160     C: 00364 0   I: 77414 0   C: 00311 1   C: 31170 0      33265 0      04636 0   C: 20710 0      06006 1
14,3170     I: 77776 1      30330 1      55312 1      31773 0      55313 0      05354 0   C: 00030 1      13202 0

14,3200        34773 0      13203 1      35011 1      04636 0   C: 01731 0      34757 0      70075 1      10000 0
14,3210        03223 1      34752 0      70103 1      00006 1      13034 1      31577 0      54003 0      06006 1
14,3220     I: 77650 1   C: 02576 1   I: 77776 1      04636 0   C: 76333 0      34764 0      70075 1      00006 1
14,3230        13215 0      06006 1   I: 52014 0   C: 00750 0   C: 31236 1   C: 31040 1   I: 77776 1      33311 1

14,3240        13203 1   I: 77776 1      33266 0      54330 0      03146 1      34763 1      70074 0      10000 0
14,3250        03316 0      00004 0      37645 1      05135 0   C: 03260 0   C: 30067 0      00003 1      03316 0
14,3260        06006 1   I: 77624 1   C: 31571 0   I: 77776 1      05205 0   C: 01534 1   C: 25252 0   C: 25254 0
14,3270     C: 00000 1   C: 00360 1   C: 00000 1   C: 00062 0   C: 61740 0   C: 77777 0   I: 77414 0   C: 00705 0

14,3300     C: 31241 1      33310 0      04636 0   C: 21766 0      13312 0      13175 0      13175 0      15205 1
14,3310     C: 00404 1   C: 00264 1      04636 0   C: 20575 1      04655 0   C: 16031 1      05354 0   C: 00030 1
14,3320        13202 0      11131 1      13407 0      40076 1      74766 0      10000 0      13037 1      06006 1
14,3330     I: 46135 1   C: 03754 1   C: 31411 1   I: 54160 1   C: 03530 1   C: 03753 0   I: 70730 1   C: 01377 0

14,3340     C: 00001 0   I: 47044 1   C: 31344 0   C: 31037 1   C: 03670 0   C: 34041 0   C: 27170 1   I: 77775 1
14,3350     C: 00017 1   C: 01046 1   I: 45150 1   C: 01077 0   C: 47017 1   C: 25072 0   C: 01046 1   I: 77656 1
14,3360     C: 36152 1   C: 26654 1   I: 43345 1   C: 02240 0   C: 00753 0   C: 02240 0   I: 77624 1   C: 61331 1
14,3370     I: 70414 1   C: 04343 1   C: 31373 1   C: 16152 0   C: 03670 0   I: 77624 1   C: 26453 1   I: 77624 1
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OCTAL LISTING FOR PARAGRAPH # 103,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

14,3400      C: 62363 0   I: 77414 0   C: 04061 1      05561 0   C: 00052 0      44770 1      60737 1      55131 1
14,3410         13037 1   I: 52160 1   C: 03573 0   C: 31336 0      41333 1      74760 0      10000 0      03423 1
14,3420         05671 1   C: 00210 1      04103 1      04636 0   C: 03745 1      34776 0      04636 0   C: 21067 0
14,3430         04103 1      03454 1      05402 1   C: 05024 1   C: 13000 0      34772 1      55307 0      55310 0

14,3440         55311 1      35025 0      04636 0   C: 20705 1      33565 1      04636 0   C: 20705 1      03742 0
14,3450         05402 1   C: 05024 1   C: 13000 0      13425 0      06006 1   I: 40331 1   C: 00305 1   C: 00000 1
14,3460      C: 00001 0   I: 77234 1   C: 31566 0   C: 11762 1   C: 01472 1   I: 43014 0   C: 01060 0   C: 00666 1
14,3470      I: 77776 1      05402 1   C: 05024 1   C: 13000 0      05354 0   C: 00065 1      13504 1      06006 1

14,3500      I: 77624 1   C: 36105 0   I: 77650 1   C: 31507 1      06006 1   I: 77624 1   C: 31571 0   I: 77624 1
14,3510      C: 36052 0   I: 77606 1   I: 53135 0   C: 00305 1   C: 31520 1   I: 45575 1   C: 41160 0   C: 31526 1
14,3520      I: 45575 1   C: 61166 1   C: 02607 1   I: 77624 1   C: 31651 1   C: 02601 1   I: 77776 1      05402 1
14,3530      C: 05024 1   C: 13000 0      10304 1      13542 0      05402 1   C: 05024 1   C: 13000 0      34770 0

14,3540         54304 1      13471 1      05402 1   C: 05024 1   C: 13000 0      06006 1   I: 45145 0   C: 02607 1
14,3550      C: 31651 1   C: 24015 0   C: 02601 1   C: 24007 0   C: 02611 0   C: 26736 1   C: 02617 0   C: 36744 0
14,3560      C: 34657 1   I: 77414 0   C: 00314 1   C: 11716 1      03425 1   C: 12200 0      30025 0      55277 0
14,3570         16030 0   I: 43020 1   C: 03457 1   C: 00071 1   I: 77776 1      04636 0   C: 16000 0      05354 0

14,3600      C: 00030 1      13603 0      13612 0      05354 0   C: 00026 0      34766 1      63650 1      63301 0
14,3610         00006 1      13575 1      04636 0   C: 16073 1      34772 1      04636 0   C: 20715 0      44763 0
14,3620         61214 1      00006 1      63631 0      33635 1      05535 1      03636 1      04362 1      03623 0
14,3630         03732 1      06006 1   I: 77614 1   C: 03420 1   C: 03457 1   C: 00307 0      11140 1      13643 1

14,3640         16710 0      00002 0      00002 0      63647 1      00006 1      66710 1      00002 0   C: 77730 0
14,3650      C: 77772 0   C: 02607 1   I: 45020 1   C: 02777 1   C: 26345 1   I: 77775 1   C: 02736 1   C: 24001 0
14,3660      C: 02744 1   C: 26736 1   C: 00001 0   C: 02744 1   I: 77776 1      03732 1      10000 0      13700 1
14,3670         35035 1      05535 1      06006 1   I: 74375 0   C: 03705 0   C: 31731 0   I: 52056 0   C: 31723 0

14,3700         40000 0      63727 0      00006 1      63714 0      50304 0      30302 0      50120 1      54046 1
14,3710         06006 1   I: 52173 0   C: 33776 1   C: 31723 0      06006 1   I: 70740 0   C: 00304 0   C: 00303 1
14,3720      I: 76740 0   C: 00154 1   C: 02372 0   I: 53455 0   C: 03452 1   I: 77650 1   C: 02777 1   C: 00343 0
14,3730      C: 22363 1   C: 11623 0      47677 1      71140 1      00006 1      76211 1      56001 0      50304 0

14,3740         54302 1      00002 0      30002 0      55777 0      31335 0      00006 1      13753 1      35016 0
14,3750         04636 0   C: 01731 0      03744 0      04636 0   C: 16724 1      04636 0   C: 17644 1      03766 0
14,3760         04636 0   C: 17133 0      04636 0   C: 17644 1      03766 0      01777 1      00004 0      30002 0
14,3770         05673 0   C: 00217 0      01363 0   C: 03773 1   C: 03774 0   CKSM 64443 0        @            @
```

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OCTAL LISTING FOR PARAGRAPH # 104,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,2000      I: 47201 1   C: 00001 0   C: 34644 0   C: 27452 1   C: 03715 1   I: 53361 0   C: 34642 0   C: 03452 1
15,2010      C: 27452 1   C: 11762 1   C: 27204 1   C: 03707 1   I: 53476 1   C: 17707 1   C: 00045 0   C: 02307 1
15,2020      I: 41535 1   C: 01356 0   I: 67254 0   C: 73257 0   C: 32050 0   I: 77621 1   I: 77244 0   C: 73242 1
15,2030      C: 11762 1   C: 17715 1   C: 11762 1   C: 02307 1   I: 41335 1   C: 32047 0   C: 00001 0   I: 76750 1

15,2040      C: 00155 0   C: 33776 1   I: 53455 0   C: 03452 1   I: 77650 1   C: 73226 0   C: 00006 1   C: 00046 0
15,2050      I: 77201 1   C: 00007 0   C: 02611 0   I: 63276 1   C: 02541 0   I: 57456 1   I: 47206 0   C: 02611 0
15,2060      I: 77772 0   C: 00001 0   I: 77616 0      34355 0      27725 1      34763 1      71334 0      00006 1
15,2070         12076 0      44770 1      70102 0      54102 0      06000 1      02143 0      30032 0      57661 1

15,2100         00006 1      21661 0      55675 0      30033 1      57662 1      00006 1      21662 0      55676 0
15,2110         30034 0      57663 0      00006 1      21663 1      55677 1      30102 1      74767 1      10000 0
15,2120         12135 0      06000 1      05402 1   C: 00006 1      05314 1      34770 0      55720 1      34355 0
15,2130         05223 1   C: 02063 0      11720 1      02165 1      05314 1      40102 0      74770 1      00006 1

15,2140         12125 1      26102 0      34772 1      55711 0      55706 0      55707 1      55710 1      55723 1
15,2150         02126 0      54001 1      00002 0      50000 1      34751 0      26001 1      00002 0      40000 0
15,2160         61720 0      00006 1      74753 0      61720 0      00002 0      31663 0      05060 1      55511 1
15,2170         31661 1      05061 0      55512 1      00006 1      71511 1      55514 1      31661 1      05060 1

15,2200         55513 0      00006 1      71511 1      55515 0      41677 1      00006 1      71512 1      53721 0
15,2210         41676 0      00006 1      71515 0      21721 0      31720 0      57707 0      02157 0      55702 1
15,2220         41677 1      00006 1      71513 0      53721 0      31676 1      00006 1      71514 1      21721 0
15,2230         31720 0      57710 0      02157 0      55703 0      31663 0      05061 0      55510 0      00006 1

15,2240         71676 0      55720 1      34772 1      20001 1      61675 1      61720 0      40000 0      55720 1
15,2250         57706 1      02157 0      55701 1      11723 1      02256 1      02300 0      41664 0      05061 0
15,2260         00006 1      71723 1      55721 0      00006 1      72626 0      27701 1      31664 1      05060 1
15,2270         40000 0      00006 1      71723 1      27702 1      41721 0      00006 1      72627 1      27703 0

15,2300         34755 1      70102 0      00006 1      15314 0      34750 1      54030 0      00006 1      32313 1
15,2310         52113 0      05314 1   C: 02314 0   C: 32066 0      22016 0      00006 1      22012 1      30021 1
15,2320         60000 1      55623 0      31702 0      61665 0      02151 0      55665 1      05060 1      55506 1
15,2330         55705 0      00006 1      71701 1      57705 1      00006 1      71703 0      55704 1      31665 0

15,2340         05061 0      55507 0      00006 1      71703 0      27705 0      41507 0      00006 1      71701 1
15,2350         27704 1      27666 1      05061 0      00006 1      71705 0      61665 0      02151 0      55665 1
15,2360         40000 0      61603 0      02151 0      55477 0      55572 1      31705 1      61664 1      02151 0
15,2370         55714 0      55664 0      41666 1      61604 1      55573 0      34766 1      70102 0      00006 1
```

```
OCTAL LISTING FOR PARAGRAPH # 105,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,2400        12466 0      44770 1      55700 0      55477 0      55500 1      41701 1      00006 1      72626 0
15,2410        61703 1      02456 1      50000 1      32631 1      55720 1      31702 0      02456 1      50000 1
15,2420        32634 1      27720 1      00006 1      01005 0      11711 0      02645 1      03325 0      03332 0
15,2430        10000 0      62624 0      12462 1      62624 0      12463 0      55624 1      10000 0      42623 0

15,2440        12442 0      32623 1      60001 0      22002 0      02430 1      52002 1      11624 1      62621 0
15,2450        12452 1      62621 0      54000 0      12455 0      22007 0      57624 0      10000 0      62622 0
15,2460        12463 0      62622 0      40000 0      55721 0      34772 1      00002 0      55700 0      11506 1
15,2470        62625 1      12473 1      62625 1      54000 0      12555 1      11506 1      12477 0      11727 0

15,2500        02513 1      02503 0      02513 1      05402 1   C: 40334 1      44770 1      55727 0      32620 1
15,2510        05233 0   C: 02375 1   C: 54066 0      11711 0      12522 1      12522 1      34772 1      00006 1
15,2520        01006 0      55711 0      11506 1      31573 1      12530 1      44772 0      55700 0      41573 0
15,2530        55573 0      55500 1      54001 1      11700 0      02537 1      34770 0      50000 1      31703 1

15,2540        02435 1      00006 1      04001 1      50000 1      32631 1      55720 1      31572 0      54001 1
15,2550        31702 0      02435 1      00006 1      04001 1      12417 0      25700 1      44770 1      55711 0
15,2560        11727 0      55727 0      12563 1      11507 0      41573 0      12567 0      31573 1      55713 1
15,2570        00006 1      74753 0      57713 0      54001 1      11507 0      41704 1      02600 0      31704 0

15,2600        02435 1      00006 1      04001 1      50000 1      32634 1      00006 1      01006 0      31717 1
15,2610        00006 1      21664 0      54001 1      11507 0      30001 0      02530 0      40001 1      02530 0
15,2620     C: 04064 1   C: 37734 0   C: 37756 1   C: 00067 0   C: 37267 0   C: 11277 0   C: 65033 1   C: 36044 1
15,2630     C: 00120 1   C: 00000 1   C: 00240 1   C: 00005 1   C: 00000 1   C: 00012 1      40025 1      55712 0

15,2640        34770 0      55711 0      05402 1   C: 00001 0      05314 1      44770 1      55617 1      45004 1
15,2650        00006 1      71701 1      60001 0      55613 0      41664 0      54021 0      40102 0      74765 0
15,2660        00006 1      12667 0      26102 0      31715 0      60021 1      57614 0      12727 0      34753 1
15,2670        60000 1      61715 0      57614 0      30021 1      64751 0      64751 0      57614 0      27614 1

15,2700        11613 0      64770 0      12704 1      64770 0      00006 1      71613 0      00006 1      73375 1
15,2710        00006 1      11506 1      54001 1      11614 1      34753 1      12717 0      44753 0      61614 0
15,2720        60001 0      54001 1      12727 0      50000 1      44752 1      60000 1      27614 1      31614 0
15,2730        00006 1      71506 1      55614 1      11700 0      03323 0      02736 1      31614 0      55614 1

15,2740        55571 1      55713 1      31613 1      54021 0      30021 1      55570 0      57613 1      00006 1
15,2750        71613 0      00006 1      73375 1      55616 0      60000 1      40000 0      63401 1      54001 1
15,2760        11613 0      40001 1      12764 1      30001 0      61614 0      63401 1      00006 1      63004 0
15,2770        40000 0      63401 1      63401 1      00006 1      63013 0      44355 1      61616 1      00006 1
```

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OCTAL LISTING FOR PARAGRAPH # 106,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,3000          63305 1      41617 1      55620 0      03066 1      41613 0      55613 0      54021 0      41614 1
15,3010          55614 1      41617 1      55617 1      44355 1      61616 1      00006 1      63020 0      13025 1
15,3020          43377 0      61614 0      60021 1      00006 1      63305 1      41617 1      55620 0      43401 0
15,3030          61616 1      61614 0      55615 0      63400 0      40000 0      00006 1      63044 1      31615 1

15,3040          00006 1      74753 0      20001 1      03047 1      00006 1      22007 0      43400 1      55567 0
15,3050          61613 1      60000 1      00006 1      73375 1      55621 1      00006 1      63060 1      03072 1
15,3060          10002 1      13066 0      31620 1      55617 1      41621 1      13071 0      41613 0      55567 0
15,3070          34772 1      55621 1      31567 1      60000 1      00006 1      73375 1      60000 1      55607 0

15,3100          40000 0      00006 1      63106 0      55607 0      31617 0      55620 0      41607 0      00006 1
15,3110          71567 0      55615 0      41567 0      00006 1      13130 1      61613 1      00006 1      71621 1
15,3120          61615 1      61614 0      22007 0      56001 0      00006 1      11567 0      00006 1      13132 0
15,3130          35020 0      13137 0      56001 0      00006 1      11567 0      00006 1      75020 1      55605 1

15,3140          33376 0      00006 1      71621 1      55621 1      33376 0      00006 1      71607 0      55607 0
15,3150          34772 1      55711 0      34770 0      54305 0      30025 0      64753 1      64753 1      27712 0
15,3160          33374 1      27712 0      44767 1      61621 0      00006 1      63177 0      51617 0      32634 1
15,3170          55622 1      31621 0      27712 0      00006 1      63201 1      34772 1      13232 0      44770 1

15,3200          55621 1      44767 1      61605 0      00006 1      63213 1      31605 0      27712 0      00006 1
15,3210          63215 1      34772 1      13234 0      44770 1      55605 1      44767 1      61607 1      00006 1
15,3220          63235 0      51620 1      32634 1      55610 0      31607 1      27712 0      00006 1      63237 1
15,3230          34772 1      13236 1      55621 1      44770 1      55605 1      44770 1      55607 0      34772 1

15,3240          55611 1      55612 1      55606 1      53622 1      10000 0      13262 0      23612 0      44770 1
15,3250          53606 1      10000 0      13262 0      23612 0      44770 1      53610 0      10000 0      13262 0
15,3260          23612 0      03270 1      56001 0      27612 1      56001 0      64770 0      05223 1   C: 03276 1
15,3270          31612 0      00006 1      01006 0      11611 1      05314 1      03333 1      34767 0      55611 1

15,3300          70102 0      00006 1      13271 1      22007 0      13246 0      41700 0      74770 1      54001 1
15,3310          50000 1      31714 1      50001 0      54000 0      60001 0      02151 0      55717 0      34772 1
15,3320          00006 1      01006 0      55567 0      55711 0      03275 1      41705 0      00006 1      71506 1
15,3330          00006 1      74753 0      27713 1      34753 1      00006 1      71713 1      55476 1      40305 0

15,3340          54305 0      00006 1      63346 0      04714 1   C: 42425 1      03364 0      66214 0      00006 1
15,3350          63354 0      30025 0      54304 1      44776 1      54305 0      00006 1      31702 0      50305 1
15,3360          52324 0      31703 1      50305 1      54325 1      31623 1      54021 0      00006 1      33373 0
15,3370          52113 0      05323 0   C: 03226 1   C: 12060 1   C: 77464 1   C: 23617 0   C: 01440 0   C: 00266 0
```

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OCTAL LISTING FOR PARAGRAPH # 107,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,3400     C: 70706 1    C: 00133 0    C: 00000 1    C: 04000 0    C: 00000 1    C: 00200 0    C: 00000 1    C: 00400 0
15,3410     C: 00000 1    C: 10000 0    C: 00000 1    C: 02000 0    C: 00000 1    C: 01000 0    C: 00000 1    C: 00020 0
15,3420     C: 00000 1    C: 00100 0    C: 00000 1    C: 34631 1    C: 23146 0    C: 77467 1    C: 77777 0    C: 03110 1
15,3430     C: 17665 1    C: 00000 1    C: 00001 0    C: 37767 0    C: 37737 0    C: 40010 1    C: 40040 1    C: 15264 0

15,3440     C: 07253 1    C: 74133 0    C: 45130 1    C: 70034 1    C: 53644 1    C: 15015 1    C: 35262 1    C: 67072 0
15,3450     C: 57521 0    C: 02552 1    C: 27310 0    C: 07210 0    C: 34714 1    C: 67300 0    C: 47414 0    C: 13262 0
15,3460     C: 27671 1    C: 05101 1    C: 34175 0    C: 70717 1    C: 46031 1    C: 62467 0    C: 45023 1    C: 10655 0
15,3470     C: 16340 1    C: 63237 1    C: 45012 0    C: 73711 1    C: 62337 1    C: 07207 0    C: 34100 1    C: 61751 0

15,3500     C: 60311 1    C: 02344 0    C: 11437 1    C: 03243 1    C: 10132 0    C: 62031 1    C: 55616 0    C: 70716 0
15,3510     C: 43617 0    C: 01747 1    C: 01335 0    C: 63532 0    C: 54217 1    C: 12010 0    C: 11614 1    C: 76152 0
15,3520     C: 45651 1    C: 60371 1    C: 57632 1    C: 03370 0    C: 03556 1    C: 76127 1    C: 67425 0    C: 72436 0
15,3530     C: 61577 0    C: 61041 0    C: 46271 1    C: 72303 1    C: 40213 0    C: 62637 1    C: 74356 1    C: 70711 1

15,3540     C: 46567 1    C: 67366 0    C: 44175 1    C: 64424 1    C: 41241 0    C: 07156 1    C: 23036 0    C: 63330 1
15,3550     C: 75735 1    C: 67512 0    C: 62476 0    C: 05227 0    C: 10611 0    C: 64757 0    C: 51701 0    C: 71233 0
15,3560     C: 53334 0    C: 66425 1    C: 76017 0    C: 66546 0    C: 64151 0    C: 73256 1    C: 65757 1    C: 14120 1
15,3570     C: 32444 1    C: 61251 0    C: 56124 0    C: 72307 0    C: 65764 1    C: 74742 0    C: 65735 0    C: 70607 1

15,3600     C: 77742 0    C: 77151 1    C: 74615 0    C: 61600 0    C: 60003 1    C: 60605 1    C: 64345 1    C: 77026 0
15,3610     C: 54200 1    C: 73160 1    C: 42475 1    C: 60430 0    C: 66614 1    C: 00653 1    C: 13072 0    C: 04042 0
15,3620     C: 27232 1    C: 62162 0    C: 44274 0    C: 07322 0    C: 33165 0    C: 03265 0    C: 32741 1    C: 63467 1
15,3630     C: 50064 0    C: 11655 1    C: 11373 0    C: 75477 1    C: 77366 1    C: 70425 0    C: 51217 1    C: 07505 0

15,3640     C: 32504 1    C: 13726 0    C: 15341 0    C: 72157 1    C: 66255 0    C: 11142 0    C: 32737 0    C: 64200 1
15,3650     C: 43016 1    C: 71316 0    C: 64201 0    C: 16400 1    C: 36737 1    C: 01364 1    C: 14350 1    C: 75051 1
15,3660     C: 60001 0    C: 17027 1    C: 31661 1    C: 73321 0    C: 43422 1    C: 77007 0    C: 51442 1    C: 11514 1
15,3670     C: 32502 1    C: 63215 1    C: 47106 0    C: 02140 0    C: 02335 0    C: 12716 1    C: 12356 1    C: 13401 0

15,3700     C: 37404 0    C: 03154 1    C: 15267 0    C: 17403 0    C: 01743 0    C: 75552 1    C: 76050 0    C: 05465 0
15,3710     C: 17001 0    C: 16221 1    C: 27572 1    C: 04420 0    C: 14273 1    C: 06440 1    C: 11323 0    C: 07767 0
15,3720     C: 30366 1    C: 14155 0    C: 23047 0    C: 13176 0    C: 03307 0    C: 13247 1    C: 03342 1    C: 01070 1
15,3730     C: 26507 1    C: 10557 1    C: 32115 0    C: 10404 0    C: 00124 0    C: 65500 1    C: 72703 0    C: 00151 1

15,3740     C: 25431 0    C: 00077 1    C: 37176 0    C: 17777 0    C: 02143 0    C: 07675 1    C: 02702 0    C: 03420 1
15,3750     C: 01470 0    C: 62414 1    C: 50541 1    C: 07506 0    C: 14361 0    C: 01674 0    C: 36075 0    C: 15736 1
15,3760     C: 21775 1    C: 16745 0    C: 13112 1    C: 02620 1    C: 31757 0    C: 73011 0    C: 60052 0    C: 15776 0
15,3770     C: 01237 0    C: 00330 1    C: 35521 1    C: 07573 1    C: 21256 0    C: 16004 1    C: 63776 1 CKSM 76540 1
```

```
OCTAL LISTING FOR PARAGRAPH # 110,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,2000      I: 77775 1    C: 02665 0    C: 03604 0    I: 52375 1    C: 03612 1    C: 03576 0    C: 27646 0    C: 02705 1
16,2010      C: 37620 1    C: 22221 0    I: 77624 1    C: 63606 1    C: 26625 1    C: 00007 0    C: 36617 1    C: 56674 1
16,2020      I: 40375 1    C: 02453 1    C: 00001 0    I: 45115 0    C: 03546 0    C: 45174 1    I: 77624 1    C: 45330 0
16,2030      C: 27472 0    C: 03546 0    I: 63201 1    C: 00001 0    C: 02453 1    I: 65325 0    C: 02461 0    C: 03663 1

16,2040      I: 62525 1    C: 33430 0    I: 45006 0    C: 72740 1    I: 77624 1    C: 45304 1    I: 77745 1    C: 03744 0
16,2050      I: 73401 0    C: 00007 0    I: 53515 0    C: 03540 0    C: 00001 0    I: 47315 0    C: 02611 0    I: 77656 1
16,2060      I: 71525 0    C: 03744 0    I: 45561 1    C: 43754 0    C: 16440 0    I: 45345 1    C: 03413 1    C: 34531 1
16,2070      C: 14041 1    C: 03656 1    I: 77625 0    C: 00041 1    C: 37423 0    C: 61650 0    I: 77775 1    C: 03612 1

16,2100      C: 17713 1    C: 03413 1    C: 00041 1    I: 77621 1    C: 03656 1    C: 37423 0    C: 61650 0    I: 41575 0
16,2110      C: 03646 0    C: 37721 1    C: 11200 0    I: 77601 0    C: 00001 0    I: 45175 0    C: 03632 0    C: 77270 1
16,2120      I: 70372 0    C: 34523 1    I: 52315 1    C: 03612 1    C: 03713 1    I: 52341 0    C: 34523 1    I: 72561 0
16,2130      C: 03703 0    C: 24015 0    C: 03721 0    I: 41456 0    I: 74241 0    C: 00015 0    C: 00001 0    I: 51352 1

16,2140      C: 00015 0    C: 14015 0    C: 03727 0    I: 56261 1    C: 21605 1    C: 03076 0    I: 63316 0    C: 00015 0
16,2150      I: 77636 1    I: 75421 1    I: 76561 1    I: 53455 0    C: 00015 0    C: 37713 0    C: 50331 0    I: 77775 1
16,2160      C: 11760 0    C: 27351 0    C: 03713 1    C: 00307 0    I: 53435 0    C: 03632 0    C: 34007 1    C: 61702 0
16,2170      C: 00315 0    I: 57435 1    C: 00307 0    I: 77772 0    C: 34323 1    C: 50444 0       06006 1    I: 45001 1

16,2200      C: 00001 0    C: 34331 1    I: 77745 1    C: 03074 1    C: 03335 1    I: 77776 1       05402 1    C: 10035 0
16,2210         06006 1    I: 51575 1    C: 03432 1    I: 67206 1    C: 01345 1    I: 44205 0    C: 34533 0    I: 67240 0
16,2220      C: 51143 0    C: 01351 1    I: 44205 0    C: 34530 0    C: 03335 1    C: 03074 1    I: 77614 1    C: 01344 0
16,2230      C: 51603 0    I: 77414 0    C: 04700 1    C: 34325 1       31465 1       74753 0       10000 0       34770 0

16,2240         50000 1       31421 1       55633 1       06006 1    I: 51375 1    C: 03432 1    C: 03705 0    I: 77656 1
16,2250      I: 41441 0    C: 03460 0    I: 56244 0    C: 51137 0    C: 34632 1    I: 41215 1    C: 11760 0    I: 70501 1
16,2260      C: 00047 1    I: 60325 0    C: 00045 0    C: 00050 1    I: 77665 1    I: 53664 0    C: 00046 0    C: 57607 1
16,2270      I: 41405 0    C: 34525 1    I: 54335 0    C: 03014 1    C: 20617 0    I: 45421 1    C: 74347 1    I: 77615 0

16,2300      C: 01044 0    C: 17413 1    C: 03430 0    I: 50025 0    C: 34527 0    C: 51102 0    I: 74375 0    C: 03705 0
16,2310      C: 03703 0    I: 52352 1    C: 03432 1    I: 63256 0    C: 03460 0    I: 47256 0    I: 45121 1    C: 01734 0
16,2320      C: 47633 1    I: 77761 1    C: 03227 0    C: 37126 0    C: 51603 0    I: 77545 0    C: 36534 0       30154 1
16,2330         12242 0    I: 43020 1    C: 03374 1    C: 01307 1    C: 34360 0    I: 50135 0    C: 03325 0    C: 61721 1

16,2340      I: 53375 0    C: 03327 1    C: 03432 1    C: 03335 1    I: 77776 1       34770 0       61724 1       55725 1
16,2350         05402 1    C: 10035 0       31725 0       55724 0       06006 1    I: 77775 1    C: 03335 1    C: 03327 1
16,2360      I: 77775 1    C: 03432 1    I: 53245 1    C: 03705 0    C: 03721 0    C: 03460 0    I: 77646 0    C: 03763 0
16,2370      I: 77776 1       05402 1    C: 10035 0       06006 1    I: 77775 1    C: 03460 0    C: 37721 1    C: 03374 1
```

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OCTAL LISTING FOR PARAGRAPH # 111,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,2400        06006 1   I: 71201 1   C: 00001 0   C: 11762 1   I: 43125 0   C: 34517 0   C: 03705 0   C: 34412 1
16,2410     I: 77745 1   C: 34521 0   I: 77606 1   I: 45014 0   C: 00675 0   C: 22002 0   I: 77776 1      05402 1
16,2420     C: 05021 1   C: 10000 0      06006 1   I: 77214 0   C: 01310 1   C: 34442 1   C: 03612 1   I: 65251 1
16,2430     C: 03466 0   C: 03474 0   I: 54225 0   C: 03476 1   C: 20222 1   I: 74265 0   C: 34523 1   I: 76451 0

16,2440     C: 01046 1   C: 03705 0   I: 57535 0   C: 03747 0   I: 77640 0   C: 34462 0   I: 53575 0   C: 01030 0
16,2450     I: 45345 1   C: 01044 0   C: 03450 0   I: 56205 0   C: 34515 1   C: 00043 0   I: 53361 0   C: 01054 1
16,2460     C: 03646 0   C: 03646 0   I: 77776 1      05402 1   C: 04021 0      06006 1   I: 77745 1   C: 03474 0
16,2470     C: 27476 1   C: 03612 1   C: 03466 0   I: 77414 0   C: 01270 0      44770 1      55724 0      05402 1

16,2500     C: 00001 0      15205 1      06006 1   I: 77775 1   C: 11762 1   C: 17327 1   C: 11762 1   C: 27325 0
16,2510     C: 03721 0   C: 03646 0   I: 77776 1      12475 1   C: 55340 0   C: 61710 0   C: 04000 0   C: 00000 1
16,2520     C: 00707 1   C: 03434 1   C: 01440 0   C: 00000 1   C: 77715 1   C: 77777 0   C: 00000 1   C: 00620 0
16,2530     C: 00000 1   C: 00310 0   C: 00040 0   C: 00000 1      34762 0      00006 1      06031 0      74762 1

16,2540        54157 0      06006 1   I: 41545 0   C: 03763 0   I: 53135 0   C: 00160 0   C: 34556 0   I: 56345 0
16,2550     C: 34630 0   C: 03076 0   I: 72414 0   C: 00700 0   C: 34555 0   I: 41421 0   I: 56345 0   C: 00001 0
16,2560     C: 34632 1   I: 44342 1   C: 11760 0   I: 41205 0   C: 03076 0   C: 00001 0   I: 40061 1   C: 20213 0
16,2570     C: 34617 0   I: 41225 1   C: 01764 0   C: 34624 0   I: 41471 0   C: 01766 1   I: 51025 1   C: 34626 1

16,2600     C: 34617 0   I: 51145 0   C: 00003 1   C: 34607 1   I: 56205 0   C: 01766 1   C: 01765 1   I: 77414 0
16,2610     C: 01066 0      07224 1      06006 1   I: 54215 0   C: 34624 0   C: 20617 0   C: 03430 0   I: 77776 1
16,2620        05402 1   C: 00003 1      15205 1   C: 00144 0   C: 00000 1   C: 00764 1   C: 00000 1   C: 00000 1
16,2630     C: 04263 1   C: 17602 0   C: 25124 1   C: 00065 1   C: 01265 1   C: 00302 0   C: 24533 1   C: 00343 0

16,2640     C: 21616 0   C: 00000 1   C: 13143 0   C: 00000 1   C: 00000 1   C: 77777 0   C: 53213 1   C: 00001 0
16,2650     C: 17630 1   C: 00001 0   C: 16700 1   C: 07760 1   C: 14473 1   C: 07564 1   C: 15042 0   I: 43020 1
16,2660     C: 02777 1   C: 00074 1   I: 77760 0   C: 02735 1   I: 47773 1   C: 00001 0   C: 00007 0   I: 65552 0
16,2670     C: 00025 0   I: 43014 0   C: 00354 0   C: 34702 0   C: 00174 0   I: 71360 1   C: 00006 1   C: 00025 0

16,2700     C: 34023 1   C: 34664 1   I: 45345 1   C: 00025 0   C: 00023 0   I: 47046 0   C: 45636 0   C: 01251 0
16,2710     I: 77414 0   C: 00074 1      34772 1      04636 0   C: 20715 0      32727 1      04636 0   C: 20743 0
16,2720        14103 0      02724 1      05561 0   C: 00014 1      06006 1   I: 77650 1   C: 02777 1   C: 01405 1
16,2730     I: 77773 1   C: 00001 0   C: 10001 1   I: 77773 1   C: 00007 0   C: 10007 1   I: 77773 1   C: 00015 0

16,2740     C: 10015 1   I: 77616 0   C: 00056 1   C: 37722 1      00004 0      00006 1      30033 1      50120 1
16,2750        52002 1      30034 0      50120 1      54003 0      00003 1      06030 1   I: 41345 0   C: 01142 1
16,2760     C: 01152 0   I: 77676 0   I: 70525 1   C: 01144 1   I: 41325 0   C: 01150 1   C: 01152 0   I: 76466 1
16,2770     C: 16714 1   C: 01146 0   I: 72405 0   C: 01144 1   C: 00033 1   I: 65205 0   C: 01142 1   C: 01154 0
```

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OCTAL LISTING FOR PARAGRAPH # 112,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,3000     I: 45205 1   C: 01150 1   I: 41325 0   C: 01146 0   C: 01152 0   I: 65276 1   C: 01154 0   I: 65205 0
16,3010     C: 01142 1   C: 01150 1   I: 43205 1   C: 00033 1   I: 76466 1   C: 02730 1   I: 76435 1   C: 02714 1
16,3020     C: 02722 1   I: 77616 0   I: 45345 1   C: 03726 1   C: 03724 0   I: 45246 0   C: 35035 1   I: 67240 0
16,3030     C: 65076 0   C: 35037 0   I: 77650 1   C: 65100 0   C: 00040 0   C: 30447 0   C: 00613 0      40102 0

16,3040        74076 0      00006 1      63217 0      35011 1      05223 1   C: 03037 0      30032 0      57645 1
16,3050        57646 1      31447 1      00006 1      21645 0      55476 1      00006 1      74751 1      55647 1
16,3060        36214 0      05223 1   C: 03342 1      04714 1   C: 42425 1      11634 0      13074 0      04714 1
16,3070     C: 13347 0      04714 1   C: 36452 1      34351 1      55634 0      11446 1      13102 0      13115 0

16,3100        13106 1      13115 0      55661 0      34766 1      55644 1      13215 0      31633 0      00006 1
16,3110        63217 0      55445 1      34767 0      55644 1      13126 0      34762 0      70101 0      10000 0
16,3120        13122 1      13217 1      25644 0      34754 0      55445 1      25644 0      31465 1      74754 1
16,3130        00006 1      13133 1      31445 0      61445 0      55444 0      37702 0      55661 0      00006 1

16,3140        31606 0      53656 1      00006 1      41606 1      20001 1      20001 1      53612 1      00006 1
16,3150        31602 1      20001 1      20001 1      21612 1      00006 1      31612 0      00006 1      71444 0
16,3160        21656 1      00006 1      31610 1      53660 1      00006 1      41610 0      20001 1      20001 1
16,3170        53612 1      00006 1      31604 1      20001 1      20001 1      21612 1      00006 1      31612 0

16,3200        00006 1      71444 0      21660 1      25644 0      00006 1      31656 0      55423 1      53606 1
16,3210        00006 1      31660 0      55424 0      53610 0      25644 0      31661 1      55446 1      34772 1
16,3220        55644 1      15314 0      22016 0      00006 1      22012 1      11644 1      13230 1      13233 1
16,3230        34322 0      05223 1   C: 03325 0      47663 1      71635 1      10000 0      13315 1      13244 1

16,3240        41635 1      74767 1      00006 1      13321 0      34761 0      64756 1      00006 1      05012 1
16,3250        33331 0      54112 1      33335 1      54030 0      15323 1      22016 0      34767 0      00006 1
16,3260        05012 1      33333 1      54112 1      37663 0      54030 0      15325 1      22016 0      00006 1
16,3270        22012 1      44772 0      61623 1      54054 1      44772 0      61624 0      54053 0      35050 1

16,3300        00006 1      05014 1      11635 1      13313 1      13313 1      10000 0      03311 1      04655 0
16,3310     C: 36166 0      04714 1   C: 36351 0      04655 0   C: 36326 0      51635 0      33331 0      04720 0
16,3320        13244 1      00006 1      31424 1      53624 1      13244 1      51644 0      33335 1      50000 1
16,3330        10000 0   C: 03255 0   C: 41005 1   C: 03266 0   C: 41171 0   C: 37772 1   C: 03123 1   C: 03126 1

16,3340     C: 03204 1   C: 03215 1      31645 1      00006 1      21646 0      00006 1      74764 1      22000 1
16,3350        55533 1      31571 0      00006 1      13355 0      13363 0      31573 1      00006 1      13363 0
16,3360        34772 1      55573 0      15314 0      41533 1      00006 1      71631 0      00006 1      71533 1
16,3370        63756 0      55573 0      31533 0      00006 1      63377 1      34770 0      13400 1      44770 1
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OCTAL LISTING FOR PARAGRAPH # 113,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,3400      55651 0     00006 1     71573 0     40001 1     61647 0     55652 0     00006 1     63412 0
16,3410      34346 1     13413 0     34752 0     55653 1     51653 0     01651 1     40000 0     00006 1
16,3420      63471 0     51653 0     01533 0     55654 0     63763 0     00006 1     63550 1     31533 0
16,3430      00006 1     74753 0     55573 0     31647 0     00006 1     73757 0     20001 1     20001 1

16,3440      20001 1     61573 1     51653 0     00000 1     40000 0     63761 1     40000 0     00006 1
16,3450      63661 0     31654 1     63762 1     00006 1     63661 0     51653 0     01647 0     40000 0
16,3460      63756 0     40000 0     00006 1     63661 0     31647 0     55652 0     31533 0     55650 1
16,3470      13500 0     51653 0     03756 0     27652 0     43760 1     51653 0     00000 1     55650 1

16,3500      00006 1     71631 0     60000 1     00006 1     73757 0     55573 0     00006 1     71650 1
16,3510      55650 1     44756 0     51653 0     00000 1     27573 0     51653 0     01652 1     40000 0
16,3520      63756 0     40000 0     00006 1     73757 0     27650 1     33760 0     00006 1     74756 0
16,3530      61650 0     56001 0     34772 1     00006 1     11573 0     00006 1     13544 0     10000 0

16,3540      34750 1     13553 0     44750 0     13553 0     22000 1     00006 1     11573 0     13553 0
16,3550      43763 1     51653 0     00000 1     55573 0     00006 1     61533 0     55573 0     13562 1
16,3560      50000 1     44751 1     00006 1     77652 0     00006 1     71631 0     20001 1     20001 1
16,3570      55573 0     13574 0     50000 1     44751 1     55573 0     00006 1     13661 1     31573 1

16,3600      00006 1     71571 1     10000 0     13607 1     13612 0     13661 1     13612 0     34772 1
16,3610      55653 1     13623 1     11573 0     64770 0     13616 1     64770 0     40000 0     65001 0
16,3620      40000 0     00006 1     63661 0     31573 1     00006 1     74766 0     00006 1     13635 0
16,3630      10000 0     33764 1     13634 1     43764 0     55573 0     11573 0     34750 1     13641 0

16,3640      34752 0     55571 1     40000 0     00006 1     63647 1     41573 0     55573 0     31653 0
16,3650      00006 1     13653 0     13664 1     30031 0     00006 1     61573 1     00006 1     65314 1
16,3660      13664 1     44772 0     55571 1     55573 0     00006 1     33755 0     52111 1     31573 1
16,3670      54031 1     31653 0     00006 1     15314 0     11571 1     13701 0     13742 1     13722 1

16,3700      13742 1     31572 0     74770 1     00006 1     13714 1     44770 1     71572 1     55572 1
16,3710      35014 1     00006 1     01006 0     13742 1     34770 0     27572 1     34773 0     00006 1
16,3720      01006 0     13742 1     31572 0     74767 1     00006 1     13735 1     44767 1     71572 1
16,3730      55572 1     33765 0     00006 1     01006 0     13742 1     34767 0     27572 1     34355 0

16,3740      00006 1     01006 0     34752 0     00006 1     05013 0     15314 0     22016 0     34772 1
16,3750      55571 1     00006 1     01006 0     15325 1  C: 03746 1  C: 34066 0  C: 00344 1  C: 06315 0
16,3760   C: 00111 0  C: 00510 0  C: 01330 0  C: 07071 0  C: 07640 1  C: 00240 1  I: 43145 0  C: 26607 1
16,3770   C: 01743 0  C: 35774 0  I: 77735 0  C: 11760 0  C: 00011 1  I: 77616 0  C: 03776 1  CKSM 72767 1
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OCTAL LISTING FOR PARAGRAPH # 114,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,2000      06006 1   I: 77624 1   C: 27516 0   I: 43014 0   C: 04064 1   C: 04303 0   C: 36011 1   I: 77614 1
17,2010   C: 04264 0   I: 77776 1      32032 1      05607 0   C: 01554 1   C: 01626 1      06006 1   I: 77624 1
17,2020   C: 27005 1   I: 45154 0   C: 02150 1   C: 20240 0   I: 77624 1   C: 20264 0   I: 77624 1   C: 27525 0
17,2030   I: 77634 0   C: 21275 1   C: 00051 0      06006 1   I: 77624 1   C: 27516 0   I: 43014 0   C: 04063 0

17,2040   C: 04304 1   C: 36044 1   I: 77614 1   C: 04263 1   I: 77776 1      32032 1      05607 0   C: 01626 1
17,2050   C: 01554 1      12016 0   I: 77745 1   C: 03723 1   C: 02607 1   I: 77760 0   C: 03722 0   I: 77620 0
17,2060   C: 00300 1   I: 66744 0   C: 00304 0   C: 41673 0   I: 76744 1   C: 00154 1   C: 00001 0   C: 10001 1
17,2070   I: 77743 1   C: 00006 1   C: 10006 0   I: 77773 1   C: 00003 1   C: 35172 0   C: 46000 0   I: 77624 1

17,2100   C: 47642 1   C: 34041 0   C: 00300 1   C: 03674 1   C: 03460 0   I: 77420 1   C: 03457 1      32162 0
17,2110      05535 1      04636 0   C: 16062 1      34772 1      04636 0   C: 20715 0      32161 0      04636 0
17,2120   C: 20601 1      14103 0      12116 1      06006 1   I: 77745 1   C: 03726 1   C: 16774 1   C: 03730 0
17,2130   C: 02776 0   I: 77776 1      00004 0      04606 0      00006 1      30025 0      53723 1      30033 1

17,2140      55724 0      30034 0      55726 1      30032 0      55730 0      00003 1      35043 0      54003 0
17,2150      05527 1      34321 0      04636 0   C: 21067 0      04103 1      12157 1      12111 0      04636 0
17,2160   C: 31614 0   C: 15200 1   C: 01536 0      22016 0      00006 1      22012 1      32524 0      10000 0
17,2170      55446 1      34772 1      54001 1      51446 0      53530 1      11446 1      12167 1      00006 1

17,2200      32540 1      52113 0      34750 1      54030 0      15323 1      22016 0      00006 1      22012 1
17,2210      04714 1   C: 13313 1      31465 1      74753 0      10000 0      34770 0      55446 1      51446 0
17,2220      32521 0      55704 1      02412 1      51446 0      31416 0      55630 1      02452 0      41446 1
17,2230      50000 1      34767 0      55626 0      40000 0      64750 1      64770 0      55625 0      44752 1

17,2240      70105 1      54105 1      51446 0      31414 1      00006 1      71626 0      22000 1      53627 1
17,2250      51446 0      31421 1      55633 1      51446 0      32530 0      55446 1      34351 1      55634 0
17,2260      31423 0      55605 1      55623 0      55601 0      31424 1      55607 0      55624 1      55603 1
17,2270      31465 1      74754 1      00006 1      12321 1      34770 0      55611 1      51611 0      31664 1

17,2300      00006 1      72527 1      00006 1      12313 0      00006 1      62310 1      32526 1      12311 1
17,2310      42526 0      51611 0      55664 0      11611 1      12275 1      31664 1      55575 0      31665 0
17,2320      55577 1      41501 0      74766 0      27501 0      04714 1   C: 42425 1      34772 1      55635 1
17,2330      30032 0      55645 0      32524 0      05233 0   C: 03037 0   C: 34066 0      00006 1      32536 0

17,2340      52113 0      31625 1      54030 0      15323 1      00004 0      31635 0      55611 1      44767 1
17,2350      55635 1      00006 1      23613 1      32525 1      55661 0      34772 1      54001 1      51661 1
17,2360      53541 1      11661 0      10000 0      12354 0      40105 1      74752 1      26105 1      31420 0
17,2370      55630 1      02461 0      32532 1      55626 0      32533 0      55633 1      00006 1      31602 1
```

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OCTAL LISTING FOR PARAGRAPH # 115,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,2400         53606 1      00006 1      31604 1      53610 0      32523 1      55704 1      02412 1      31611 0
17,2410         55635 1      01613 1      00006 1      51704 0      30001 0      53706 0      00006 1      51704 0
17,2420         30003 1      53710 1      00006 1      51704 0      30005 1      53712 0      00006 1      51704 0
17,2430         30007 0      53714 0      00006 1      51704 0      30011 1      53716 1      00006 1      51704 0

17,2440         30013 0      53720 1      00006 1      51704 0      30015 0      53722 0      51704 0      30016 0
17,2450         55723 1      00002 0      31467 0      00006 1      72534 0      20001 1      20001 1      20001 1
17,2460         55631 0      31630 0      00006 1      71471 0      20001 1      20001 1      55632 0      00002 0
17,2470      C: 37777 1   C: 67657 1   C: 01703 1   C: 47472 0   C: 27656 1   C: 37777 1   C: 60361 0   C: 00000 1

17,2500      C: 67304 1   C: 00000 1   C: 37777 1   C: 65371 1   C: 65337 0   C: 42700 0   C: 33045 0   C: 01000 0
17,2510      C: 00000 1   C: 00000 1   C: 42700 0   C: 33045 0   C: 20000 0   C: 60730 0   C: 17145 1   C: 41323 0
17,2520      C: 35773 1   C: 02470 0   C: 01425 0   C: 02502 1   C: 00063 1   C: 00027 1   C: 00210 1   C: 00170 1
17,2530      C: 00005 1   C: 00000 1   C: 00247 0   C: 00232 1   C: 33074 1   C: 03227 0   C: 40066 0   C: 02205 1

17,2540      C: 36066 1      22016 0      32624 0      61634 1      54030 0      12550 1      37663 0      54030 0
17,2550         33302 0      54031 1      00006 1      22012 1      04542 0      34752 0      00006 1      05013 0
17,2560         32623 1      00006 1      06031 0      72623 0      00006 1      12625 0      55502 0      00006 1
17,2570         74760 0      76214 1      55513 0      55514 1      31502 1      00006 1      74762 1      76214 1

17,2600         55515 0      31502 1      00006 1      74764 1      76214 1      55516 0      31465 1      74753 0
17,2610         00006 1      12614 1      46214 1      12615 0      44767 1      55617 1      11631 0      55513 0
17,2620         12631 0      55514 1      12631 0   C: 07700 1   C: 37772 1      55513 0      55514 1      55515 0
17,2630         55516 0      11562 0      34770 0      12635 1      34767 0      55520 0      11626 0      12643 0

17,2640         12653 1      12645 0      12653 1      34322 0      12655 1      35775 1      12655 1   C: 00000 1
17,2650      C: 00003 1   C: 00006 1   C: 00000 1      51513 1      32647 0      61520 1      50000 1      32703 1
17,2660         72722 0      55452 1      00006 1      74762 1      55523 0      11563 1      34770 0      12671 1
17,2670         34767 0      55521 1      11627 1      12677 1      12724 0      12701 1      12724 0      34322 0

17,2700         12726 1      35775 1      12726 1   C: 00000 1   C: 05125 1   C: 05252 1   C: 00231 1   C: 02421 1
17,2710      C: 02610 1   C: 00146 1   C: 02504 1   C: 02442 1   C: 00000 1   C: 02421 1   C: 02442 1   C: 00000 1
17,2720      C: 02504 1   C: 02610 1   C: 01417 1   C: 06360 1      51514 0      32647 0      61521 0      50000 1
17,2730         32703 1      72723 1      55454 1      00006 1      74764 1      55524 1      11561 0      34770 0

17,2740         12742 0      34767 0      55517 1      11630 1      13035 0      13035 0      12747 0      11626 0
17,2750         12754 1      12764 1      12756 0      12764 1      34322 0      12766 0      35775 1      12766 0
17,2760      C: 00000 1   C: 00001 0   C: 00002 0   C: 00000 1      51515 1      32647 0      61517 0      50000 1
17,2770         33117 0      73136 1      55450 0      31516 1      00006 1      63027 1      11627 1      36214 0
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OCTAL LISTING FOR PARAGRAPH # 116,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,3000       13002 1     36211 0     51516 1     62760 1     50000 1     33140 1     73151 0     61450 1
17,3010       55502 0     00006 1     74762 1     66061 0     55522 1     00006 1     13022 0     31502 1
17,3020       55450 0     13263 1     11561 0     13027 0     13017 0     13027 0     13017 0     31450 1
17,3030       00006 1     74762 1     67701 0     55522 1     13263 1     11627 1     13042 0     13046 1

17,3040       13044 0     13046 1     34322 0     13050 0     35775 1     13050 0     51516 1     32647 0
17,3050       61517 0     50000 1     33117 0     73137 0     55450 0     31515 1     00006 1     13111 1
17,3060       11626 0     36214 0     13064 1     36211 0     51515 1     62760 1     50000 1     33140 1
17,3070       73152 0     61450 1     55502 0     00006 1     74765 0     66061 0     55522 1     00006 1

17,3100       13104 0     31502 1     55450 0     13263 1     11561 0     13111 1     13101 0     13111 1
17,3110       13101 0     31450 1     00006 1     74765 0     67701 0     55522 1     13263 1  C: 11000 1
17,3120    C: 22125 1  C: 00252 1  C: 11231 1  C: 15421 1  C: 04610 1  C: 11146 1  C: 15504 1  C: 04442 1
17,3130    C: 11000 1  C: 15504 1  C: 04610 1  C: 11000 1  C: 15421 1  C: 04442 1  C: 03760 0  C: 34017 0

17,3140    C: 11000 1  C: 11231 1  C: 11146 1  C: 11000 1  C: 04610 1  C: 15504 1  C: 11000 1  C: 15421 1
17,3150    C: 04442 1  C: 03417 0  C: 34360 0     11562 0     13163 1     13157 0     13161 0     55550 1
17,3160       13361 1     41523 0     55523 0     31562 1     00006 1     51523 1     73342 0     55460 0
17,3170       63275 1     00006 1     63203 0     51523 1     33276 1     55550 1     40000 0     27562 0

17,3200       33277 0     55460 0     13346 1     41460 0     63302 0     00006 1     63211 0     33302 0
17,3210       55460 0     31460 1     00006 1     71523 0     23550 0     55562 0     13346 1     11563 1
17,3220       13227 1     13223 0     13225 0     55551 0     13525 1     41524 1     55524 1     31563 0
17,3230       00006 1     51524 0     73342 0     55462 1     63275 1     00006 1     63247 0     51524 0

17,3240       33276 1     55551 0     40000 0     27563 1     33277 0     55462 1     13512 0     41462 1
17,3250       63302 0     00006 1     63255 0     33302 0     55462 1     31462 0     00006 1     71524 1
17,3260       23551 1     55563 1     13512 0     11561 0     13303 0     13267 0     13303 0     51522 0
17,3270       33276 1     55547 1     13505 0  C: 77037 0  C: 77277 0  C: 77537 0  C: 00000 1  C: 00240 1

17,3300    C: 00500 1  C: 00740 1  C: 00027 1     31561 1     00006 1     51522 0     73342 0     55456 0
17,3310       63275 1     00006 1     63323 0     51522 0     33276 1     55547 1     40000 0     27561 0
17,3320       33277 0     55456 0     13366 0     41456 0     63302 0     00006 1     63331 0     33302 0
17,3330       55456 0     31456 1     00006 1     71522 1     23547 0     55561 0     13366 0  C: 65252 1

17,3340    C: 57777 1  C: 40000 0  C: 00000 1  C: 37777 1  C: 20000 0  C: 12525 0     11626 0     13355 0
17,3350       13352 1     13355 0     51513 1     32647 0     50000 1     32703 1     72722 0     55453 0
17,3360       13217 1     31452 0     55453 0     34772 1     55460 0     13217 1     11515 0     13377 0
17,3370       34772 1     55451 1     11516 0     13442 1     34772 1     27451 1     13153 1     11630 1
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OCTAL LISTING FOR PARAGRAPH # 117,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,3400        13415 0     13415 0     13403 1     11626 0     13370 1     13407 0     13370 1     51515 1
17,3410        32647 0     50000 1     33117 0     73136 1     13371 0     11626 0     36214 0     13421 1
17,3420        36211 0     51515 1     62760 1     50000 1     33140 1     73152 0     55451 1     00006 1
17,3430        74765 0     67701 0     55522 1     41456 0     63277 0     00006 1     71522 1     30001 0

17,3440        27547 1     13372 0     11630 1     13473 0     13473 0     13446 0     11627 1     36214 0
17,3450        13452 0     36211 0     51516 1     62760 1     50000 1     33140 1     73151 0     27451 1
17,3460        00006 1     74762 1     67701 0     55522 1     41456 0     63277 0     00006 1     71522 1
17,3470        30001 0     27547 1     13153 1     11627 1     13374 0     13477 1     13374 0     51516 1

17,3500        32647 0     50000 1     33117 0     73137 0     13375 1     31450 1     55451 1     34772 1
17,3510        55456 0     13153 1     11627 1     13521 0     13516 1     13521 0     51514 0     32647 0
17,3520        50000 1     32703 1     72723 1     55455 0     13531 1     31454 0     55455 0     34772 1
17,3530        55462 1     34772 1     55457 1     34766 1     55461 1     34775 0     55463 0     41456 0

17,3540        61460 1     00006 1     63566 1     41460 0     61462 0     00006 1     63572 1     41460 0
17,3550        27462 1     41456 0     27460 0     00006 1     33565 1     52113 0     44770 1     71501 0
17,3560        55501 0     44772 0     55464 1     15323 1  C: 02140 0  C: 42066 1     53457 1     53461 1
17,3570        53457 1     13543 1     53461 1     53463 0     53461 1     41456 0     61460 1     00006 1

17,3600        63602 0     13547 0     53457 1     53461 1     53457 1     13547 0     22016 0     00006 1
17,3610        22012 1     10031 1     15323 1     13615 1     15323 1     41501 0     74770 1     00006 1
17,3620        13631 1     27501 0     31450 1     00006 1     01006 0     31452 0     61454 0     00006 1
17,3630        01005 0     11456 0     13711 1     13650 0     13636 0     13650 0     11460 0     13714 1

17,3640        13655 0     13643 1     13655 0     11462 1     13717 1     13662 1     15323 1     13662 1
17,3650        51457 0     03667 0     44770 1     55456 0     13636 0     51461 0     03667 0     44770 1
17,3660        55460 0     13643 1     51463 1     03667 0     44770 1     55462 1     15323 1     31451 0
17,3670        00006 1     01006 0     00002 0     32723 0     00006 1     02005 0     61453 1     00006 1

17,3700        01005 0     00002 0     32722 1     00006 1     02005 0     61455 1     00006 1     01005 0
17,3710        00002 0     34772 1     57456 1     13721 1     34772 1     57460 1     13721 1     34772 1
17,3720        57462 0     54031 1     04542 0     34752 0     00006 1     05013 0     15323 1  I: 43020 1
17,3730     C: 02755 1  C: 03665 1  I: 77614 1  C: 04273 0  I: 45131 0  C: 02675 1  C: 27777 0  C: 13717 1

17,3740     C: 14045 0  I: 56261 1  C: 20606 0  C: 00045 0  C: 33770 1  C: 22301 0  C: 14017 1  C: 02722 1
17,3750     I: 60316 0  C: 00047 1  I: 41275 1  C: 00017 1  C: 00041 1  I: 77657 0  C: 21576 0  I: 44206 0
17,3760     C: 33416 1  C: 16744 1  I: 60205 0  C: 00045 0  C: 00047 1  I: 53605 1  C: 00745 0  C: 20575 1
17,3770     C: 36742 0  C: 02755 1  C: 03772 0  C: 03773 1  CKSM 53362 0      @           @           @
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OCTAL LISTING FOR PARAGRAPH # 120,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,2000      34772 1     54061 1     54062 1     00006 1     50061 0     30165 0     50062 0     52662 1
20,2010      50061 0     30167 1     50062 0     54663 0     40062 1     65000 1     00006 1     12025 0
20,2020      35775 1     26061 1     36214 0     26062 1     12003 1     35024 1     54003 0     34775 0
20,2030      05607 0  C: 01436 1  C: 00706 0     34772 1     54061 1     54062 1     50061 0     31156 1

20,2040      50062 0     54722 1     40062 1     64773 0     00006 1     12052 0     34767 0     26061 1
20,2050      24062 0     12036 1     30157 1     54730 1     00006 1     30066 1     52732 0     30067 0
20,2060      54707 0     30063 1     54713 0     04651 1  I: 77776 1     34767 0     70104 0     00006 1
20,2070      12075 0     00006 1     34750 1     53717 0     12104 1     00006 1     30025 0     21717 0

20,2100      45016 1     54001 1     44772 0     21717 0     00004 0     44770 1     55340 0     40774 1
20,2110      66211 0     00006 1     62114 1     12117 0     41501 0     74752 1     27501 0     00006 1
20,2120      31711 1     53526 0     00006 1     31713 0     53530 1     00006 1     31715 0     53532 0
20,2130      31675 1     55564 0     31677 0     55565 1     31701 0     55566 1     30025 0     65016 0

20,2140      57671 0     04655 0  C: 45077 0     00004 0     40025 1     61671 0     10000 0     64770 0
20,2150      12153 0     64752 0     40000 0     05223 1  C: 02161 0     00003 1     35016 0     27671 1
20,2160      15205 1     34767 0     70104 0     00006 1     12171 0     11774 0     12170 1     12176 1
20,2170      55774 0     37650 0     05135 0  C: 03037 0  C: 44066 1     05314 1     37650 0     05135 0

20,2200   C: 02374 0  C: 74066 1     05314 1     30032 0     55646 0     30033 1     55650 1     30034 0
20,2210      55652 0     00002 0  I: 77725 1  C: 20146 0  C: 03550 1  I: 77745 1  I: 40005 0  C: 03550 1
20,2220   C: 40221 1  I: 43352 1  C: 03546 0  I: 40006 0  C: 40303 0  C: 03546 0  I: 74346 0  C: 03552 0
20,2230   I: 73525 1  I: 53361 0  C: 03560 1  I: 53435 0  C: 03574 1  I: 63206 0  C: 03605 1  I: 50256 0

20,2240   I: 63352 0  I: 65241 0  C: 03566 1  I: 75326 1  I: 73406 1  C: 16732 0  I: 74146 1  C: 00002 0
20,2250   C: 26734 0  C: 03605 1  C: 26657 1  C: 03613 0  C: 02746 0  I: 74014 1  C: 04343 1  C: 40261 0
20,2260   C: 00012 1  I: 45014 0  C: 03666 1  C: 25002 1  I: 43345 1  C: 00037 0  C: 03540 0  C: 27542 1
20,2270   I: 77650 1  C: 60061 0  I: 50025 0  C: 15334 1  C: 40215 0  I: 77625 0  C: 20142 1  I: 75225 0

20,2300   C: 15334 1  I: 77650 1  C: 40216 0  I: 43345 1  C: 03540 0  C: 36161 1  I: 52014 0  C: 02465 1
20,2310   C: 76023 1     00006 1     30025 0     53022 1     32330 0     05223 1  C: 02331 1     05402 1
20,2320   C: 40023 1     34754 0     00006 1     05012 1     34766 1     00006 1     05011 1     05314 1
20,2330   C: 01750 1     44754 1     00006 1     03012 1     44766 0     00006 1     03011 1     05362 0

20,2340   C: 00003 1  C: 05014 1  C: 77777 0     00006 1     32354 1     53460 0     34664 1     05135 0
20,2350   C: 02523 1  C: 50067 0     15314 0  C: 00000 1  C: 23420 0     40102 0     74076 0     00006 1
20,2360      62362 1     15314 0     44770 1     55444 0     34770 0     55446 1     44772 0     55323 0
20,2370      44767 1     00006 1     03012 1     32460 1     00006 1     05012 1     05255 0  C: 00006 1
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OCTAL LISTING FOR PARAGRAPH # 121,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,2400        34767 0        00006 1        05012 1        05255 0     C: 00002 0        11446 1        12446 1        31444 1
20,2410        55446 1        00006 1        62444 1        44772 0        55446 1        32462 0        02431 0        32461 0
20,2420        02431 0        32462 0        02431 0        41446 1        10000 0        12444 0        44770 1        55446 1
20,2430        12415 1        00006 1        23004 1        51446 0        54054 1        51446 0        34756 1        00006 1

20,2440        05014 1        05255 0     C: 00310 0        01004 1        05255 0     C: 00620 0        44772 0        61423 0
20,2450        54054 1        44772 0        61424 1        54053 0        35050 1        00006 1        05014 1        15314 0
20,2460     C: 02200 1     C: 77527 1     C: 00124 0        31465 1        76214 1        60000 1        54774 1        00004 0
20,2470        31465 1        74346 0        64751 0        00006 1        12501 0        44767 1        70103 1        54103 1

20,2500        12504 0        40103 1        74767 1        26103 1        00003 1        31465 1        74765 0        00006 1
20,2510        62512 0        32612 0        62613 1        55655 1        31465 1        74762 1        00006 1        62521 0
20,2520        34770 0        55631 0        31465 1        74757 1        00006 1        62527 0        44770 1        27631 0
20,2530        00004 0        00006 1        12537 0        40075 1        74752 1        26075 1        12542 1        44752 1

20,2540        70075 1        54075 1        00003 1        31466 1        74754 1        00006 1        62550 0        12551 0
20,2550        44770 1        40000 0        55630 1        31466 1        74757 1        10000 0        12562 0        34770 0
20,2560        55626 0        12572 1        34772 1        55626 0        31466 1        74765 0        10000 0        12572 1
20,2570        44770 1        55626 0        31466 1        74762 1        10000 0        12601 0        34770 0        55627 1

20,2600        00002 0        34772 1        55627 1        31466 1        74770 1        10000 0        00002 0        44770 1
20,2610        55627 1        00002 0     C: 00631 0     C: 00056 1        31467 0        00006 1        72641 1        55623 0
20,2620        31470 0        00006 1        72641 1        55624 1        55625 0        00006 1        32643 1        00006 1
20,2630        11467 1        55620 0        00006 1        32643 1        00006 1        11470 1        55621 1        55622 1

20,2640        00002 0     C: 25137 0     C: 00023 0     C: 12522 1        22016 0        00006 1        22012 1        33620 0
20,2650        54112 1        31625 1        54030 0        30033 1        57636 0        00006 1        21636 1        02670 1
20,2660        55642 1        30034 0        57637 1        00006 1        21637 0        02670 1        55643 0        12701 1
20,2670        55611 1        00006 1        73621 0        00006 1        12677 1        34772 1        55611 1        31611 0

20,2700        00002 0        00006 1        31576 1        53665 1        00006 1        31530 0        21665 1        41151 1
20,2710        00006 1        71153 0        20001 1        00006 1        71642 1        20001 1        53536 1        41643 0
20,2720        00006 1        71145 1        20001 1        21536 1        00006 1        41536 1        21665 1        03246 1
20,2730        00006 1        31542 0        53671 1        00006 1        31546 1        53675 0        00006 1        31552 1

20,2740        53701 1        03300 1        00006 1        31606 0        21667 0        03261 1        41623 0        61666 0
20,2750        26054 1        34756 1        00006 1        05014 1        00006 1        31544 0        53673 0        00006 1
20,2760        31550 0        53677 1        00006 1        31554 1        53703 0        03372 1        31602 1        00006 1
20,2770        73623 1        55663 1        31601 1        00006 1        73623 1        21663 1        31666 0        00006 1
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OCTAL LISTING FOR PARAGRAPH # 122,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,3000        73622 0    21663 1    03004 0    15323 1    25635 0    00006 1    31671 0    53542 1
20,3010        00006 1    31673 1    53544 1    00006 1    31675 1    53546 0    00006 1    31677 0
20,3020        53550 1    00006 1    31701 0    53552 0    00006 1    31703 1    53554 0    00006 1
20,3030        31665 0    55477 0    53576 0    31666 0    55623 0    00006 1    31663 0    53602 0

20,3040        25635 0    00002 0    22016 0    00006 1    22012 1    33616 0    54112 1    31625 1
20,3050        54030 0    30033 1    57640 1    00006 1    21640 0    02670 1    55642 1    30034 0
20,3060        57641 0    00006 1    21641 1    02670 1    55643 0    00006 1    31600 0    53665 1
20,3070        00006 1    31532 1    21665 1    31151 0    00006 1    71145 1    20001 1    00006 1

20,3100        71642 1    20001 1    53540 0    41643 0    00006 1    71153 0    20001 1    21540 0
20,3110        00006 1    41540 0    21665 1    03246 1    00006 1    31556 0    53671 1    00006 1
20,3120        31562 1    53675 0    00006 1    31566 0    53701 1    03300 1    00006 1    31610 1
20,3130        21667 0    03261 1    41624 1    61666 0    26053 0    34755 1    00006 1    05014 1

20,3140        00006 1    31560 0    53673 0    00006 1    31564 1    53677 1    00006 1    31570 1
20,3150        53703 0    03372 1    31604 1    00006 1    73623 1    55663 1    31603 0    00006 1
20,3160        73623 1    21663 1    31666 0    00006 1    73622 0    21663 1    03170 1    15323 1
20,3170        25635 0    00006 1    31671 0    53556 1    00006 1    31673 1    53560 1    00006 1

20,3200        31675 1    53562 0    00006 1    31677 0    53564 0    00006 1    31701 0    53566 1
20,3210        00006 1    31703 1    53570 0    00006 1    31665 0    55500 1    53600 1    31666 0
20,3220        55624 1    00006 1    31663 0    53604 0    34772 1    55635 1    00002 0    22016 0
20,3230        37702 0    61625 1    64752 0    61625 1    54030 0    33616 0    54112 1    30033 1

20,3240        55636 1    55640 0    30034 0    55637 0    55641 1    15325 1    31664 1    00006 1
20,3250        74766 0    00006 1    13260 1    11664 0    34754 0    13257 0    44754 1    55664 0
20,3260        00002 0    31667 1    60000 1    54001 1    34772 1    61666 0    00006 1    73615 1
20,3270        00006 1    13277 1    11666 1    33614 1    13276 0    43614 0    55666 1    00002 0

20,3300        34772 1    55615 0    55617 1    55621 1    55666 1    55662 0    31665 0    00006 1
20,3310        71705 0    55616 0    31664 1    00006 1    71705 0    21616 0    53671 1    21616 0
20,3320        31616 1    00006 1    71712 0    55620 0    31615 1    00006 1    71712 0    21620 0
20,3330        53675 0    21620 0    31465 1    74753 0    10000 0    13344 0    00006 1    31620 1

20,3340        20001 1    20001 1    53622 1    13356 0    31620 1    00006 1    71717 0    55622 1
20,3350        31617 0    00006 1    71717 0    21622 1    53701 1    21622 1    41622 1    00006 1
20,3360        71632 0    55667 0    41621 1    00006 1    71632 0    21667 0    53667 0    20001 1
20,3370        53667 0    00002 0    34772 1    55611 1    55613 0    31665 0    00006 1    71706 0
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OCTAL LISTING FOR PARAGRAPH # 123,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,3400        55612 1      31664 1      00006 1      71706 0      21612 1      41616 0      00006 1      71710 1
20,3410        55614 1      41615 0      00006 1      71710 1      21614 1      53614 1      21612 1      53612 1
20,3420        20001 1      21673 0      53673 0      53671 1      34772 1      55611 1      55672 1      31665 0
20,3430        00006 1      71707 1      55612 1      31664 1      00006 1      71707 1      21612 1      41616 0

20,3440        00006 1      71711 0      55673 0      41615 0      00006 1      71711 0      21673 0      53612 1
20,3450        21673 0      34772 1      55611 1      55613 0      31616 1      00006 1      71713 1      55612 1
20,3460        31615 1      00006 1      71713 1      21612 1      41620 0      00006 1      71715 1      55614 1
20,3470        41617 1      00006 1      71715 1      21614 1      53614 1      21612 1      53612 1      20001 1

20,3500        21677 1      53677 1      53675 0      34772 1      55611 1      55676 0      31616 1      00006 1
20,3510        71714 0      55612 1      31615 1      00006 1      71714 0      21612 1      41620 0      00006 1
20,3520        71716 1      55677 1      41617 1      00006 1      71716 1      21677 1      53612 1      21677 1
20,3530        31465 1      74754 1      10000 0      00002 0      34772 1      55611 1      55613 0      31620 1

20,3540        00006 1      71720 1      55612 1      31617 0      00006 1      71720 1      21612 1      41622 1
20,3550        00006 1      71722 0      55614 1      41621 1      00006 1      71722 0      21614 1      53614 1
20,3560        21612 1      53612 1      20001 1      21703 0      53703 0      53701 1      34772 1      55611 1
20,3570        55702 1      31620 1      00006 1      71721 0      55612 1      31617 0      00006 1      71721 0

20,3600        21612 1      41622 1      00006 1      71723 1      55703 0      41621 1      00006 1      71723 1
20,3610        21703 0      53612 1      21703 0      00002 0   C: 00375 0   C: 00101 1   C: 02644 0   C: 03227 0
20,3620     C: 03042 1   C: 00115 1   C: 00243 1   C: 37535 0      04611 0      05561 0   C: 00132 1      05561 0
20,3630     C: 00133 0      00006 1      33747 0      52113 0      00006 1      33747 0      52111 1      06000 1

20,3640        47673 0      71465 0      55465 0      03647 1      35011 1      04636 0   C: 01731 0      34756 1
20,3650        70102 0      00006 1      13644 0      44770 1      55501 0      55727 0      30007 0      55711 0
20,3660        55713 1      00004 0      00006 1      31666 0      53604 0      31664 1      55717 0      00006 1
20,3670        74753 0      55715 1      40102 0      74755 0      26102 0      40076 1      74770 1      26076 1

20,3700        00003 1      04655 0   C: 54343 1      04611 0      00004 0      41044 1      55720 1      34753 1
20,3710        64753 1      60025 0      27720 1      44773 1      61720 0      10000 0      63745 1      13715 0
20,3720        13721 1      64770 0      55725 1      05233 0   C: 02063 0   C: 32066 0      43744 1      70102 0
20,3730        64355 0      54102 0      30007 0      55666 1      34770 0      54305 0      05362 0   C: 40116 0

20,3740     C: 05024 1   C: 13000 0      04655 0   C: 54327 0   C: 16017 0   C: 77766 0   C: 03226 1   C: 12060 1
20,3750     C: 03750 0   C: 03751 1 CKSM 56542 1         @            @            @            @            @
20,3760           @            @            @            @            @            @            @            @
20,3770           @            @            @            @            @            @            @            @
```

```
OCTAL LISTING FOR PARAGRAPH # 124,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,2000        22016 0      00006 1      22012 1      34540 1      54112 1      37661 1      54030 0      32031 1
21,2010        00006 1      06031 0      72031 0      04714 1   C: 43152 0      51656 0      31710 0      55476 1
21,2020        51657 1      31710 0      55477 0      51660 0      31710 0      55500 1      04714 1   C: 42425 1
21,2030        15323 1   C: 00077 1      22016 0      00006 1      22012 1      02042 0      15323 1   C: 02140 0

21,2040     C: 42066 1   C: 37704 0      32041 0      54030 0      55464 1      41501 0      74766 0      27501 0
21,2050        00006 1      32040 1      52113 0      44076 0      70102 0      64753 1      54102 0      00002 0
21,2060        55512 1      00006 1      71511 1      55511 1      34772 1      57510 1      00006 1      71512 1
21,2070        21511 1      00002 0      21511 1      00006 1      12111 0      11510 0      12112 0      12101 1

21,2100        12114 0      11511 1      12117 0      12105 0      40000 0      64750 1      55511 1      34750 1
21,2110        55510 0      00002 0      64752 0      12110 1      40000 0      64750 1      12110 1      64752 0
21,2120        55511 1      34752 0      12110 1      22016 0      31464 0      00006 1      62130 1      12132 1
21,2130        44770 1      55464 1      00006 1      32137 0      52113 0      12141 0   C: 02140 0   C: 42066 1

21,2140        22016 0      00006 1      22012 1      34752 0      05654 0      12170 1      41501 0      74753 0
21,2150        27501 0      34750 1      55340 0      34772 1      55567 0      55570 0      55571 1      34753 1
21,2160        05654 0      12170 1      55464 1      37661 1      54030 0      02642 0      12355 1   C: 37770 0
21,2170        11464 1      12551 0      12674 1      12553 1      55464 1      30030 1      55634 0      37663 0

21,2200        54030 0      41334 0      74763 0      10000 0      12215 1      41501 0      74753 0      27501 0
21,2210        34753 1      55340 0      05654 0      12424 0      12541 1      31501 1      74753 0      00006 1
21,2220        12222 0      12355 1      34767 0      55506 1      60000 1      55507 0      51507 1      41552 0
21,2230        00006 1      51617 0      73121 1      51507 1      21553 1      00006 1      51507 1      41534 0

21,2240        53511 1      34754 0      02060 0      53511 1      51507 1      21553 1      11506 1      12223 1
21,2250        30032 0      57635 0      00006 1      21635 1      40000 0      22007 0      53516 0      30033 1
21,2260        57636 0      00006 1      21636 1      40000 0      55502 0      00006 1      71640 0      21516 0
21,2270        31641 0      00006 1      71502 0      53520 0      31643 1      00006 1      71502 0      53522 1

21,2300        30034 0      57637 1      00006 1      21637 0      40000 0      55502 0      00006 1      71642 1
21,2310        21520 0      31644 0      00006 1      71502 0      21522 1      34767 0      55506 1      60000 1
21,2320        55507 0      00006 1      51507 1      31516 1      51507 1      21553 1      00006 1      51507 1
21,2330        31516 1      51507 1      21542 1      51507 1      31552 1      60000 1      60000 1      00006 1

21,2340        51617 0      73137 0      51507 1      21534 0      51506 0      31620 1      00006 1      51506 0
21,2350        71547 1      51507 1      21534 0      11506 1      12316 0      31560 0      74777 0      10000 0
21,2360        12366 1      37656 0      05121 0   C: 03560 1   C: 44066 1      34322 0      55560 1      41340 0
21,2370        00006 1      62416 0      34767 0      55506 1      60000 1      55507 0      00006 1      50000 1
```

```
OCTAL LISTING FOR PARAGRAPH # 125,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,2400        31647 0     53511 1     00006 1     51507 1     31576 1     02072 0     00006 1     31511 0
21,2410        51506 0     55572 1     51507 1     53647 1     11506 1     12373 0     41501 0     74765 0
21,2420        00006 1     13202 0     27501 0     02425 0     15323 1     34765 1     00006 1     02012 0
21,2430        00006 1     12436 0     41501 0     74766 0     27501 0     00002 0     31501 1     76211 1

21,2440        00006 1     12476 1     74766 0     00006 1     12467 1     44763 0     00006 1     03012 1
21,2450        44772 0     55476 1     55477 0     55500 1     55503 1     55504 0     55505 1     54050 0
21,2460        54051 1     54052 1     46211 1     71501 0     64767 0     55501 0     00002 0     34763 1
21,2470        00006 1     05012 1     46211 1     71501 0     55501 0     00002 0     34763 1     00006 1

21,2500        02012 0     00006 1     12432 1     34767 0     55506 1     44754 1     00006 1     51506 0
21,2510        71476 1     54001 1     10000 0     32547 0     12516 0     42547 1     60001 0     55502 0
21,2520        12524 1     50000 1     32547 0     54001 1     51506 0     41503 1     60001 0     51506 0
21,2530        26050 0     51506 0     23503 0     11506 1     12504 0     37673 1     00006 1     05014 1

21,2540        00002 0     32545 1     54030 0     55464 1     15323 1  C: 37754 0  C: 77177 0  C: 37200 1
21,2550     C: 00600 1     34770 0     55340 0     04714 1  C: 40463 1     04714 1  C: 40614 0     32633 0
21,2560        10000 0     55506 1     34772 1     54001 1     51506 0     53527 1     11506 1     12560 1
21,2570        55525 0     02642 0     44772 0     55633 1     55632 0     32634 1     55654 0     34766 1

21,2600        55634 0     34775 0     55617 1     30032 0     55635 1     30033 1     55636 1     30034 0
21,2610        55637 0     34772 1     55464 1     41334 0     74763 0     10000 0     12622 1     55617 1
21,2620        32635 0     12627 1     37656 0     05121 0  C: 03560 1  C: 44066 1     34766 1     55501 0
21,2630        32636 0     54030 0     05323 0  C: 00043 0  C: 07534 1  C: 20004 1  C: 37772 1  C: 03606 1

21,2640     C: 36066 1  C: 62524 0     34775 0     55506 1     34772 1     51506 0     55450 0     11506 1
21,2650        12643 0     34766 1     55461 1     34775 0     55463 0     44770 1     71501 0     55501 0
21,2660        00006 1     32640 1     52111 1     33075 0     54031 1     00006 1     22070 0     04542 0
21,2670        34752 0     00006 1     05013 0     00070 0     11617 1     13170 0     12700 0     12700 0

21,2700        37663 0     56030 1     27634 0     10034 1     12710 1     12717 0     12710 1     12717 0
21,2710        62641 0     00006 1     62717 1     05547 1  C: 00020 0     34772 1     55340 0     31501 1
21,2720        74752 1     00006 1     12724 0     44770 1     55617 1     43057 1     71501 0     55501 0
21,2730        00006 1     00031 0     54001 1     31632 1     00006 1     06001 0     73063 0     00006 1

21,2740        62753 1     22000 1     55632 0     30001 0     00006 1     74764 1     30001 0     27501 0
21,2750        41501 0     73064 1     27501 0     41632 0     73063 0     00006 1     63272 0     55340 0
21,2760        03152 1     40075 1     74753 0     26075 1     34753 1     05654 0     13076 1     31501 1
21,2770        74753 0     10000 0     12541 1     44773 1     60774 0     00006 1     63001 0     44770 1
```

```
OCTAL LISTING FOR PARAGRAPH # 126,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,3000        55617 1     34767 0     55506 1     60000 1     55507 0     51506 0     31656 0     00006 1
21,3010        13032 1     60774 0     54002 1     50002 0     33064 0     00006 1     74760 0     51507 1
21,3020        53526 0     31501 1     73064 1     00006 1     13042 0     34772 1     22007 0     51507 1
21,3030        53542 1     13050 0     22007 0     51507 1     53526 0     31501 1     73064 1     00006 1

21,3040        13050 0     13025 1     50002 0     43064 1     00006 1     74762 1     51507 1     21542 1
21,3050        51507 1     31541 0     51506 0     55567 0     11506 1     13002 1     13452 0  C: 01760 1
21,3060     C: 01400 1  C: 00060 1  C: 00300 1  C: 00077 1  C: 16000 0  C: 00165 0  C: 77612 1  C: 00722 0
21,3070     C: 77055 1  C: 02215 0  C: 75562 1  C: 11064 0  C: 66713 1  C: 00027 1     31501 1     00006 1

21,3100        74756 0     55502 0     41632 0     71502 0     13320 1     34772 1     55567 0     55570 0
21,3110        55571 1     13763 1  C: 00000 1  C: 00740 1  C: 77037 0  C: 00000 1  C: 06604 0  C: 32703 1
21,3120     C: 06604 0  C: 02031 1  C: 12132 1  C: 13030 0  C: 14047 1  C: 15241 1  C: 16650 0  C: 20555 0
21,3130     C: 23065 0  C: 26137 0  C: 32053 0  C: 35712 0  C: 00435 0  C: 13412 1  C: 00435 0  C: 00032 0

21,3140     C: 01350 0  C: 01575 1  C: 02103 1  C: 02523 1  C: 03327 1  C: 04432 0  C: 06264 1  C: 11351 0
21,3150     C: 17324 1  C: 33622 1     55502 0     76214 1     55657 0     31502 1     00006 1     74754 1
21,3160        55502 0     76214 1     55660 1     31502 1     00006 1     74754 1     55656 1     00002 0
21,3170        55617 1     32167 0     61634 1     54030 0     13177 1     37663 0     54030 0     44772 0

21,3200        55464 1     15323 1     44765 0     71501 0     55501 0     40074 0     74760 0     00006 1
21,3210        13217 1     00006 1     41570 0     53477 0     41571 1     55500 1     15323 1     30105 0
21,3220        74763 0     00006 1     13265 1     00006 1     31311 0     53514 1     31307 1     00006 1
21,3230        20032 1     55476 1     31513 1     00006 1     20033 0     55502 0     00006 1     71640 0

21,3240        27476 1     31502 1     00006 1     71641 1     55477 0     31502 1     00006 1     71643 0
21,3250        55500 1     31514 0     00006 1     20034 1     55502 0     00006 1     71642 1     27477 0
21,3260        31502 1     00006 1     71644 1     27500 1     15323 1     00006 1     31015 1     53514 1
21,3270        31013 1     13227 1     34753 1     05654 0     13310 1     31501 1     74753 0     10000 0

21,3300        12541 1     34754 0     05654 0     13404 0     31340 1     00006 1     63334 0     13410 0
21,3310        34770 0     55340 0     00006 1     00032 0     54001 1     40000 0     71633 1     23633 0
21,3320        73063 0     03152 1     51656 0     34614 0     55561 0     51657 1     34614 0     55562 0
21,3330        51660 0     34614 0     55563 1     13105 1     30032 0     00006 1     21572 1     55567 0

21,3340        30033 1     00006 1     21573 0     55502 0     00006 1     71640 0     27567 0     31502 1
21,3350        00006 1     71641 1     55570 0     31502 1     00006 1     71643 0     55571 1     30034 0
21,3360        00006 1     21574 1     55502 0     00006 1     71642 1     27570 0     31502 1     00006 1
21,3370        71644 1     27571 1     41340 0     00006 1     63452 1     31564 1     27567 0     31565 0
```

```
OCTAL LISTING FOR PARAGRAPH # 127,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,3400      27570 0     31566 0     27571 1     13452 0     11340 0     13410 0     13334 1     13410 0
21,3410      34772 1     55525 0     55526 0     55527 1     55530 1     55531 0     55532 0     55564 0
21,3420      55565 1     55566 1     31501 1     73064 1     00006 1     13433 1     34772 1     55567 0
21,3430      55570 0     55571 1     13452 0     55340 0     00006 1     30033 1     53573 0     30034 0

21,3440      55574 1     13334 1  C: 00114 0  C: 00022 1  C: 06426 1  C: 00012 1  C: 35415 1  C: 30016 0
21,3450   C: 22021 1  C: 12173 1     31655 0     64766 1     55502 0     34767 0     55506 1     00000 1
21,3460      55507 0     00006 1     50000 1     31534 1     53516 0     31340 1     00006 1     13474 1
21,3470      00006 1     51507 1     41526 0     21516 0     51506 0     31567 1     55517 1     11515 0

21,3500      13510 1     13503 0     13520 1     11516 0     13510 1     13510 1     13520 1     13520 1
21,3510      00006 1     31516 1     53521 1     31502 1     55523 0     31517 0     55522 1     03527 1
21,3520      00006 1     41516 0     53521 1     41502 0     55523 0     41517 1     55522 1     00006 1
21,3530      61655 0     63442 0     00006 1     63562 0     41502 0     61522 0     00006 1     63541 1

21,3540      13553 0     00006 1     41521 1     00006 1     11654 0     00006 1     61522 0     61655 0
21,3550      00006 1     63641 1     13715 0     45006 0     00006 1     61502 1     61522 0     00006 1
21,3560      63645 0     13656 0     00006 1     43444 1     53514 1     00006 1     31521 0     21514 1
21,3570      11513 0     13704 0     13574 0     13600 0     11514 1     13704 0     13704 0     13600 0

21,3600      00006 1     31521 0     00006 1     11654 0     61502 1     61522 0     10000 0     13715 0
21,3610      13715 0     13613 1     13715 0     00006 1     43446 0     53514 1     00006 1     31521 0
21,3620      21514 1     11513 0     13715 0     13625 1     13631 1     11514 1     13715 0     13715 0
21,3630      13631 1     31522 0     61502 1     65006 1     10000 0     13727 1     13727 1     13704 0

21,3640      13704 0     00006 1     41516 0     53511 1     13740 0     41517 1     61523 1     00006 1
21,3650      73451 0     53511 1     00006 1     41516 0     21511 1     13740 0     11515 0     13675 1
21,3660      13662 1     13666 0     11516 0     13675 1     13675 1     13666 0     00006 1     41516 0
21,3670      53511 1     00006 1     33450 0     21511 1     13740 0     00006 1     41516 0     53511 1

21,3700      00006 1     43450 1     21511 1     13740 0     11515 0     13666 0     13710 0     13675 1
21,3710      11516 0     13666 0     13666 0     13675 1     13675 1     51506 0     44754 1     71501 0
21,3720      55501 0     51506 0     33060 1     71501 0     00006 1     13761 0     13641 0     41517 1
21,3730      00006 1     61523 1     00006 1     73451 0     53511 1     00006 1     41516 0     21511 1

21,3740      51506 0     31623 1     02060 0     34756 1     02060 0     11510 0     13752 0     13756 1
21,3750      13754 0     13756 1     34750 1     13757 0     34752 0     13757 0     31511 0     51506 0
21,3760      55561 0     11506 1     13456 1     00006 1     33770 1     52113 0     15323 1  C: 02541 0
21,3770   C: 36066 1  C: 03771 0  C: 03772 0  CKSM 73463 1        @           @           @           @
```

```
OCTAL LISTING FOR PARAGRAPH # 130,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

22,2000         06006 1    I: 77634 0    C: 44370 0    C: 03262 1    I: 72364 0    C: 03320 0    C: 03262 1    I: 77624 1
22,2010      C: 44377 1    I: 72364 0    C: 03425 1    C: 01310 1    I: 77624 1    C: 44377 1    I: 45160 1    C: 03320 0
22,2020      C: 44334 0    I: 77775 1    I: 77626 0    C: 50474 0    I: 77626 0    C: 50502 0    I: 77626 0    C: 74510 0
22,2030      I: 75160 1    C: 03266 0    C: 03425 1    I: 77624 1    C: 44304 0    I: 45575 1    C: 50335 1    I: 77626 0

22,2040      C: 50343 0    I: 77626 0    C: 74351 0    I: 45001 1    C: 00023 0    C: 44343 0    I: 45575 1    C: 50474 0
22,2050      I: 77626 0    C: 50502 0    I: 77626 0    C: 74510 0    I: 45345 1    C: 03271 0    C: 03430 0    I: 45325 1
22,2060      C: 03432 1    C: 03273 1    I: 45325 1    C: 03301 0    C: 03440 1    I: 77666 1    C: 03311 1    I: 43345 1
22,2070      C: 03426 1    C: 03446 1    I: 43225 0    C: 15326 1    C: 03436 0    C: 03317 1    I: 77726 1    C: 03365 1

22,2100      I: 51025 1    C: 04367 1    C: 44111 0    I: 77776 1       00004 0       44770 1       55340 0       03163 0
22,2110         12723 1    I: 45345 1    C: 03365 1    C: 04370 1    I: 77244 0    C: 44123 1    C: 03311 1    I: 77656 1
22,2120      C: 03343 0    I: 77650 1    C: 44745 1    I: 53375 0    C: 03426 1    C: 03267 1    I: 77762 1    C: 27267 1
22,2130      C: 03434 1    I: 74455 0    C: 03275 1    C: 27275 1    C: 03442 0    I: 74455 0    C: 03303 1    C: 03303 1

22,2140      I: 70545 1    C: 03317 1    I: 45325 1    C: 15334 1    C: 03317 1    I: 65204 1    C: 45761 0    C: 03307 0
22,2150      I: 56225 1    C: 00001 0    C: 00003 1    I: 65366 1    C: 03277 0    I: 56225 1    C: 00001 0    C: 00003 1
22,2160      I: 65366 1    C: 03267 1    I: 56225 1    C: 00001 0    C: 00003 1    I: 55566 1    I: 77656 1    C: 03343 0
22,2170      I: 45345 1    C: 03343 0    C: 03345 0    I: 71240 1    C: 44203 0    C: 03343 0    I: 50025 0    C: 03347 1

22,2200      C: 44260 0    I: 77650 1    C: 44234 1    I: 45345 1    C: 03345 0    C: 03347 1    I: 77640 0    C: 44260 0
22,2210      I: 51145 0    C: 03313 0    C: 44216 1    I: 57575 1    C: 03343 0    C: 03343 0    I: 51145 0    C: 03271 0
22,2220      C: 44224 0    I: 57545 1    C: 03343 0    C: 03343 0    I: 51145 0    C: 03301 0    C: 44745 1    I: 57545 1
22,2230      C: 03347 1    C: 03347 1    I: 77650 1    C: 44745 1    I: 51145 0    C: 03311 1    C: 44242 0    I: 57575 1

22,2240      C: 03343 0    C: 03343 0    I: 51145 0    C: 03271 0    C: 44250 0    I: 57545 1    C: 03345 0    C: 03345 0
22,2250      I: 51145 0    C: 03273 1    C: 44745 1    I: 57545 1    C: 03347 1    C: 03347 1    I: 77650 1    C: 44745 1
22,2260      I: 51145 0    C: 03315 0    C: 44266 0    I: 57575 1    C: 03343 0    C: 03345 0    I: 51145 0    C: 03273 1
22,2270      C: 44274 0    I: 57545 1    C: 03343 0    C: 03343 0    I: 51145 0    C: 03301 0    C: 44745 1    I: 57545 1

22,2300      C: 03345 0    C: 03345 0    I: 77650 1    C: 44745 1    I: 77601 0    C: 00001 0    I: 64743 0    C: 77762 1
22,2310      C: 77770 1    I: 55523 0    C: 77776 1    I: 64717 1    C: 00001 0    C: 77760 0    I: 64723 0    C: 77766 0
22,2320      C: 77774 0    I: 63666 1    C: 00001 0    I: 64723 0    C: 77756 0    C: 77764 1    I: 55523 0    C: 77772 0
22,2330      I: 41517 1    C: 00001 0    I: 77650 1    C: 44343 0    I: 76601 1    C: 00001 0    C: 00001 0    I: 62713 0

22,2340      C: 00007 0    C: 00015 0    I: 77606 1    I: 65345 0    C: 00003 1    C: 00007 0    C: 14003 1    I: 77626 0
22,2350      C: 63770 1    C: 00005 1    I: 77725 1    C: 00015 0    C: 14005 1    I: 77626 0    C: 63762 1    C: 00013 0
22,2360      I: 77725 1    C: 00017 1    C: 14013 0    I: 77626 0    C: 77760 0    I: 77616 0    C: 00013 0    C: 17071 1
22,2370         00004 0       30034 0       54156 1       00006 1       30033 1       00003 1       16445 0    I: 66370 0
```

```
OCTAL LISTING FOR PARAGRAPH # 131,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

22,2400      C: 00003 1   C: 00051 0   C: 00001 0   C: 00010 0   I: 77601 0   C: 00001 0   I: 47133 0   C: 00013 0
22,2410      C: 51754 0   C: 00013 0   I: 65356 1   C: 00013 0   I: 41546 0   I: 71300 1   C: 44406 0   C: 00007 0
22,2420      I: 72405 0   C: 00013 0   C: 10001 1   I: 77745 1   C: 00005 1   I: 65205 0   C: 00001 0   C: 00007 0
22,2430      I: 41205 0   C: 00011 1   C: 00003 1   I: 44352 0   C: 00015 0   I: 77752 1   C: 10003 0   I: 77745 1

22,2440      C: 00003 1   I: 65205 0   C: 00005 1   C: 00007 0   I: 41205 0   C: 00011 1   C: 00001 0   I: 77752 1
22,2450      I: 72415 1   C: 00017 1   C: 10005 0   I: 77745 1   C: 00011 1   C: 10007 1   I: 77745 1   C: 00013 0
22,2460      I: 72405 0   C: 00003 1   C: 10011 0   I: 77745 1   C: 00013 0   I: 57405 1   C: 00001 0   I: 77752 1
22,2470      C: 10013 1   I: 77745 1   C: 00005 1   I: 57405 1   C: 00013 0   I: 77752 1   C: 10015 1   I: 77745 1

22,2500      I: 72405 0   C: 00011 1   I: 41325 0   C: 00007 0   C: 00001 0   I: 72415 1   I: 77626 0   C: 67760 1
22,2510      I: 77745 1   I: 72405 0   C: 00011 1   I: 41325 0   C: 00007 0   C: 00003 1   I: 72425 1   I: 77626 0
22,2520      C: 67756 1   I: 77616 0   I: 41401 1   C: 00001 0   I: 65356 1   I: 41546 0   I: 65302 0   I: 41021 1
22,2530      C: 15334 1   C: 45761 0   I: 77725 1   C: 03343 0   I: 41316 0   C: 00005 1   I: 52415 0   C: 00003 1

22,2540      I: 77604 0   C: 45761 0   C: 17426 1   C: 03345 0   I: 41316 0   C: 00005 1   I: 52415 0   C: 00003 1
22,2550      I: 77604 0   C: 45761 0   C: 17436 0   C: 03347 1   I: 41316 0   C: 00005 1   I: 52415 0   C: 00003 1
22,2560      I: 77604 0   C: 45761 0   C: 03446 1   I: 41345 0   C: 03343 0   C: 03345 0   I: 72405 0   C: 00005 1
22,2570      I: 41325 0   C: 03347 1   C: 00001 0   I: 43206 1   C: 00007 0   I: 41112 0   C: 45761 0   C: 17434 1

22,2600      I: 62421 1   I: 77604 0   C: 45761 0   C: 17430 0   C: 03343 0   I: 41205 0   C: 03347 1   C: 00005 1
22,2610      I: 65352 0   C: 03345 0   I: 41405 0   C: 00001 0   I: 62415 0   C: 00007 0   I: 77604 0   C: 45761 0
22,2620      C: 17432 1   I: 62421 1   I: 77604 0   C: 45761 0   C: 17442 0   C: 03345 0   I: 41205 0   C: 03347 1
22,2630      C: 00005 1   I: 65352 0   C: 03343 0   I: 41405 0   C: 00001 0   I: 62415 0   C: 00007 0   I: 77604 0

22,2640      C: 45761 0   C: 17444 0   I: 62421 1   I: 77604 0   C: 45761 0   C: 03440 1   I: 77616 0   I: 67543 1
22,2650      C: 00007 0   I: 71406 0   I: 41152 1   C: 45761 0   C: 00051 0   I: 57543 1   C: 00015 0   I: 67471 1
22,2660      C: 00051 0   I: 51123 0   C: 00001 0   C: 44675 0   I: 57545 1   I: 43244 1   C: 44672 1   C: 15334 1
22,2670      I: 77650 1   C: 44674 1   I: 77625 0   C: 15334 1   I: 77606 1   I: 57543 1   C: 00013 0   I: 67471 1

22,2700      C: 00051 0   I: 51123 0   C: 00011 1   C: 44715 1   I: 57545 1   I: 43244 1   C: 44712 0   C: 15334 1
22,2710      I: 77650 1   C: 44716 1   I: 52025 1   C: 15334 1   C: 44716 1   I: 77745 1   I: 43466 1   I: 77776 1
22,2720         00004 0      04636 0   C: 40203 1      00004 0      04463 1      34767 0      70104 0      00006 1
22,2730         12740 1      35016 0      05233 0   C: 02320 1   C: 74066 1      05402 1   C: 00111 0      05205 0

22,2740         34767 0      05233 0   C: 02311 0   C: 20066 0      15205 1   I: 70740 0   C: 00774 0   C: 05002 0
22,2750      I: 45002 1   C: 44522 1   I: 74343 0   C: 05002 0   C: 03343 0   I: 77721 0   C: 05014 1   C: 17311 1
22,2760      C: 03365 1   I: 55605 1   C: 05012 1   C: 05002 0   I: 77661 0   C: 20606 0   C: 03317 1   I: 77214 0
22,2770      C: 00313 0   C: 71747 0   C: 03311 1   I: 77761 1   C: 05036 1   C: 03275 1   I: 77614 1   C: 01035 0
```

OCTAL LISTING FOR PARAGRAPH # 132, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
22,3000     C: 45053 0   C: 00044 1   C: 15053 0   C: 00221 0   C: 24255 0   C: 00554 0   C: 02660 0   C: 02660 0
22,3010     C: 13301 1   C: 00003 1   C: 04000 0   C: 03146 1   C: 14632 0   C: 00000 1   C: 00000 1   C: 00000 1
22,3020     C: 00000 1   C: 00000 1   C: 00000 1   C: 03131 1   C: 11275 1   C: 77461 1   C: 47370 0   C: 00000 1
22,3030     C: 00000 1   C: 00316 0   C: 30407 1   C: 03131 1   C: 11275 1   C: 00004 0   C: 05251 0      34767 0

22,3040        70104 0      00006 1      13047 0      34764 0      70075 1      00006 1      13161 0      41340 0
22,3050        00006 1      62720 0      06006 1   I: 75160 1   C: 03320 0   C: 03425 1   I: 77624 1   C: 44304 0
22,3060     I: 45575 1   C: 50442 0   I: 77626 0   C: 50450 0   I: 77626 0   C: 74456 0   I: 45160 1   C: 03320 0
22,3070     C: 44647 1   I: 77634 0   C: 45644 0   C: 03267 1   I: 77414 0   C: 01215 0   C: 40064 1      34767 0

22,3100        55664 0      60000 1      55665 1      51664 1      31666 0      00006 1      51664 1      21661 0
22,3110        00006 1      73013 1      51665 0      53576 0      51664 1      31666 0      51664 1      57661 1
22,3120        51665 0      55646 0      11664 0      13100 1      00003 1      03135 0      04655 0   C: 40143 0
22,3130        34770 0      05233 0   C: 02303 0   C: 20066 0      15205 1      00006 1      40025 1      53673 0

22,3140        00006 1      31717 1      21673 0      11672 1      00002 0      13147 1      13157 0      11673 0
22,3150        00002 0      13153 1      40000 0      65016 0      00006 1      63157 1      24002 0      24002 0
22,3160        16706 1      04655 0   C: 74416 1      31307 1      55646 0      31310 1      55650 1      31311 0
22,3170        55652 0      00002 0   C: 00302 0   C: 17755 0   I: 53754 1   C: 03746 1   C: 57176 0   C: 26746 0

22,3200     I: 53750 0   C: 03745 1   C: 57176 0   C: 02657 1   I: 45020 1   C: 01023 1   C: 45222 1   C: 37456 1
22,3210     C: 25717 1   I: 41401 1   C: 00003 1   I: 65225 1   C: 03456 0   C: 00001 0   I: 45206 1   C: 03456 0
22,3220     I: 52006 0   C: 01023 1   I: 41545 0   C: 05173 1   I: 63130 0   C: 00047 1   C: 00002 0   I: 40135 1
22,3230     C: 00050 1   C: 45235 1   I: 51575 1   C: 02026 1   I: 77725 1   I: 43545 1   I: 77620 0   C: 01023 1

22,3240     C: 36635 1   C: 27202 1   I: 77624 1   C: 45300 0   I: 77745 1   C: 02635 0   C: 34041 0   C: 27170 1
22,3250     I: 77624 1   C: 45310 1   I: 53575 0   C: 03554 0   I: 53435 0   C: 03562 0   C: 26611 0   C: 03546 0
22,3260     I: 72441 0   C: 02611 0   C: 26603 0   C: 03540 0   I: 72441 0   C: 02611 0   C: 26601 1   C: 03540 0
22,3270     I: 53435 0   C: 03546 0   C: 26617 0   C: 03562 0   I: 72441 0   C: 02617 0   C: 36605 1   C: 01023 1

22,3300     I: 43175 0   C: 00001 0   C: 01352 1   C: 45314 0   C: 27540 0   C: 00007 0   C: 03546 0   I: 77616 0
22,3310     I: 43175 0   C: 00001 0   C: 01352 1   C: 45304 1   C: 27554 0   C: 00007 0   C: 03562 0   I: 77616 0
22,3320     I: 53754 1   C: 03746 1   C: 57176 0   I: 63350 1   C: 03745 1   I: 63257 1   C: 57176 0   I: 77616 0
22,3330     I: 53754 1   C: 03746 1   C: 57576 1   I: 77616 0      04553 0      04572 0      05547 1   C: 00244 0

22,3340        06006 1   I: 77624 1   C: 11217 0   I: 71214 0   C: 01067 1   C: 02463 1   C: 34041 0   C: 27170 1
22,3350     I: 43145 0   C: 15336 0   C: 03466 0   C: 16734 0   C: 05547 1   C: 26732 0   C: 00001 0   I: 45115 0
22,3360     C: 00007 0   C: 45320 1   C: 26746 0   I: 77626 0   C: 41120 1   C: 25002 1   I: 77615 0   C: 02463 1
22,3370     C: 03413 1   I: 77776 1      35026 0      05535 1      06006 1   I: 77624 1   C: 73027 0   I: 45175 0
```

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OCTAL LISTING FOR PARAGRAPH # 133,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

22,3400      C: 15336 0    C: 24005 1    I: 77624 1    C: 73027 0    I: 77650 1    C: 45377 0    I: 41575 0    C: 02541 0
22,3410      I: 63256 0    C: 02611 0    I: 53435 0    I: 76561 1    C: 03462 1    C: 02445 0    I: 40055 0    C: 03504 0
22,3420      C: 45421 1    C: 37474 1    C: 45320 1    C: 26746 0    I: 77614 1    C: 03466 0    C: 26657 1    C: 05545 0
22,3430      C: 36732 1    C: 25002 1    I: 72142 0    C: 03745 1    C: 37472 1    C: 45204 0    I: 77624 1    C: 45330 0

22,3440      C: 17460 0    C: 03754 1    I: 52054 1    C: 45445 0    C: 47161 1    I: 77745 1    C: 02754 0    I: 50025 0
22,3450      C: 33563 1    C: 47161 1    I: 45145 0    C: 00041 1    C: 45330 0    I: 60201 1    C: 00003 1    C: 00047 1
22,3460      I: 50315 0    C: 02541 0    C: 03474 0    I: 56246 1    C: 00003 1    I: 45257 0    C: 20201 0    C: 33557 0
22,3470      I: 71240 1    C: 47161 1    C: 02742 1    I: 45312 0    C: 15326 1    C: 14017 1    C: 03752 1    I: 56342 1

22,3500      I: 41325 0    C: 02742 1    C: 00041 1    I: 77624 1    C: 45330 0    I: 72412 0    I: 41366 1    I: 52414 1
22,3510      C: 04343 1    C: 45512 0    I: 50315 0    C: 02541 0    C: 03474 0    C: 03502 0    I: 77646 0    I: 41301 0
22,3520      C: 00050 1    I: 53660 1    C: 00047 1    C: 20204 0    C: 14015 0    C: 15336 0    C: 00021 1    I: 53575 0
22,3530      C: 00015 0    C: 26732 0    C: 02541 0    I: 75315 1    C: 03474 0    C: 03502 0    I: 45076 1    I: 45320 1

22,3540      C: 26746 0    I: 77614 1    C: 03426 1    C: 47145 1    C: 77776 1    C: 62460 1    C: 17777 0    C: 37776 0
22,3550      I: 77776 1       35037 0       05535 1       34535 0       05535 1       06006 1    I: 77650 1    C: 02356 0
22,3560         30102 1       74076 0       00006 1       65205 0       74753 0       00006 1       15205 1       30034
22,3570         05161 0       55640 0       30034 0       05060 1       55645 0       34620 1       00006 1       20032 1

22,3600         40000 0       05060 1       55644 1       00006 1       71645 0       55641 1       34620 1       00006 1
22,3610         20032 1       40000 0       05061 0       55642 1       00006 1       71645 0       40000 0       55643 0
22,3620         15205 1       00004 0       30037 0       54154 0       30040 0       54157 0       30041 1       00003 1
22,3630         54161 0       34772 1       54155 1       54160 1       54162 0       16470 0       07226 0       16030 0

22,3640         03661 0       34772 1       54155 1       16027 0       03661 0       52162 0       52155 1       03661 0
22,3650         54156 1       52160 1       52155 1       03661 0       54155 1       30161 1       54154 0       34770 0
22,3660         16027 0       52155 1       20001 1       10000 0       64770 0       13667 1       40000 0       54154 0
22,3670         00002 0       50000 1       34751 0       26154 0       00002 0       54142 1       50130 0       10000 0

22,3700         64770 0       13705 1       64770 0       64770 0       40000 0       60142 0       10000 0       64770 0
22,3710         13712 1       40000 0       54142 1       13717 1       50000 1       34751 0       60142 0       50130 0
22,3720         54000 0       00002 0       50120 1       30046 0       04636 0    C: 17244 0       16030 0    C: 02713 0
22,3730      C: 02554 1       33727 0       54003 0       53716 1       53722 0       53716 1       53720 1       53730 0

22,3740         53720 1       53726 1       53732 1       53726 1       16030 0       33730 0       54003 0       53557 0
22,3750         53563 1       53557 0       53561 0       53571 1       53561 0       53567 0       53573 0       53567 0
22,3760         16030 0       00006 1       34750 1       52155 1       10000 0       34772 1       16026 1       13770 0
22,3770         00006 1       44750 0       16024 0    C: 03773 1    C: 03774 0  CKSM 03746 1          @             @
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OCTAL LISTING FOR PARAGRAPH # 134,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

23,2000        I: 47133 0   C: 00006 1   C: 51754 0   I: 41434 1   C: 46027 0   I: 72556 1   I: 66606 1   C: 00004 0
23,2010        I: 41434 1   C: 51754 0   I: 41346 0   C: 00003 1   C: 14241 1   I: 41356 1   I: 77626 0   C: 63734 1
23,2020        I: 77746 1   C: 24045 0   C: 00041 1   I: 76521 0   C: 06300 1   C: 00041 1   I: 77616 0      32321 0
23,2030           26154 0      34754 0      07256 1      06030 1   I: 77220 1   C: 00034 0   C: 02766 1   I: 77624 1

23,2040        C: 47633 1   I: 76521 0   C: 06256 0   C: 26766 1   C: 15334 1   C: 26555 0   C: 15332 1   C: 26563 0
23,2050        C: 15330 0   C: 36571 1   C: 46076 1   I: 47020 0   C: 00034 0   C: 45731 0   I: 64375 1   C: 02714 1
23,2060        C: 06256 0   I: 77772 0   C: 26555 0   C: 02722 1   I: 76521 0   C: 06256 0   C: 26563 0   C: 02730 1
23,2070        I: 76521 0   C: 06256 0   C: 02571 0   I: 47034 0   C: 45731 0   C: 45745 0   I: 47375 0   C: 02571 0

23,2100        C: 02766 1   I: 77600 1   C: 46103 1   I: 40056 0   C: 46145 0   C: 00027 1   I: 57441 1   C: 02555 0
23,2110        C: 24023 0   C: 00027 1   I: 77641 1   C: 02563 0   C: 34021 0   C: 47311 1   I: 77634 0   C: 45640 1
23,2120        C: 26774 1   C: 02766 1   I: 77600 1   C: 46124 1   I: 72441 0   C: 02571 0   I: 77726 1   I: 62440 0
23,2130        C: 46142 1   I: 45200 1   C: 46142 1   C: 06327 1   I: 77634 0   C: 45640 1   C: 02776 0   I: 77614 1

23,2140        C: 01630 0   C: 00034 0   I: 77614 1   C: 01430 1   C: 00034 0   I: 77745 1   C: 06323 0   C: 16774 1
23,2150        C: 06325 0   C: 02776 0   I: 77614 1   C: 01630 0   C: 00034 0   I: 44301 0   C: 00160 0   C: 15344 0
23,2160        I: 77776 1      07171 1   C: 00002 0   C: 00000 1   C: 00000 1   C: 01001 1   C: 14636 1   C: 00325 0
23,2170        C: 07310 1   C: 00541 1   C: 16735 1      34772 1      54156 1      00006 1      32212 1      52155 1

23,2200           52160 1      40000 0      07256 1      52156 1      52155 1      52160 1      20155 1      06006 1
23,2210        I: 77616 0   C: 00542 1   C: 34414 1   I: 47375 0   C: 01712 1   C: 03452 1   C: 03460 0   I: 77635 1
23,2220        C: 01712 1   C: 17466 0   C: 03606 1   I: 56204 1   C: 57544 0   C: 06254 1   I: 41400 0   C: 46243 0
23,2230        I: 45346 1   C: 15334 1   I: 65361 0   C: 03466 0   I: 74356 1   C: 03460 0   I: 76455 1   I: 53455 0

23,2240        C: 03452 1   C: 03474 0   I: 77616 0   I: 75345 1   C: 06254 1   C: 03606 1   I: 77621 1   C: 03606 1
23,2250        C: 03606 1   I: 77650 1   C: 46223 0   C: 01015 1   C: 34732 0   C: 15373 1   C: 11346 0   C: 00000 1
23,2260        C: 00000 1   C: 67313 1   C: 65307 0   C: 00000 1   C: 00000 1   C: 20000 0   C: 00000 1   C: 00000 1
23,2270        C: 00000 1   C: 10464 0   C: 12470 1   C: 00000 1   C: 00000 1   C: 15373 1   C: 11346 0   C: 15373 1

23,2300        C: 11346 0   C: 00000 1   C: 00000 1   C: 10464 0   C: 12470 1   C: 00000 1   C: 00000 1   C: 20000 0
23,2310        C: 00000 1   C: 00000 1   C: 00000 1   C: 67313 1   C: 65307 0   C: 00000 1   C: 00000 1   C: 15373 1
23,2320        C: 11346 0   C: 07020 1   C: 60000 1   C: 00000 1   C: 61740 0   C: 77777 0   C: 07020 1   C: 00000 1
23,2330           06006 1   I: 45014 0   C: 00716 1   C: 46551 1   C: 50064 0   I: 77776 1      34765 1      05233 0

23,2340        C: 02514 0   C: 46104 0      00003 1      32372 0      54003 0      34772 1      55733 0      35051 0
23,2350           05135 0   C: 02373 1   C: 46064 1      00003 1      36214 0      71733 0      10000 0      02363 0
23,2360           04636 0   C: 01730 1      02354 1      32371 0      04636 0   C: 20576 1      05626 0      05626 0
23,2370           02343 1   C: 04054 1   C: 02334 1      06006 1   I: 45145 0   C: 15336 0   C: 46424 1   C: 16316 1
```

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OCTAL LISTING FOR PARAGRAPH # 135,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

23,2400      C: 01257 0    I: 46142 1    C: 46420 0    I: 77624 1    C: 27161 1    I: 77775 1    C: 00001 0    C: 26320 1
23,2410      C: 00007 0    C: 16326 1    C: 00030 1    I: 45030 0    C: 46457 0    C: 46635 0    I: 77650 1    C: 46461 0
23,2420      I: 77624 1    C: 27145 1    I: 77650 1    C: 46405 1    C: 01255 1    I: 77420 1    C: 00734 1       32446 0
23,2430         04636 0    C: 20576 1       05524 1       02435 1       02427 1       06006 1    I: 53145 1    C: 01255 1

23,2440      C: 46443 0    C: 34041 0    C: 00734 1    I: 52034 1    C: 51751 0    C: 46441 1    C: 01420 0    C: 27533 1
23,2450      C: 07571 0    C: 25004 1    C: 06702 1    C: 00001 0    C: 11530 1    C: 00002 0    C: 31230 1    I: 77624 1
23,2460      C: 46647 0    C: 36314 1    C: 46660 0    I: 46135 1    C: 01215 0    C: 46611 0    I: 45234 0    C: 51751 0
23,2470      C: 02316 1    C: 16316 1    C: 02337 1    I: 77654 0    C: 46504 1    I: 43345 1    C: 02337 1    C: 02316 1

23,2500      C: 02337 1    I: 77776 1       34770 0       02512 0    I: 43345 1    C: 02335 0    C: 02316 1    C: 02335 0
23,2510      I: 77776 1       34767 0       55733 0       05205 0       34764 0       71247 0       10000 0       02525 1
23,2520         37647 0       05121 0    C: 05524 1    C: 04062 1       05314 1       35016 0       05230 0    C: 02514 0
23,2530      C: 46064 1       36214 0       71733 0       50000 1       02535 0       05314 1       02544 0       35016 0

23,2540         54001 1       34772 1       21735 0       05314 1       35016 0       54001 1       34772 1       21737 1
23,2550         05314 1    I: 77776 1       35051 0       05135 0    C: 02567 1    C: 46064 1       00003 1       10067 1
23,2560         05152 1       32371 0       04636 0    C: 20576 1       05626 0       05626 0       02561 1       06006 1
23,2570      I: 52175 0    C: 01030 0    C: 46573 1    C: 26320 1    C: 01036 0    C: 02326 1    I: 45014 0    C: 00315 0

23,2600      C: 46631 1    C: 46647 0    C: 36314 1    C: 46660 0    I: 77776 1       05354 0    C: 00013 0       02622 0
23,2610         06306 1    I: 77624 1    C: 27516 0    I: 45145 0    C: 02335 0    C: 64027 0    I: 46135 1    C: 01215 0
23,2620      C: 46466 1    I: 77776 1       34764 0       71247 0       00006 1       15524 0       04636 0    C: 01730 1
23,2630         02567 1    I: 77624 1    C: 46635 0    I: 77650 1    C: 46602 1    I: 71214 0    C: 04462 0    C: 06450 0

23,2640      C: 14037 0    C: 06454 1    C: 26312 0    C: 02026 1    I: 77646 0    I: 43414 1    C: 01463 1    I: 71214 0
23,2650      C: 04062 1    C: 06452 1    C: 14037 0    C: 06456 0    C: 16312 0    C: 05173 1    I: 43414 1    C: 01663 0
23,2660      I: 44001 0    C: 00001 0    C: 00051 0    I: 77214 0    C: 04742 1    C: 46674 0    C: 02320 1    I: 77752 1
23,2670      C: 26320 1    C: 02326 1    I: 77752 1    C: 02326 1    I: 77624 1    C: 57152 0    I: 77624 1    C: 57220 0

23,2700      I: 77625 0    C: 02314 0    I: 64414 1    C: 04742 1    C: 46705 1    I: 77624 1    C: 46745 0    C: 16343 1
23,2710      C: 00017 1    I: 77625 0    C: 02314 0    C: 00161 1    I: 64414 1    C: 04742 1    C: 46717 1    I: 77624 1
23,2720      C: 46745 0    C: 16345 1    C: 00161 1    I: 51025 1    C: 02312 0    C: 46731 0    I: 52145 0    C: 15336 0
23,2730      C: 46735 1    I: 45145 0    C: 00017 1    C: 57256 1    I: 77676 0    C: 16337 1    C: 02312 0    I: 45015 1

23,2740      C: 02314 0    C: 57261 0    I: 77676 0    C: 36335 1    C: 00051 0    I: 51025 1    C: 06755 0    C: 46752 0
23,2750      I: 43415 0    C: 06755 0    I: 43545 1    C: 06755 0    C: 01065 0    C: 05603 1    I: 77620 0    C: 02310 1
23,2760      I: 53575 0    C: 03531 0    C: 14033 1    C: 00045 0    C: 25136 1    C: 01102 0    I: 53435 0    C: 00033 1
23,2770      C: 37502 1    C: 22327 1    I: 77775 1    C: 03502 0    C: 01102 0    I: 72441 0    C: 01072 0    I: 45326 1
```

```
OCTAL LISTING FOR PARAGRAPH # 136,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

23,3000    C: 15326 1  I: 41301 0  C: 00047 1  C: 07016 1  I: 53605 1  C: 01136 1  C: 21576 0  C: 27524 1
23,3010    C: 15336 0  C: 03510 0  C: 03516 0  I: 77650 1  C: 02310 1  C: 31103 1  C: 36652 0  I: 40220 0
23,3020    C: 02310 1  C: 00001 0  I: 77624 1  C: 36657 0  I: 76505 0  C: 01734 0  I: 77650 1  C: 02310 1
23,3030    I: 67214 1  C: 05312 1  C: 50104 1  C: 02551 1  I: 52054 1  C: 47037 0  C: 47133 0  I: 77614 1

23,3040    C: 05354 0  C: 47046 0  I: 52014 0  C: 05347 1  C: 47133 0  C: 71001 0  I: 71201 1  C: 00001
23,3050    C: 03413 1  I: 71214 0  C: 05356 1  C: 47055 1  C: 02461 0  I: 67206 1  C: 02372 0  I: 67206 1
23,3060    C: 02373 1  I: 67206 1  C: 02374 0  I: 67206 1  C: 02375 1  I: 67206 1  C: 02376 1  I: 67206 1
23,3070    C: 02377 0  I: 71206 0  C: 01062 1  I: 45225 0  C: 00003 1  C: 03736 0  I: 71240 1  C: 47133 0

23,3100    C: 03734 1  I: 43225 0  C: 01062 1  C: 00005 1  I: 71240 1  C: 50114 0  C: 01062 1  I: 51025 1
23,3110    C: 00001 0  C: 50120 1  I: 77615 0  C: 00015 0  I: 50015 0  C: 00007 0  C: 50120 1  I: 43345 1
23,3120    C: 00001 0  C: 07137 0  I: 43225 0  C: 00015 0  C: 00011 1  I: 45225 0  C: 03736 0  C: 00013 0
23,3130    I: 43040 1  C: 47133 0  C: 05073 0  I: 52014 0  C: 01671 0  C: 70776 0  C: 00001 0  C: 00002 0

23,3140    C: 00000 1  C: 00003 1  C: 00000 1  C: 00000 1  C: 13560 0  C: 36657 0  C: 25002 1  I: 43206 1
23,3150    C: 02463 1  C: 16351 1  C: 03502 0  I: 77644 1  C: 47165 0  I: 45345 1  C: 03472 0  I: 52006 0
23,3160    C: 47165 0  I: 71201 1  C: 00001 0  C: 15336 0  I: 77606 1  I: 72545 0  C: 03472 0  I: 77615 0
23,3170    C: 02463 1  C: 16351 1  C: 03766 0  I: 45342 0  C: 07140 0  I: 77654 0  C: 47233 0  I: 41345 0

23,3200    C: 03766 0  C: 03472 0  I: 45261 0  C: 20217 1  I: 77615 0  C: 02463 1  C: 02461 0  I: 77021 1
23,3210    C: 03663 1  C: 00005 1  I: 40240 0  C: 63566 1  C: 00001 0  I: 63375 0  C: 03474 0  C: 02541 0
23,3220    I: 77624 1  C: 63606 1  C: 26453 1  C: 00007 0  C: 26533 0  C: 03512 1  I: 63201 1  C: 00001 0
23,3230    C: 03756 0  I: 77650 1  C: 34012 0  I: 43345 1  C: 03472 0  C: 02351 1  C: 36351 0  C: 47177 0

23,3240    I: 71220 1  C: 00051 0  C: 02714 1  I: 65325 0  C: 15336 0  C: 02720 0  I: 55476 1  I: 77656 1
23,3250    C: 14027 1  C: 00027 1  I: 77742 0  C: 14023 0  C: 00033 1  I: 77742 0  C: 34021 0  C: 47311 1
23,3260    C: 16762 0  C: 02716 0  I: 77742 0  C: 14023 0  C: 00027 1  I: 65205 0  C: 02720 0  C: 00033 1
23,3270    I: 45205 1  C: 02714 1  I: 77626 0  C: 43756 1  C: 47311 1  C: 26764 0  C: 00027 1  I: 77641 1

23,3300    C: 02730 1  C: 24021 1  C: 00027 1  I: 77641 1  C: 02722 1  C: 34023 1  C: 47311 1  C: 36760 0
23,3310    C: 00051 0  I: 51545 1  C: 00023 0  I: 50025 0  C: 07525 1  C: 47324 1  I: 72545 0  C: 00021 1
23,3320    I: 75326 1  C: 00023 0  C: 00025 0  I: 77616 0  I: 72545 0  C: 00023 0  I: 77736 0  C: 14025 0
23,3330    C: 00021 1  I: 77640 0  C: 47335 1  I: 43545 1  C: 00025 0  I: 75345 1  C: 15334 1  C: 00023 0

23,3340    I: 77625 0  C: 00025 0  C: 00025 0  I: 77616 0  I: 77601 0  C: 00001 0  I: 47375 0  C: 02714 1
23,3350    C: 02700 1  I: 41456 0  I: 44041 1  C: 02730 1  C: 00051 0  C: 24021 1  C: 00001 0  I: 77641 1
23,3360    C: 02722 1  C: 34023 1  C: 47311 1  C: 26760 1  C: 00001 0  I: 50235 0  C: 02714 1  C: 02700 1
23,3370    I: 77752 1  C: 24021 1  C: 02700 1  I: 77641 1  C: 02714 1  C: 34023 1  C: 47311 1  C: 02764 0
```

```
OCTAL LISTING FOR PARAGRAPH # 137,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

23,3400      I: 45246 0    C: 07527 0    I: 77644 1    C: 47422 0    I: 50375 0    C: 02706 1    C: 00001 0    C: 24021 1
23,3410      C: 02672 0    I: 45441 1    C: 43754 0    C: 47311 1    C: 26762 0    C: 02760 1    I: 77634 0    C: 45644 0
23,3420      C: 35310 0    C: 00051 0    I: 77776 1       05671 1    C: 00401 1       05547 1    C: 00056 1       06006 1
23,3430      I: 77650 1    C: 47404 1    I: 66370 0    C: 02743 0    C: 00051 0    C: 02727 1    I: 77601 0    C: 00001 0

23,3440      I: 46773 0    C: 02752 0    C: 02760 1    I: 77656 1    C: 06760 0    I: 77773 1    C: 02752 0    I: 76433 1
23,3450      C: 02760 1    C: 06766 0    I: 77700 0    C: 47440 1    I: 66160 0    C: 00006 1    C: 00036 1    I: 66370 0
23,3460      C: 00022 1    C: 00051 0    C: 00006 1    I: 66374 1    C: 00006 1    C: 00052 0    C: 00002 0    I: 76720 0
23,3470      C: 00036 1    C: 00001 0    I: 62757 0    C: 75033 0    C: 00007 0    I: 77757 1    C: 75025 1    C: 30031 0

23,3500      C: 00015 0    I: 53357 0    C: 75017 0    I: 76455 1    C: 00031 0    I: 53520 0    C: 00036 1    C: 06736 0
23,3510      I: 77700 0    C: 47512 1    I: 77704 1    C: 47467 1    I: 77775 1    C: 02714 1    C: 26736 1    C: 02722 1
23,3520      C: 26744 1    C: 02730 1    C: 02752 0    I: 77616 0    C: 05520 0    C: 26075 1    C: 05252 1    C: 25253 1
23,3530      I: 77776 1       03534 0       00006 1    I: 77616 0       30032 0       55175 1       30033 1       55171 0

23,3540         30034 0       55173 1       00006 1       22142 0       34766 1       76211 1       54143 0       50143 1
23,3550         31171 1       52155 1       52127 1       04733 1    C: 51754 0       00006 1       30155 0       50143 1
23,3560         53172 0       04733 1    C: 01514 0       52155 1       50143 1       53150 0       00006 1       50143 1
23,3570         31172 1       04733 1    C: 01526 1       52127 1       52155 1       50143 1       53142 0       10143 0

23,3600         13545 1       00142 0       00004 0       00006 1       22061 0       34766 1       76211 1       54062 1
23,3610         50062 0       31171 1       05061 0       00006 1       74753 0       50062 0       53142 0       50062 0
23,3620         31171 1       05060 1       00006 1       74753 0       50062 0       53150 0       10062 1       13606 0
23,3630         30061 0       00003 1       00000 1    I: 77776 1       07466 1       46214 1       03651 0       06006 1

23,3640      I: 43575 1    C: 00123 1    I: 77776 1       03542 1       07466 1       36214 0       13636 0    I: 77776 1
23,3650         13644 0       54142 1       00006 1       22145 1       10142 1       40142 1       66214 0       00006 1
23,3660         50000 1       33740 1       52144 1       34770 0       54130 1       00006 1       50143 1       40123 0
23,3670         13672 0       52131 0       52155 1       33736 0       60143 1       54116 0       07056 0       10142 1

23,3700         52155 1       13704 0       00006 1       40155 1       52134 0       36211 0       26116 0       00006 1
23,3710         50130 0       50143 1       30123 1       52155 1       07056 0       52155 1       20134 0       52134 0
23,3720         20001 1       50130 0       50143 1       52123 0       52131 0       10000 0       13671 0       00006 1
23,3730         26142 1       10142 1       13654 1       00145 1       13654 1       00145 1    C: 01141 1    C: 00004 0

23,3740      C: 00002 0    C: 00000 1    C: 00004 0    I: 41345 0    C: 03212 0    C: 01150 1    I: 41325 0    C: 03216 1
23,3750      C: 01142 1    I: 77621 1    I: 77671 1    C: 01152 0    C: 03204 1    I: 72405 0    C: 01144 1    I: 77621 1
23,3760      C: 03214 0    C: 17206 0    C: 03212 0    I: 65205 0    C: 01142 1    C: 03216 1    I: 43205 1    C: 01150 1
23,3770      I: 77752 1    C: 03210 1    I: 77616 0    C: 03773 1    C: 03774 0  CKSM 65343 0          @             @
```

```
OCTAL LISTING FOR PARAGRAPH # 140,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

24,2000        06006 1    I: 45145 0    C: 03413 1    C: 46424 1    I: 77624 1    C: 27202 1    I: 63375 0    C: 00007 0
24,2010     C: 00001 0    I: 63256 0    I: 77626 0    C: 75457 0    I: 53435 0    I: 77626 0    C: 61451 0    C: 00015 0
24,2020     C: 34041 0    C: 27170 1    I: 63375 0    C: 00007 0    C: 00001 0    C: 00007 0    I: 63256 0    I: 77626 0
24,2030     C: 77762 1    I: 53435 0    I: 77626 0    C: 51443 0    C: 00007 0    I: 72441 0    C: 02326 1    C: 26312 0

24,2040     C: 00015 0    I: 72441 0    C: 02326 1    C: 26314 0    C: 02320 1    I: 72441 0    C: 02334 1    C: 02316 1
24,2050     I: 77776 1       32103 1       04636 0    C: 20576 1       15524 0       15524 0       06006 1    I: 77624 1
24,2060     C: 46425 0    I: 77650 1    C: 50004 0    C: 01420 0    I: 77420 1    C: 00734 1       00006 1       34770 0
24,2070        53256 0       32102 0       04636 0    C: 20576 1       05524 1       02077 0       02071 0       06006 1

24,2100     I: 77650 1    C: 00734 1    C: 01014 0    C: 01540 1    I: 43014 0    C: 05313 0    C: 71001 0    C: 05354 0
24,2110     C: 50114 0    I: 77614 1    C: 05355 1    C: 71001 0    I: 52131 0    C: 02551 1    C: 00001 0    C: 47133 0
24,2120     I: 52014 0    C: 05273 1    C: 71001 0    I: 77745 1    C: 00013 0    I: 76561 1    I: 53455 0    C: 03540 0
24,2130     I: 53515 0    C: 03554 0    I: 53515 0    C: 03562 0    I: 63235 0    C: 00007 0    C: 00007 0    I: 50235 0

24,2140     C: 00001 0    I: 77626 0    C: 53762 1    I: 72441 0    I: 75326 1    C: 00015 0    I: 41542 1    I: 71214 0
24,2150     C: 05701 1    C: 50206 0    C: 00001 0    I: 65225 1    C: 03466 0    C: 03462 1    I: 60225 1    C: 03470 1
24,2160     C: 00047 1    I: 65265 0    C: 00003 1    C: 03462 1    C: 03470 1    I: 43014 0    C: 05742 0    C: 20323 1
24,2170     C: 05743 1    C: 20323 1    I: 41345 0    C: 00003 1    C: 03466 0    I: 71244 0    C: 20330 0    C: 33561 0

24,2200     I: 77765 0    C: 03464 1    C: 03464 1    I: 43014 0    C: 05462 1    C: 05663 1    I: 77745 1    C: 00001 0
24,2210     C: 17466 0    C: 03462 1    C: 37470 0    C: 20316 1       06006 1    I: 67214 1    C: 00664 0    C: 03425 1
24,2220     I: 71214 0    C: 01347 0    C: 50224 0    C: 15336 0    C: 17703 0    C: 11532 0    C: 17727 0    C: 03413 1
24,2230     C: 17450 0    C: 11530 1    C: 03460 0    I: 77414 0    C: 05265 0       04655 0    C: 73566 0       04636 0

24,2240     C: 03731 1       06006 1    I: 77214 0    C: 01070 1    C: 15336 0    C: 03705 0    I: 77614 1    C: 01347 0
24,2250     C: 34065 0    I: 51575 1    C: 03646 0    C: 27654 0    C: 03640 0    C: 03576 0    I: 53435 0    C: 03632 0
24,2260     C: 27713 1    C: 03632 0    C: 03570 0    I: 65236 0    C: 00045 0    I: 56275 1    C: 17051 0    I: 41205 0
24,2270     C: 03654 0    C: 03076 0    I: 77671 1    C: 03727 0    C: 24017 1    C: 03646 0    I: 74241 0    C: 03713 1

24,2300     C: 03713 1    I: 41552 0    I: 65245 1    C: 03646 0    C: 00017 1    I: 63356 1    C: 00007 0    I: 53435 0
24,2310     C: 03713 1    I: 45561 1    C: 50056 1    I: 65256 0    C: 00017 1    I: 74346 0    I: 74255 0    C: 03721 0
24,2320     C: 00045 0    I: 53352 0    I: 77626 0    C: 74056 1    I: 77656 1    C: 27713 1    C: 03721 0    I: 45006 0
24,2330     C: 11200 0    I: 64375 1    C: 03713 1    C: 01734 0    I: 40372 0    C: 00001 0    C: 17357 0    C: 15336 0

24,2340     I: 41414 0    C: 00704 1    C: 34157 0    I: 41335 1    C: 03025 0    C: 11542 1    I: 43352 1    C: 11544 1
24,2350     I: 71406 0    I: 73525 1    I: 67206 1    C: 03024 1    I: 72405 0    C: 11542 1    I: 41415 1    C: 11546 0
24,2360     I: 65346 0    I: 41556 1    C: 14323 0    C: 00007 0    I: 72405 0    C: 00005 1    I: 65276 1    C: 00007 0
24,2370     I: 72405 0    C: 00003 1    I: 77666 1    C: 14307 0    C: 00323 0    I: 72405 0    C: 00005 1    I: 41325 0
```

```
OCTAL LISTING FOR PARAGRAPH # 141,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

24,2400       C: 00323 0     C: 00003 1     I: 57552 1     I: 77666 1     C: 14323 0     I: 77666 1     C: 14315 0     C: 00323 0
24,2410       I: 65325 0     C: 00315 0     C: 00307 0     I: 77666 1     C: 27351 0     C: 03713 1     I: 53515 0     C: 03632 0
24,2420       I: 57435 1     C: 00001 0     I: 41456 0     I: 77624 1     C: 61702 0     I: 57435 1     C: 00001 0     I: 63372 1
24,2430       C: 00307 0     I: 76505 0     C: 00001 0     C: 24307 0     C: 00315 0     I: 76505 0     C: 00001 0     C: 24315 0

24,2440       C: 00323 0     I: 76505 0     C: 00001 0     C: 00323 0     I: 77414 0     C: 01073 1        03202 1        05561 0
24,2450       C: 00124 0        04636 0     C: 56074 1        05402 1     C: 00014 1        44770 1        55724 0        06006 1
24,2460       I: 77614 1     C: 00704 1     C: 51626 1     I: 51575 1     C: 03721 0     C: 17763 0     C: 15336 0     C: 17426 1
24,2470       C: 11560 1     C: 01062 1     I: 77776 1        33517 1        04636 0     C: 21067 0        13403 1        12560 1

24,2500          44770 1        55444 0        34772 1        55446 1        34770 0        05233 0     C: 02366 0     C: 40066 0
24,2510          11444 0        33523 0        12514 1        33525 0        04636 0     C: 01731 0        33514 1        54777 1
24,2520          05362 0     C: 00026 0     C: 00234 1        04606 0        06006 1     I: 45345 1     C: 03413 1     C: 03460 0
24,2530       C: 00041 1     I: 77624 1     C: 27576 0        02542 0        00006 1        31105 1        53413 1        00006 1

24,2540          33530 1        21413 1        00006 1        30155 0        53673 0        00006 1        43525 1        21673 0
24,2550          00006 1        31673 1        05332 0     C: 02565 0     C: 50067 0        05402 1     C: 20214 1        15205 1
24,2560          34770 0        12501 0        04636 0     C: 20715 0        15205 1        33525 0        05223 1     C: 02602 1
24,2570          34772 1        54777 1        35053 1        05121 0     C: 02562 1     C: 50067 0        44342 1        04126 0

24,2600       C: 00004 0        05314 1        31214 1        74763 0        00006 1        12631 0        44765 0        70076 1
24,2610          54076 1        30075 0        74756 0        10000 0        13642 0        33514 1        54777 1        33522 1
24,2620          05223 1     C: 02634 1        46211 1        04126 0     C: 00004 0        11166 0        15314 0        04655 0
24,2630       C: 76607 1        33513 0        54777 1        12625 0        33525 0        05233 0     C: 02651 1     C: 50066 1

24,2640          44760 0        54777 1        05362 0     C: 40074 0     C: 00033 1        05134 1     C: 02534 1     C: 34067 1
24,2650          15314 0        40103 1        74754 1        26103 1        30103 0        74755 0        00006 1        15314 0
24,2660          33514 1        54777 1        05402 1     C: 00274 0        30032 0        55447 0        00006 1        30025 0
24,2670          53022 1        40101 0        74762 1        26101 0        34754 0        00006 1        05011 1        40106 1

24,2700          74757 1        26106 1        34760 1        70076 1        10000 0        12773 1        40102 0        74754 1
24,2710          26102 0        44076 0        70102 0        54102 0        00006 1        33550 1        52113 0        46214 1
24,2720          04126 0     C: 00004 0        05255 0     C: 00050 1        44770 1        55635 1        34772 1        55644 1
24,2730          44076 0        70102 0        64752 0        54102 0        36214 0        54001 1        40000 0        53170 1

24,2740          00006 1        41571 1        53665 1        44773 1        04126 0     C: 00004 0        34750 1        54030 0
24,2750          00006 1        33562 0        52113 0        05255 0     C: 00240 1        40102 0        74754 1        10000 0
24,2760          02764 0        40076 1        74756 0        26076 1        34772 1        00006 1        01005 0        00006 1
24,2770          34772 1        53164 1        15314 0        44754 1        70102 0        54102 0        04606 0        00006 1
```

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OCTAL LISTING FOR PARAGRAPH # 142,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

24,3000        31430 1      53413 1      00006 1      30025 0      21413 1      05362 0   C: 40053 0   C: 07014 0
24,3010     C: 77777 0   C: 03016 0   C: 50066 1      31430 1      05223 1   C: 03023 0      44760 0      70076 1
24,3020        54076 1      04611 0      12711 0      04611 0      03045 0      05255 0   C: 00372 1      03217 0
24,3030        04714 1   C: 42042 1      04714 1   C: 13313 1      03161 1      05362 0   C: 00003 1   C: 00354 0

24,3040        34664 1      05121 0   C: 03174 0   C: 50066 1      15314 0      00004 0      00006 1      30025 0
24,3050        53022 1      44762 1      70101 0      54101 0      44754 1      00006 1      03011 1      34753 1
24,3060        00006 1      05012 1      31635 0      64770 0      00006 1      13101 0      40102 0      74076 0
24,3070        00006 1      63101 1      31633 0      00006 1      13101 0      31601 1      55423 1      31603 0

24,3100        55424 0      00002 0   I: 77775 1   C: 15336 0   C: 03126 1   I: 77776 1      34750 1      55446 1
24,3110        04606 0      00004 0      00006 1      31413 0      52155 1      00006 1      40025 1      20155 1
24,3120        07224 1      30155 0      00006 1      63125 1      13126 0      34770 0      55430 0      05223 1
24,3130     C: 03023 0      05362 0   C: 40053 0   C: 10035 0      05561 0   C: 00042 1      13614 0   I: 77776 1

24,3140        05671 1   C: 01407 0      13614 0   I: 77614 1   C: 01344 0   C: 51603 0   I: 77214 0   C: 00711 0
24,3150     C: 51603 0   C: 15336 0   C: 03126 1   I: 77776 1      44772 0      55633 1      54777 1      13134 0
24,3160        00004 0      43520 1      00006 1      03012 1      44770 1      55323 0      34772 1      54777 1
24,3170        44756 0      70103 1      54103 1      00002 0      33515 0      04636 0   C: 20716 0      13403 1

24,3200        13441 1      13174 1      00004 0      30032 0      55572 1      00006 1      30034 0      53574 1
24,3210        35007 0      55655 1      44765 0      71465 0      55465 0      00002 0      00004 0      33521 1
24,3220        55655 1      41465 0      74765 0      27465 0      00002 0      34756 1      70103 1      10000 0
24,3230        13234 0      05402 1   C: 00006 1      05314 1      00006 1      30025 0      53661 0      00006 1

24,3240        41413 1      21661 0      35016 0      05223 1   C: 03225 1      10777 1      13251 0      13261 0
24,3250        13251 0      43511 0      60777 0      00006 1      13264 0      37651 1      05121 0   C: 03276 1
24,3260     C: 50066 1      40025 1      55271 0      15314 0      37651 1      05135 0   C: 03271 0   C: 50066 1
24,3270        13261 0      06006 1   I: 77624 1   C: 51651 1   I: 77776 1      13306 0      30032 0      55175 1

24,3300        30033 1      55171 0      30034 0      55173 1      04636 0   C: 47602 0      00004 0      10777 1
24,3310        13466 1      15205 1      13427 1      33514 1      04636 0   C: 20727 1      13363 0      13407 0
24,3320        05402 1   C: 00534 0      33514 1      54777 1      04606 0      44124 0      55412 0      04611 0
24,3330        03045 0      33526 0      04636 0   C: 01731 0      34770 0      05233 0   C: 02355 0   C: 40066 0

24,3340        04714 1   C: 42042 1      05362 0   C: 00026 0   C: 05024 1   C: 50777 0      05561 0   C: 00154 1
24,3350        05547 1   C: 00153 0      44760 0      54777 1      05362 0   C: 40114 1   C: 00033 1      05134 1
24,3360     C: 02534 1   C: 34067 1      15205 1      05402 1   C: 00076 0      34772 1      54777 1      03045 0
24,3370        33526 0      04636 0   C: 01731 0      00004 0      04714 1   C: 42042 1      05362 0   C: 00006 1
```

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OCTAL LISTING FOR PARAGRAPH # 143,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

24,3400     C: 05024 1   C: 50777 0      03160 0      00006 1      33554 0      53062 0      14103 0      05402 1
24,3410     C: 00134 1      33514 1      54777 1      05547 1   C: 00030 1      05547 1   C: 00042 1      35017 1
24,3420        04636 0   C: 01731 0      05561 0   C: 00030 1      05402 1   C: 00004 0      15205 1      33514 1
24,3430        04636 0   C: 20727 1      13376 1      13471 1      05362 0   C: 00006 1   C: 05024 1   C: 50777 0

24,3440        03160 0      00006 1      33556 1      53062 0      35017 1      04636 0   C: 01731 0      03202 1
24,3450        00003 1      05402 1   C: 05024 1   C: 57777 1      33512 1      04636 0   C: 20716 0      13403 1
24,3460        13462 0      13451 0      00006 1      33554 0      53062 0      14105 0      30777 0      04636 0
24,3470     C: 20721 1      00004 0      30103 0      74755 0      10000 0      13506 0      34755 1      26103 1

24,3500        30103 0      74754 1      00006 1      13506 0      05222 0   C: 02664 1      33514 1      54777 1
24,3510        15205 1   C: 01525 1   C: 04125 0   C: 01537 1   C: 01450 1   C: 04050 0   C: 04123 0   C: 00204 1
24,3520     C: 02202 0   C: 00707 1   C: 04700 1   C: 03410 1   C: 00000 1   C: 00764 1   C: 00372 1   C: 00000 1
24,3530     C: 05664 0   C: 02217 1   C: 06650 1   C: 00013 0   C: 06112 0   C: 04000 0   C: 00000 1   C: 00707 1

24,3540     C: 03434 1   C: 21215 1   C: 12215 1   C: 00053 1   C: 07423 0   C: 77636 1   C: 44653 1   C: 03226 1
24,3550     C: 12066 1   C: 03706 0   C: 50067 0   C: 03143 1   C: 76067 1   C: 03576 0   C: 50066 1   C: 02176 0
24,3560     C: 34066 0   C: 02163 1   C: 36066 1      06006 1   I: 71214 0   C: 00464 1   C: 15336 0   C: 03703 0
24,3570     I: 43145 0   C: 11534 0   C: 00700 0   C: 50226 1   I: 52152 0   C: 50226 1      06006 1   I: 77624 1

24,3600     C: 34331 1   I: 77624 1   C: 51651 1   I: 77776 1      33616 0      00006 1      06031 0      73616 1
24,3610        00006 1      13614 0      05547 1   C: 00233 0      04655 0   C: 77143 1   C: 07700 1      34753 1
24,3620        05121 0   C: 03451 1   C: 50066 1      05561 0   C: 00155 0      15314 0   I: 77624 1   C: 51651 1
24,3630     I: 77776 1      00006 1      33556 1      53062 0      33511 1      54777 1      05362 0   C: 40036 0

24,3640     C: 00234 1      12523 0      33512 1      54777 1      33530 1      05223 1   C: 03617 1      44766 0
24,3650        12623 0   I: 40220 0   C: 03730 0   C: 00001 0   I: 41575 0   C: 03721 0   I: 77624 1   C: 57032 1
24,3660     C: 37665 0   C: 03730 0      04636 0   C: 03731 1      06006 1   I: 77624 1   C: 27566 1      30155 0
24,3670        55672 1      05223 1   C: 03676 0      05402 1   C: 40574 0      15205 1      00006 1      33552 0

24,3700        53062 0      05120 1   C: 03730 0   C: 50067 0      44767 1      12623 0      06006 1   I: 77201 1
24,3710     C: 00001 0   C: 03665 1   I: 41455 0   C: 03432 1   C: 37460 1   C: 57032 1   C: 37675 1   C: 70537 1
24,3720     I: 77776 1      05402 1   C: 10035 0      34773 0      05607 0   C: 01457 0   C: 01664 1      03614 1
24,3730        06006 1   I: 77775 1   C: 15336 0   C: 03675 0   C: 03665 1   I: 77776 1      35054 0      05176 1

24,3740        05402 1   C: 05024 1   C: 62777 1      33516 0      04636 0   C: 20743 0      04103 1      04103 1
24,3750        13730 1      00006 1      30025 0      16024 0      10154 0      34772 1      13761 0      13760 1
24,3760        44753 0      54155 1      34772 1      56154 1      00006 1      74753 0      20155 1      16030 0
24,3770     C: 03770 1   C: 03771 0 CKSM 46703 1         @            @            @            @            @
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OCTAL LISTING FOR PARAGRAPH # 144,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,2000     I: 77776 1      42113 1       00004 0       70102 0       62114 1       54102 0       00003 1       06006 1
25,2010     I: 77735 0   C: 03011 1    C: 03626 0    I: 77735 0    C: 03010 0    C: 03624 1    I: 77605 1    C: 15324 0
25,2020     C: 17630 1   C: 15151 0    I: 70405 1    C: 03624 1    C: 17632 0    C: 15200 1    C: 17175 1    C: 15344 0
25,2030     C: 17614 1   C: 03624 1    I: 57565 0    C: 03327 1    C: 37634 1    C: 52063 0    I: 47375 0    C: 01036 0

25,2040     C: 01756 1   I: 50256 0    C: 03474 0    C: 03676 0    I: 47076 0    C: 45761 0    C: 17644 1    C: 03624 1
25,2050     I: 43205 1   C: 15202 0    C: 15204 0    C: 03712 0    I: 66331 0    C: 03646 0    C: 52260 1    C: 03325 0
25,2060     C: 52115 0   I: 77634 0    C: 53607 0    I: 77220 1    C: 03645 0    C: 03401 1    I: 43014 0    C: 00662 0
25,2070     C: 01663 0   C: 14747 0    C: 15336 0    C: 14753 0    C: 01044 0    C: 37524 0    C: 26524 0    I: 77656 1

25,2100     C: 17452 1   C: 12112 0    C: 37606 0    C: 46213 0    I: 72441 0    C: 01756 1    I: 77726 1    C: 37702 0
25,2110     C: 03645 0   C: 00003 1    C: 01520 1    C: 11774 0    C: 11010 0    I: 77624 1    C: 52125 0    I: 77776 1
25,2120        05402 1   C: 10035 0       06006 1    I: 77650 1    C: 03645 0    I: 77214 0    C: 03346 0    C: 52133 1
25,2130     C: 03526 0   I: 52076 1    C: 52136 1    I: 74375 0    C: 01036 0    C: 15232 0    C: 03516 0    I: 44056 1

25,2140     C: 03373 0   C: 17510 0    C: 00043 0    C: 03622 1    I: 77625 0    C: 15326 1    C: 17654 0    C: 00045 0
25,2150     C: 27674 1   C: 03516 0    I: 72441 0    C: 01756 1    C: 27700 0    C: 01315 1    I: 41246 1    C: 15234 0
25,2160     I: 53152 1   C: 55136 0    C: 27640 0    C: 03516 0    I: 53435 0    C: 01756 1    C: 03502 0    I: 71214 0
25,2170     C: 03346 0   C: 55077 1    C: 15336 0    I: 43225 0    C: 03524 1    C: 01044 0    C: 37606 0    C: 46223 0

25,2200     I: 40241 1   C: 03502 0    C: 00001 0    C: 27676 0    C: 03474 0    I: 77614 1    C: 03667 0    I: 50235 0
25,2210     C: 01756 1   C: 03502 0    I: 43044 0    C: 52215 0    C: 03467 1    I: 77775 1    C: 03474 0    I: 45241 1
25,2220     C: 01756 1   C: 15164 0    I: 43244 1    C: 55141 0    C: 15164 0    I: 65552 0    C: 03702 1    I: 57414 1
25,2230     C: 03707 1   C: 52232 0    C: 17714 0    C: 03640 0    I: 50025 0    C: 15242 1    C: 52255 1    I: 77214 0

25,2240     C: 03074 1   C: 03432 1    I: 50206 0    C: 03542 1    I: 63552 0    I: 47515 0    I: 56225 1    C: 00001 0
25,2250     I: 75400 1   C: 52253 1    C: 03727 0    I: 77650 1    C: 03373 0    I: 52014 0    C: 03274 0    C: 52253 1
25,2260     I: 43014 0   C: 03312 1    C: 52362 1    C: 03354 0    C: 53524 1    I: 63545 0    C: 03654 0    I: 56205 0
25,2270     C: 03654 0   C: 15306 0    I: 47015 0    C: 15310 1    C: 54432 0    C: 03720 1    I: 50025 0    C: 15316 1

25,2300     C: 52304 1   I: 77745 1    C: 15316 1    C: 03720 1    I: 45345 1    C: 03674 1    C: 15304 1    I: 51014 0
25,2310     C: 03265 0   C: 52316 1    I: 52131 0    C: 03646 0    C: 53316 0    C: 52351 1    I: 41345 0    C: 03654 0
25,2320     C: 15312 0   I: 77615 0    C: 15314 0    C: 03710 1    I: 40065 0    C: 15270 0    C: 52327 0    C: 17706 0
25,2330     C: 03624 1   C: 17634 0    C: 03700 0    I: 41471 0    C: 03674 1    I: 41316 0    I: 45271 1    C: 15300 0

25,2340     C: 15302 1   I: 40015 1    C: 03674 1    C: 52351 1    I: 71240 1    C: 52351 1    C: 03624 1    I: 77676 0
25,2350     C: 03634 0   I: 77614 1    C: 03052 0    C: 53524 1    I: 45345 1    C: 03720 1    C: 03640 0    I: 52044 0
25,2360     C: 53524 1   C: 53231 1    I: 43345 1    C: 03700 0    C: 15262 0    I: 45040 1    C: 52354 1    C: 53021 1
25,2370     I: 77731 1   C: 03646 0    C: 52373 1    I: 77745 1    C: 03640 0    C: 17664 0    C: 03624 1    C: 17647 1
```

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OCTAL LISTING FOR PARAGRAPH # 145,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,2400      C: 03700 0    I: 71240 1    C: 52406 1    C: 03725 1    C: 17647 1    C: 03700 0    I: 43271 1    C: 03647 1
25,2410      C: 03674 1    C: 14326 0    C: 03700 0    I: 56316 0    C: 03647 1    I: 43271 1    C: 15274 1    C: 03640 0
25,2420      I: 41205 0    C: 00326 0    C: 00326 0    I: 77671 1    C: 03622 1    C: 14330 1    C: 03700 0    I: 71244 0
25,2430      C: 52433 1    C: 00330 1    C: 03664 0    I: 51145 0    C: 03634 0    C: 52442 1    I: 45345 1    C: 00326 0

25,2440      C: 15216 0    C: 00326 0    I: 41345 0    C: 00330 1    C: 15274 1    I: 40271 1    C: 00326 0    C: 00001 0
25,2450      I: 56271 0    C: 00326 0    C: 03725 1    C: 03704 1    I: 55221 0    C: 15344 0    C: 00326 0    C: 17616 0
25,2460      C: 03704 1    I: 41225 1    C: 15344 0    C: 03704 1    I: 77671 1    C: 00330 1    C: 03620 0    I: 43205 1
25,2470      C: 03175 1    C: 03704 1    I: 44366 1    C: 15344 0    I: 77605 1    C: 03616 0    C: 03757 1    I: 41221 0

25,2500      C: 00326 0    C: 03725 1    I: 77671 1    C: 03757 1    C: 14027 1    C: 03757 1    I: 50025 0    C: 15206 1
25,2510      C: 53332 0    I: 63545 0    C: 03757 1    C: 17666 1    C: 15334 1    I: 50025 0    C: 03757 1    C: 53225 1
25,2520      C: 17662 0    C: 15334 1    C: 03672 1    I: 50025 0    C: 00326 0    C: 52533 0    I: 77621 1    C: 03662 0
25,2530      C: 17662 0    C: 00326 0    C: 03672 1    I: 45145 0    C: 03672 1    C: 53003 1    C: 03656 1    I: 56261 1

25,2540      C: 20607 1    C: 03175 1    I: 77625 0    C: 15252 0    C: 03660 1    I: 41215 1    C: 31771 1    C: 15256 1
25,2550      I: 41205 0    C: 03662 0    C: 03662 0    I: 56271 0    C: 03656 1    C: 03666 1    I: 50021 1    C: 00027 1
25,2560      C: 52750 1    C: 03761 1    I: 77625 0    C: 00027 1    I: 43205 1    C: 15334 1    C: 00027 1    C: 14027 1
25,2570      C: 03761 1    I: 60516 0    I: 77621 1    C: 15334 1    C: 17670 0    C: 03666 1    I: 41225 1    C: 15334 1

25,2600      C: 03666 1    I: 41205 0    C: 03670 0    C: 03670 0    I: 43312 0    C: 31771 1    I: 65366 1    C: 03666 1
25,2610      I: 41205 0    C: 03670 0    C: 03761 1    I: 67471 1    I: 41552 0    C: 17731 1    C: 03757 1    I: 43205 1
25,2620      C: 15172 1    C: 03712 0    C: 03732 1    I: 63525 0    C: 00326 0    I: 56205 0    C: 03175 1    C: 03666 1
25,2630      I: 45071 0    C: 00330 1    C: 46155 1    I: 56205 0    C: 15210 0    C: 00027 1    C: 03733 0    I: 41325 0

25,2640      C: 15260 1    C: 03700 0    I: 56205 0    C: 03674 1    C: 00330 1    I: 41471 0    C: 03624 1    C: 17734 1
25,2650      C: 15176 0    I: 41225 1    C: 03761 1    C: 15174 1    C: 27735 0    C: 03731 1    C: 17126 1    C: 03735 0
25,2660      I: 43215 0    I: 43215 0    I: 41025 0    C: 03702 1    C: 57544 0    C: 03610 0    I: 45246 0    C: 15224 1
25,2670      I: 43040 1    C: 53032 0    C: 03311 1    C: 52677 0    I: 51145 0    C: 03610 0    C: 53220 1    I: 41345 0

25,2700      C: 03642 1    C: 03610 0    I: 45325 1    C: 03612 1    C: 03610 0    I: 77665 1    I: 77626 0    C: 74135 0
25,2710      I: 50015 0    C: 03725 1    C: 52744 1    I: 77600 1    C: 52740 0    C: 03725 1    I: 77776 1       04606 0
25,2720         35055 1       55270 1       05402 1    C: 00474 0       35055 1       05176 1       33031 0       55645 0
25,2730         06006 1    I: 43145 0    C: 03610 0    C: 03071 1    C: 17612 1    C: 15200 1    C: 37175 0    C: 52373 1

25,2740      I: 77745 1    C: 15344 0    C: 37725 0    C: 53220 1    I: 70545 1    C: 03725 1    I: 52076 1    C: 52706 1
25,2750      I: 41205 0    C: 03757 1    C: 15152 0    I: 41325 0    C: 03725 1    C: 15152 0    I: 43325 1    C: 03660 1
25,2760      C: 15254 0    I: 41205 0    C: 03662 0    C: 15256 1    I: 56271 0    C: 03656 1    C: 03757 1    I: 55221 0
25,2770      I: 77615 0    C: 03757 1    C: 37757 0    C: 53003 1    C: 17175 1    C: 03757 1    I: 77716 1    C: 17666 1
```

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OCTAL LISTING FOR PARAGRAPH # 146,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,3000       C: 15336 0    I: 77650 1    C: 52561 1    I: 56342 1    C: 03616 0    I: 72421 0    C: 15334 1    I: 45316 1
25,3010       C: 03704 1    I: 43471 1    C: 03620 0       06006 1    I: 45014 0    C: 03271 0    C: 53021 1    I: 77650 1
25,3020       C: 52373 1    I: 77745 1    C: 15336 0    C: 17612 1    C: 15160 1    C: 17642 1    C: 15154 0    C: 03725 1
25,3030       I: 77616 0    C: 53574 1    I: 77634 0    C: 54440 0    I: 45345 1    C: 03640 0    C: 15222 1    I: 43040 1

25,3040       C: 53042 1    C: 03070 0    I: 45345 1    C: 03674 1    C: 00326 0    I: 71244 0    C: 53257 1    C: 03640 0
25,3050       I: 50025 0    C: 03175 1    C: 53312 1    I: 51145 0    C: 03700 0    C: 53064 0    I: 45345 1    C: 03674 1
25,3060       C: 03757 1    I: 50025 0    C: 15166 1    C: 53332 0    I: 77745 1    C: 03640 0    I: 50025 0    C: 00330 1
25,3070       C: 53074 1    I: 52145 0    C: 03624 1    C: 53523 0    I: 41345 0    C: 03640 0    C: 03620 0    I: 75415 0

25,3100       C: 03704 1    I: 41221 0    C: 15344 0    C: 03616 0    C: 01312 0    I: 41221 0    C: 00326 0    C: 03725 1
25,3110       C: 15310 1    C: 03672 1    I: 50025 0    C: 01312 0    C: 53133 0    I: 41406 0    I: 56205 0    C: 03660 1
25,3120       C: 03662 0    I: 41215 1    C: 31771 1    C: 15256 1    I: 41205 0    I: 77671 1    C: 03656 1    I: 44271 0
25,3130       C: 01312 0    C: 01310 1    C: 01310 1    I: 45345 1    C: 03640 0    C: 15344 0    I: 50004 0    C: 57544 0

25,3140       C: 53151 1    I: 45345 1    C: 03664 0    C: 03175 1    I: 45325 1    C: 03640 0    C: 03175 1    I: 45471 1
25,3150       C: 74163 0    I: 77745 1    C: 03700 0    I: 41225 1    C: 01310 1    C: 03614 1    I: 43271 1    C: 15212 1
25,3160       C: 03674 1    I: 41225 1    C: 01312 0    C: 03614 1    I: 41471 0    C: 15214 1    I: 51400 1    C: 53470 1
25,3170       I: 50025 0    C: 15276 0    C: 53177 0    I: 43205 1    C: 15156 1    C: 15276 0    I: 41565 1    I: 42545 0

25,3200       I: 77615 0    C: 03725 1    I: 41400 0    C: 53470 1    C: 17634 0    C: 03640 0    I: 50025 0    C: 15220 0
25,3210       C: 53524 1    I: 71214 0    C: 03273 1    I: 71244 0    C: 53524 1    C: 15336 0    C: 37634 1    C: 53524 1
25,3220       I: 77745 1    C: 03610 0    C: 17612 1    C: 15200 1    C: 03175 1    I: 47131 1    C: 03646 0    C: 52373 1
25,3230       C: 54505 0    I: 77604 0    C: 57544 0    I: 41345 0    C: 03654 0    C: 03706 0    I: 41325 0    C: 15264 0

25,3240       C: 03710 1    I: 43271 1    C: 03674 1    C: 03700 0    I: 43205 1    C: 15230 1    I: 77725 1    C: 03710 1
25,3250       I: 77621 1    C: 03640 0    I: 43205 1    C: 15226 0    I: 52061 1    C: 20211 1    C: 53202 1    I: 77604 0
25,3260       C: 57544 0    I: 54345 1    C: 03624 1    C: 20611 0    I: 45325 1    C: 03674 1    C: 00326 0    I: 43205 1
25,3270       C: 03624 1    C: 03700 0    I: 43205 1    C: 15230 1    I: 45325 1    C: 00326 0    C: 03674 1    I: 41316 0

25,3300       C: 03624 1    I: 65271 0    C: 15274 1    C: 00326 0    I: 56316 0    C: 03622 1    I: 45265 1    C: 00330 1
25,3310       I: 77650 1    C: 53250 0    I: 66234 1    C: 54473 0    C: 03646 0    C: 53316 0    I: 45345 1    C: 15170 0
25,3320       C: 03640 0    I: 72240 1    C: 53332 0    C: 03316 0    I: 72214 0    C: 03314 1    C: 53330 1    C: 15336 0
25,3330       C: 37316 1    C: 54402 0    I: 47131 1    C: 03646 0    C: 53332 0    C: 54477 1    I: 66214 0    C: 03067 0

25,3340       C: 03646 0    C: 53342 1    I: 45345 1    C: 03674 1    C: 15216 0    I: 77440 1    C: 53611 1       04606 0
25,3350          35775 1       55761 1       41673 0       51761 0       63634 0       10000 0       11761 1       13351 1
25,3360          64770 0       55646 0       51761 0       43634 1       51761 0       63635 1       57646 1       22007 0
25,3370          00006 1       11646 0       55651 0       34773 0       55650 1       34776 0       27761 1       50000 1
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OCTAL LISTING FOR PARAGRAPH # 147,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,3400      43634 1     51761 0     63635 1     00006 1     71651 0     51761 0     63634 0     51650 0
25,3410      55652 0     11650 1     13374 0     57653 0     61637 1     00006 1     71657 0     52155 1
25,3420      00006 1     41700 0     20001 1     20001 1     20001 1     61655 0     00006 1     71656 1
25,3430      61654 1     20155 1     30154 1     55760 0     06006 1  I: 45242 1  C: 03702 1  I: 43014 0

25,3440   C: 03305 1  C: 53466 0  C: 03747 0  C: 53451 1  I: 43145 0  C: 13770 0  C: 03065 1  C: 37716 0
25,3450   C: 53466 0  C: 03716 1  I: 77676 0  I: 56204 1  C: 57544 0  C: 03653 1  I: 40061 1  C: 20206 1
25,3460   C: 53470 1  I: 40015 1  C: 03626 0  C: 53470 1  C: 37634 1  C: 53474 0  I: 77745 1  C: 13467 0
25,3470   I: 41234 1  C: 45761 0  C: 03624 1  C: 03634 0  I: 45345 1  C: 15162 0  C: 03640 0  I: 43244 1

25,3500   C: 53524 1  C: 15162 0  I: 41240 1  C: 53521 1  C: 15264 0  I: 41325 0  C: 03654 0  C: 15334 1
25,3510   I: 41215 1  C: 03624 1  I: 56325 0  C: 15266 1  C: 03622 1  I: 75415 0  I: 51015 1  C: 03700 0
25,3520   C: 53524 1  I: 77745 1  C: 03624 1  C: 03634 0  I: 77745 1  C: 03634 0  C: 17636 1  C: 03622 1
25,3530   I: 77614 1  C: 03305 1  C: 53564 0  I: 43205 1  C: 03632 0  C: 15244 1  I: 51525 1  C: 03634 0

25,3540   I: 50025 0  C: 03630 1  C: 53551 0  I: 75345 1  C: 03676 0  C: 03644 1  I: 71240 1  C: 53627 1
25,3550   I: 41542 1  I: 75345 1  C: 03676 0  C: 03644 1  I: 77625 0  I: 71240 1  C: 53564 0  C: 03644 1
25,3560   I: 57414 1  C: 03210 1  C: 53564 0  C: 03644 1  I: 56345 0  C: 03636 1  C: 03624 1  I: 65542 1
25,3570   I: 43165 1  C: 03644 1  C: 03270 1  C: 03316 0  I: 77776 1     34754 0     70102 0     00006 1

25,3600      13604 1     31122 1     04636 0  C: 20724 1     00004 0     10067 1     05152 1     04655 0
25,3610   C: 77143 1  I: 77776 1     04606 0     35055 1     05121 0  C: 02511 0  C: 54066 0     05362 0
25,3620   C: 00414 0  C: 10035 0     33626 0     55645 0     06006 1  I: 77650 1  C: 54532 1  I: 75345 1
25,3630   C: 03630 1  C: 03634 0  C: 37636 0  C: 53564 0  C: 00474 0  C: 01235 1  C: 02337 1  C: 03721 0

25,3640   C: 05230 0  C: 06213 1  C: 10550 0  C: 11717 0  C: 13314 0  C: 14736 0  C: 16255 1  C: 16457 0
25,3650   C: 25570 1  C: 77526 0  C: 77360 1  C: 77106 0  C: 76516 1  C: 76071 0  C: 75570 1  C: 74661 0
25,3660   C: 70657 1  C: 66352 0  C: 66352 0  C: 54557 1  C: 40000 0  C: 40000 0  C: 77635 1  C: 77563 1
25,3670   C: 77354 0  C: 76712 1  C: 76066 0  C: 75322 0  C: 73237 0  C: 72104 1  C: 70301 1  C: 65635 1

25,3700   C: 57311 0  C: 50575 0  C: 50575 0  C: 74443 1  C: 74333 1  C: 74433 0  C: 74763 0  C: 75432 0
25,3710   C: 75735 1  C: 76200 1  C: 75735 1  C: 75140 0  C: 74075 0  C: 73312 0  C: 73732 0  C: 73732 0
25,3720   C: 00026 0  C: 00077 1  C: 00217 0  C: 00431 1  C: 00712 0  C: 01136 1  C: 02015 1  C: 02374 0
25,3730   C: 03123 1  C: 04051 1  C: 05767 1  C: 07476 0  C: 11324 1  C: 76272 1  C: 75472 1  C: 74604 0

25,3740   C: 74210 1  C: 74052 0  C: 73735 1  C: 73217 1  C: 73013 1  C: 73155 1  C: 74151 1  C: 76703 1
25,3750   C: 77575 0  C: 77575 0  C: 00112 0  C: 00204 1  C: 00407 1  C: 01113 0  C: 02161 0  C: 03260 0
25,3760   C: 03717 0  C: 05411 0  C: 10057 1  C: 13476 0  C: 20324 0  C: 21677 1  C: 21677 1  C: 16631 1
25,3770   C: 06755 0  C: 03771 0  C: 03772 0  CKSM 77311 1       @           @           @           @
```

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OCTAL LISTING FOR PARAGRAPH # 150,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,2000       22016 0       00006 1       22012 1       41501 0       74766 0       27501 0       04714 1    C: 42425 1
26,2010       34760 1       00006 1       05012 1       00006 1       34541 0       52113 0       37661 1       54030 0
26,2020       15323 1    I: 45020 1    C: 03657 0    C: 45174 1    I: 77624 1    C: 45330 0    I: 77624 1    C: 46745 0
26,2030    C: 16357 1    C: 00005 1    I: 77624 1    C: 45330 0    I: 77624 1    C: 46745 0    C: 36355 1    C: 03657 0

26,2040    I: 77601 0    C: 00001 0    I: 41575 0    C: 15330 0    I: 41434 1    C: 51751 0    C: 36347 1    C: 55345 0
26,2050    C: 16766 1    C: 02347 0    C: 34041 0    C: 27170 1    I: 47375 0    C: 00007 0    C: 00001 0    C: 24031 0
26,2060    C: 00001 0    I: 57456 1    I: 41401 1    C: 00001 0    I: 54335 0    C: 03752 1    C: 20214 1    I: 41342 1
26,2070    C: 14135 0    C: 36347 1    C: 54105 1    I: 53575 0    C: 00031 0    C: 16766 1    C: 14133 0    I: 77625 0

26,2100    C: 02347 0    C: 36347 1    C: 54105 1    C: 36766 0    C: 31120 0    I: 73545 1    C: 02347 0    I: 47315 0
26,2110    C: 02766 1    C: 00001 0    I: 72561 0    I: 50315 0    C: 02766 1    C: 00001 0    I: 72561 0    C: 02766 1
26,2120    I: 71525 0    C: 02347 0    I: 51315 1    C: 00015 0    C: 00001 0    I: 76561 1    I: 53255 0    I: 40256 1
26,2130    C: 00001 0    I: 43406 1    C: 05252 1    C: 25251 0    C: 01414 1    C: 06044 1    I: 52170 0    C: 54163 1

26,2140    C: 54146 0    I: 52170 0    C: 54201 0    C: 54146 0    I: 77770 1    C: 54212 1    I: 54201 0    C: 00001 0
26,2150    C: 20617 0    I: 57571 0    C: 01707 0    I: 57571 0    C: 02034 1    I: 66261 1    C: 20221 1    C: 00051 0
26,2160    C: 00006 1    I: 77650 1    C: 00046 0    I: 41206 0    C: 02147 1    I: 71406 0    I: 65361 0    C: 02133 1
26,2170    I: 63356 1    C: 02133 1    I: 53406 0    I: 53435 0    C: 02141 1    I: 76435 1    I: 53361 0    I: 77772 0

26,2200    C: 14003 1    I: 63370 0    C: 00066 1    C: 02037 1    I: 52761 0    C: 00001 0    C: 02133 1    I: 72500 1
26,2210    C: 54204 0    I: 77616 0    I: 65370 0    C: 00060 1    C: 14233 0    I: 74206 0    C: 02037 1    I: 77761 1
26,2220    C: 00001 0    C: 14005 1    I: 41425 1    C: 31771 1    I: 53357 0    C: 02125 0    C: 00005 1    I: 72500 1
26,2230    C: 54217 1    I: 77616 0    C: 22000 1    C: 00000 1       34753 1       55247 0       44770 1       55726 1

26,2240       02546 1       35034 0       05540 0       02247 1       05402 1    C: 00014 1       05205 0       22007 0
26,2250       11726 1       34753 1       12253 0       53716 1       34753 1       55247 0       06006 1    I: 77745 1
26,2260    C: 01044 0    C: 37651 1    C: 52063 0    I: 43175 0    C: 01030 0    C: 03274 0    C: 02320 1    I: 77656 1
26,2270    C: 26334 1    C: 01036 0    C: 02326 1    I: 53435 0    C: 02334 1    C: 03502 0    I: 45345 1    C: 03651 0

26,2300    C: 01044 0    I: 45040 1    C: 54257 0    C: 54652 1       05527 1       35033 1       05535 1       32425 0
26,2310       04636 0    C: 20743 0       04103 1       02315 1       02254 0       05344 1    C: 00076 0       34770 0
26,2320       54332 1       02546 1       06006 1    I: 47131 1    C: 03325 0    C: 54402 0    C: 41703 0       00006 1
26,2330       32431 0       53062 0       32545 1       04636 0    C: 21147 0       04103 1       02341 0       02332 1

26,2340       02244 1       04655 0    C: 41624 1       35034 0       04636 0    C: 20743 0       02343 1       02351 1
26,2350       02343 1       05402 1    C: 04024 0       11726 1       34753 1       12356 1       55715 1       31411 1
26,2360       22007 0       53604 0       34770 0       55727 0       35025 0       55122 0       05547 1    C: 00134 1
26,2370       41700 0       74770 1       00006 1       12422 0       02406 1       35052 0       05121 0    C: 02406 1
```

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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971                  PAGE 1681

OCTAL LISTING FOR PARAGRAPH # 151,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,2400    C: 54066 0      05314 1   I: 52131 0   C: 00053 1   C: 53574 1   C: 20412 1      05344 1   C: 00077 1
26,2410       32427 1      55724 0      32426 0      55122 0      44770 1      55727 0      05402 1   C: 00004 0
26,2420       04636 0   C: 20715 0      05402 1   C: 00004 0      05205 0   C: 04077 0   C: 01500 0   C: 52000 0
26,2430    C: 03404 1   C: 76067 1      05344 1   C: 00100 0      32437 0      55122 0      06030 1   C: 01512 0

26,2440       05344 1   C: 00101 1      35052 0      05121 0   C: 02456 1   C: 54062 1      05362 0   C: 00554 0
26,2450    C: 10035 0      06006 1   I: 47131 1   C: 03646 0   C: 53034 0   C: 52120 0      05561 0   C: 00134 1
26,2460       32472 1      04636 0   C: 21101 1      02460 1      02467 0      02460 1      02244 1      05547 1
26,2470    C: 00134 1      02422 1   C: 04105 1      05344 1   C: 00102 1      35025 0      02502 1      05344 1

26,2500    C: 00103 0      32510 1      55122 0      05547 1   C: 00134 1      05402 1   C: 00004 0      06030 1
26,2510    C: 01502 1      32544 0      04636 0   C: 20743 0      02517 0      02517 0      02511 0      00004 0
26,2520       34767 0      64770 0      40000 0      70102 0      54102 0      00003 1      00006 1      32644 0
26,2530       53062 0      14103 0   I: 43175 0   C: 01030 0   C: 00662 0   C: 16152 0   C: 01044 0   I: 45014 0

26,2540    C: 01663 0   C: 26453 1   I: 77634 0   C: 53607 0   C: 04103 1   C: 00041 1      00006 1      23773 0
26,2550       04636 0   C: 03731 1      06006 1   I: 45014 0   C: 00716 1   C: 54605 0   C: 27566 1      30155 0
26,2560       55774 0      05233 0   C: 02567 1   C: 54067 1      05402 1   C: 40434 0      05205 0      35052 0
26,2570       05135 0   C: 02604 1   C: 54066 0      00006 1      32644 0      53062 0      05362 0   C: 00454 1

26,2600    C: 00175 1      04606 0      04655 0   C: 76607 1      06006 1   I: 77204 1   C: 57544 0   C: 01036 0
26,2610    I: 64235 1   C: 01030 0   C: 01734 0   I: 71256 0   C: 00160 0   I: 43240 0   C: 54623 1   C: 14646 0
26,2620    I: 47004 0   C: 54642 0   C: 54627 0   I: 43276 0   C: 14646 0   I: 77404 1   C: 54632 1      05671 1
26,2630    C: 01426 0      02634 1      05671 1   C: 01427 1      35023 0      04636 0   C: 20710 0      32647 0

26,2640       04636 0   C: 01731 0      01773 0   C: 03143 1   C: 76067 1   C: 22111 0   C: 17335 1   C: 01750 1
26,2650    C: 00000 1   C: 13560 0   I: 45345 1   C: 02020 1   C: 15006 0   I: 71244 0   C: 55002 0   C: 31757 0
26,2660    I: 77624 1   C: 57151 0   I: 45145 0   C: 15024 0   C: 57261 0   I: 77624 1   C: 57052 1   I: 77624 1
26,2670    C: 55033 1   I: 45015 1   C: 02020 1   C: 57261 0   C: 03733 0   I: 57415 0   C: 03651 0   C: 03735 0

26,2700    I: 77615 0   C: 01044 0   C: 37727 1   C: 57052 1   I: 77624 1   C: 55033 1   I: 77624 1   C: 11744 0
26,2710    I: 77624 1   C: 11731 1   I: 77624 1   C: 11731 1   C: 37714 1   C: 55054 0   I: 77605 1   I: 43265 1
26,2720    C: 15032 1   C: 00001 0   C: 17725 1   C: 02240 0   I: 77615 0   C: 06456 0   C: 34023 1   C: 55051 0
26,2730    I: 45325 1   C: 00001 0   C: 15010 1   I: 63471 0   C: 15012 0   C: 00001 0   I: 43205 1   C: 15014 0

26,2740    I: 41215 1   C: 15016 1   C: 15020 1   I: 77725 1   I: 43271 1   C: 15030 0   C: 31771 1   I: 77665 1
26,2750    I: 51015 1   C: 15022 0   C: 54755 1   I: 77745 1   C: 15336 0   C: 17722 0   C: 02240 0   I: 45015 1
26,2760    C: 15026 1   C: 57261 0   I: 77624 1   C: 57052 1   I: 77624 1   C: 55033 1   I: 73015 1   C: 15026 1
26,2770    C: 03713 1   C: 34023 1   C: 55051 0   I: 67076 1   C: 00155 0   C: 17761 1   I: 77626 0   C: 74020 0
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OCTAL LISTING FOR PARAGRAPH # 152, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,3000      I: 77634 0    C: 54304 1    I: 52145 0    C: 06452 1    C: 54660 0    C: 00002 0    C: 26244 1    C: 33335 1
26,3010      C: 05707 1    C: 36365 1    C: 30244 0    C: 77113 1    C: 42770 1    C: 77354 0    C: 65030 1    C: 21450 0
26,3020      C: 00001 0    C: 01750 1    C: 00000 1    C: 00305 1    C: 04541 0    C: 00003 1    C: 27040 0    C: 32525 1
26,3030      C: 12525 0    C: 77777 0    C: 76601 1    I: 47315 0    C: 02334 1    C: 03502 0    I: 76561 1    I: 74315 0

26,3040      C: 02334 1    C: 00017 1    I: 45455 1    C: 74235 0    I: 72441 0    C: 01712 1    C: 02156 1    I: 77650 1
26,3050      C: 26570 1    I: 77657 0    C: 20201 0    C: 00021 1    I: 41345 0    C: 00041 1    C: 00021 1    I: 45325 1
26,3060      C: 00041 1    C: 00021 1    I: 56257 1    C: 20171 1    I: 77625 0    C: 00025 0    I: 41566 1    I: 65271 0
26,3070      C: 00037 0    I: 65205 0    C: 00021 1    C: 00035 1    I: 56366 1    I: 65542 1    I: 77616 0    I: 56345 0

26,3100      C: 03700 0    C: 15320 1    I: 41325 0    C: 03640 0    C: 15322 0    I: 43271 1    C: 03674 1    I: 43205 1
26,3110      C: 03640 0    C: 03640 0    C: 03640 0    I: 71214 0    C: 03307 0    C: 55122 0    C: 03702 1    I: 52005 0
26,3120      C: 15236 1    C: 52173 0    I: 45345 1    C: 03674 1    C: 15326 1    I: 43044 0    C: 55130 0    C: 03066 1
26,3130      I: 41345 0    C: 03702 1    C: 15240 0    I: 52071 0    C: 03674 1    C: 52173 0    I: 52145 0    C: 16425 0

26,3140      C: 52162 0    I: 51425 0    C: 16426 0    I: 75461 0    C: 20216 0    I: 52005 0    C: 15250 1    C: 52226 0
26,3150      C: 02525 1    C: 12525 0    C: 12525 0    C: 04631 1    C: 23146 0    C: 03146 1    C: 14632 0    C: 76314 0
26,3160      C: 71462 1    C: 05075 0    C: 16051 1    C: 07777 1    C: 00000 1    C: 00236 0    C: 36763 0    C: 00204 1
26,3170      C: 11303 1    C: 05260 0    C: 05572 1    C: 12343 0    C: 21616 0    C: 01073 1    C: 31515 1    C: 00172 0

26,3200      C: 03571 1    C: 05136 0    C: 32046 1    C: 75031 1    C: 40775 0    C: 13132 0    C: 33062 0    C: 00160 0
26,3210      C: 05104 1    C: 14631 0    C: 23146 0    C: 74015 0    C: 46560 0    C: 00475 1    C: 35746 1    C: 10262 0
26,3220      C: 02622 0    C: 05441 0    C: 14412 0    C: 00022 1    C: 36641 1    C: 01003 0    C: 06315 0    C: 63073 0
26,3230      C: 73236 1    C: 32047 0    C: 24367 0    C: 37200 1    C: 05636 1    C: 00046 0    C: 13137 0    C: 00017 1

26,3240      C: 30730 0    C: 00040 0    C: 30447 0    C: 00000 1    C: 17565 1    C: 01727 1    C: 20103 1    C: 00121 0
26,3250      C: 17460 0    C: 00400 0    C: 00000 1    C: 01252 0    C: 25253 1    C: 24365 1    C: 30244 0    C: 77152 1
26,3260      C: 51354 1    C: 00336 1    C: 21610 0    C: 00433 0    C: 02775 0    C: 00000 1    C: 20017 0    C: 77765 0
26,3270      C: 70243 0    C: 31463 1    C: 06315 0    C: 00541 1    C: 33575 0    C: 00146 1    C: 14632 0    C: 00052 0

26,3300      C: 30013 0    C: 20411 1    C: 03041 1    C: 20610 1    C: 10513 1    C: 11473 1    C: 02355 0    C: 00203 0
26,3310      C: 02234 0    C: 16237 0    C: 00146 1    C: 01456 1    C: 03450 0    C: 01727 1    C: 01217 1    C: 56232 1
26,3320      C: 72332 0    C: 77000 1    C: 43741 1    C: 36702 1    C: 21727 0    C: 10000 0    C: 00000 1    C: 00000 1
26,3330      C: 00000 1    C: 00000 1    C: 00000 1    C: 20000 0    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1

26,3340      C: 00000 1    C: 00000 1    C: 00000 1    C: 37777 1    C: 37777 1    I: 46020 1    C: 00050 1    C: 55362 0
26,3350      I: 77624 1    C: 55416 1    I: 77775 1    C: 02012 0    I: 53235 0    C: 00001 0    C: 00001 0    I: 52105 1
26,3360      C: 00025 0    C: 55406 0    I: 77624 1    C: 55567 0    I: 76521 0    C: 00025 0    I: 77650 1    C: 55354 0
26,3370      I: 46020 1    C: 00050 1    C: 55412 0    I: 77624 1    C: 55416 1    I: 61375 1    C: 02012 0    C: 00025 0
```

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OCTAL LISTING FOR PARAGRAPH # 153,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,3400     I: 77772 0    I: 51235 1    C: 00001 0    C: 00001 0    I: 77721 0    C: 00025 0    I: 40372 0    C: 00001 0
26,3410     I: 77650 1    C: 00050 1    I: 77624 1    C: 55367 0    I: 77650 1    C: 55401 1    I: 40220 0    C: 00051 0
26,3420     C: 00011 1    I: 77770 1    C: 00005 1    I: 65345 0    C: 15647 0    C: 15641 0    I: 45006 0    C: 55543 0
26,3430     I: 71406 0    C: 14041 1    I: 77756 0    C: 14043 0    C: 15645 1    I: 41525 0    C: 15637 1    I: 45170 0

26,3440     C: 00004 0    C: 55543 0    C: 14027 1    C: 15643 1    I: 41525 0    C: 15635 0    I: 45170 0    C: 00005 1
26,3450     C: 55543 0    I: 71406 0    I: 77606 1    C: 00025 0    I: 76405 1    C: 00041 1    C: 14035 1    I: 76405 1
26,3460     C: 00043 0    C: 14037 0    I: 41556 1    I: 77676 0    C: 14033 1    C: 00027 1    C: 14007 0    I: 76405 1
26,3470     C: 00041 1    C: 14027 1    C: 00011 1    I: 76405 1    C: 00043 0    C: 14031 0    C: 15336 0    I: 57525 1

26,3500     C: 00043 0    I: 63325 0    C: 00041 1    C: 00033 1    I: 63361 0    C: 15633 0    C: 00011 1    I: 53361 0
26,3510     C: 15631 1    I: 77772 0    C: 24041 1    I: 63361 0    C: 15633 0    C: 00033 1    I: 52361 1    C: 15631 1
26,3520     I: 65372 1    C: 00007 0    I: 74346 0    C: 00011 1    I: 73525 1    C: 00007 0    I: 52361 1    C: 00025 0
26,3530     I: 77772 0    C: 14033 1    C: 00007 0    I: 74356 1    I: 71525 0    C: 00007 0    I: 53361 0    C: 00025 0

26,3540     I: 57572 0    C: 34025 1    C: 00051 0    I: 54345 1    C: 00007 0    C: 20617 0    I: 72371 1    C: 01707 0
26,3550     C: 00155 0    C: 14017 1    C: 00020 0    I: 77605 1    I: 43257 0    C: 20206 1    I: 67206 1    C: 00017 1
26,3560     I: 41261 1    C: 20212 1    C: 00013 0    I: 43257 0    C: 20213 0    I: 43400 1    C: 55565 1    I: 40220 0
26,3570     C: 00051 0    C: 00011 1    I: 77770 1    C: 00000 1    I: 65345 0    C: 15653 0    C: 15651 1    I: 45006 0

26,3600     C: 55543 0    I: 41401 1    C: 00023 0    I: 65346 0    C: 00023 0    I: 65356 1    C: 15336 0    I: 73525 1
26,3610     C: 00023 0    I: 65276 1    C: 00023 0    I: 63346 0    C: 15336 0    I: 41525 0    C: 15334 1    I: 71201 1
26,3620     C: 00017 1    C: 15336 0    I: 65325 0    C: 01712 1    C: 01714 1    I: 55476 1    I: 77650 1    C: 00051 0
26,3630     C: 17775 1    C: 02052 1    C: 00333 1    C: 10374 0    C: 77665 1    C: 42175 1    C: 22211 0    C: 00636 1

26,3640     C: 77777 0    C: 77767 1    C: 34076 1    C: 30363 1    C: 24760 0    C: 00133 0    C: 02052 1    C: 35250 0
26,3650     C: 37116 0    C: 32631 1    C: 30576 0    C: 10326 1       05547 1    C: 00054 0       00004 0       00006 1
26,3660        30025 0       53007 0       03715 1       03656 1       52155 1       53011 1       00004 0       04636 0
26,3670     C: 17121 0       05561 0    C: 00007 0       05561 0    C: 00010 0       05561 0    C: 00176 1       34756 1

26,3700        00006 1       05013 0       05402 1    C: 07024 0    C: 20000 0    C: 03735 0    C: 54062 1       35011 1
26,3710        04636 0    C: 21067 0       13707 0       13707 0       13707 0       00006 1       22156 0       04511 0
26,3720        00003 1       52155 1       34764 0       54001 1       34772 1       20155 1       44342 1       70155 1
26,3730        56155 0       74342 1       10000 0       24156 0       00156 0       44756 0       00006 1       03013 0

26,3740        00004 0       34772 1       54001 1       52025 1       03715 1       03740 1       00006 1       41011 1
26,3750        20155 1       34757 0       07256 1       07224 1       10154 0       03762 1       03762 1       03760 0
26,3760        34757 0       20154 0       00006 1       31007 1       20155 1       07226 0       52155 1       20025 1
26,3770        05561 0    C: 00054 0       04103 1    C: 03773 1    C: 03774 0  CKSM 51074 0          @             @
```

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OCTAL LISTING FOR PARAGRAPH # 154,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,2000       06006 1   I: 77201 1   C: 00001 0   C: 15336 0   I: 77614 1   C: 05305 1   C: 56042 1   I: 77214 0
27,2010    C: 05354 0   C: 56044 1   C: 03554 0   C: 26561 1   C: 03540 0   C: 26553 0   C: 03546 0   C: 26567 1
27,2020    C: 03562 0   C: 02575 1   I: 77776 1      05402 1   C: 04024 0      06006 1   I: 77775 1   C: 02567 1
27,2030    C: 27562 0   C: 02561 1   C: 27540 0   C: 02553 0   C: 27554 0   C: 02575 1   C: 37546 1   C: 74000 1

27,2040    I: 77624 1   C: 72561 0   C: 37540 1   C: 10733 1   I: 71214 0   C: 01352 1   C: 56066 1   C: 03450 0
27,2050    I: 77624 1   C: 76560 0   I: 77624 1   C: 56674 1   I: 77624 1   C: 32050 0   I: 64375 1   C: 03667 0
27,2060    C: 00001 0   I: 77772 0   C: 17540 0   C: 02603 0   I: 77650 1   C: 56072 1   I: 57575 1   C: 03405 0
27,2070    C: 17540 0   C: 02605 0   C: 37542 0   C: 10733 1      04665 0      55004 0      06006 1   I: 45014 0

27,2100    C: 02711 1   C: 56104 1   C: 56225 1   C: 01310 1   I: 77776 1      35031 0      04636 0   C: 21154 1
27,2110       02215 0      02115 0      12150 0      02152 0      05205 0      06006 1   I: 45014 0   C: 02711 1
27,2120    C: 56123 1   C: 56225 1   C: 01310 1   I: 77776 1      37673 1      05654 0      12127 0      67671 0
27,2130       00006 1      12133 0      12105 0      35031 0      04636 0   C: 20710 0      02152 0      04655 0

27,2140    C: 44000 1      06006 1   I: 43014 0   C: 05350 1   C: 56104 1   C: 00752 1   C: 56104 1   I: 77776 1
27,2150       31004 1      04660 0      40100 1      74755 0      10000 0      00002 0      30002 0      54156 1
27,2160       46214 1      60133 0      55257 1      05402 1   C: 00071 1      34762 0      05516 0      00156 0
27,2170       34764 0      70075 1      00006 1      12213 1      05547 1   C: 00077 1      30104 1      74760 0

27,2200       10000 0      02210 0      05547 1   C: 00024 1      34772 1      55323 0      05547 1   C: 00037 0
27,2210       35053 1      05176 1      01257 0      04655 0   C: 74416 1      31214 1      00006 1      12150 0
27,2220       30100 0      74755 0      00006 1      14103 0      04546 1   I: 40020 1   C: 03310 0   C: 56230 0
27,2230    I: 47164 1   C: 03320 0   C: 44370 0   C: 34032 1   C: 44377 1   I: 61375 1   C: 03357 0   C: 03321 1

27,2240    I: 77656 1   C: 00035 1   I: 53435 0   C: 03351 0   I: 57400 1   C: 56355 1   C: 17343 0   C: 00045 0
27,2250    I: 50025 0   C: 16426 0   C: 56355 1   I: 50375 0   C: 03351 0   C: 00035 1   I: 65552 0   I: 77624 1
27,2260    C: 44522 1   I: 75160 1   C: 03320 0   C: 03425 1   I: 77624 1   C: 44304 0   I: 51545 1   C: 00007 0
27,2270    I: 50025 0   C: 16413 0   C: 56345 0   I: 51545 1   C: 03351 0   I: 51025 1   C: 16415 0   C: 56345 0

27,2300    I: 77775 1   I: 77626 0   C: 50442 0   I: 77626 0   C: 50450 0   I: 77626 0   C: 50456 0   C: 03327 1
27,2310    I: 57444 1   C: 56312 1   I: 50035 1   C: 03351 0   C: 56321 1   I: 57575 1   C: 03351 0   C: 37343 1
27,2320    C: 56324 1   I: 77775 1   C: 03351 0   C: 03343 0   I: 51545 1   C: 03351 0   I: 51025 1   C: 16417 1
27,2330    C: 56334 0   I: 52145 0   C: 16423 0   C: 56336 1   I: 77745 1   C: 16421 1   I: 77624 1   C: 44522 1

27,2340    I: 75160 1   C: 03320 0   C: 03425 1   I: 77624 1   C: 44304 0   I: 45160 1   C: 00000 1   C: 44647 1
27,2350    I: 77634 0   C: 45644 0   I: 52001 1   C: 00001 0   C: 03310 0   I: 50375 0   C: 00035 1   C: 03351 0
27,2360    I: 72240 1   C: 56365 1   C: 00032 0   I: 77650 1   C: 56352 0   I: 47375 0   C: 03327 1   C: 15334 1
27,2370    I: 47256 0   C: 03351 0   I: 40056 0   C: 56407 1   C: 17343 0   C: 00045 0   I: 50025 0   C: 16426 0
```

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OCTAL LISTING FOR PARAGRAPH # 155,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,2400     C: 56407 1   I: 77775 1   C: 03343 0   C: 17343 0   C: 15334 1   I: 77650 1   C: 56257 1   I: 52175 0
27,2410     C: 15334 1   C: 56403 0   C: 15555 0   C: 35172 0   C: 14113 1   C: 36326 0   C: 07701 0   C: 35703 0
27,2420     C: 04343 1   C: 21616 0   C: 03070 0   C: 34344 0   C: 00000 1   C: 00001 0   C: 00002 1      35025 0
27,2430        04636 0   C: 20743 0      15524 0      12435 0      12427 0      05547 1   C: 00124 0      04636 0

27,2440     C: 56074 1      15524 0   C: 20000 0   C: 00000 1   I: 53575 0   I: 72441 0   C: 01742 1   I: 51136 1
27,2450     C: 56454 1   I: 43215 0   C: 16443 0   C: 16443 0   C: 03626 0   I: 77616 0   C: 00052 0   C: 36307 0
27,2460     C: 00052 0   C: 36307 0   I: 45020 1   C: 02310 1   C: 27516 0   I: 43145 0   C: 01062 1   C: 01472 1
27,2470     C: 00041 1   I: 43014 0   C: 01673 1   C: 01676 1   I: 43014 0   C: 01474 1   C: 01635 0   C: 02310 1

27,2500     I: 43014 0   C: 00350 1   C: 31263 1   C: 01742 1   C: 31263 1   I: 50135 0   C: 03375 0   C: 56525 0
27,2510     I: 43014 0   C: 00710 1   C: 01006 0   C: 00752 1   C: 31263 1   I: 77776 1      05402 1   C: 00132 1
27,2520        37650 0      05176 1      12526 0   I: 77620 0   C: 01006 0   I: 77776 1      35026 0      04636 0
27,2530     C: 01731 0      06006 1   I: 77650 1   C: 56500 1   C: 00045 0   C: 01217 1      00006 1      04007 1

27,2540        54016 1      00006 1      22012 1      40076 1      74757 1      00006 1      15323 1      34762 0
27,2550        70075 1      00006 1      12574 1      40100 1      74755 0      00006 1      12574 1      30046 0
27,2560        55703 0      34767 0      00006 1      02033 0      00006 1      12576 0      55113 1      37650 0
27,2570        05135 0   C: 03420 1   C: 70067 1      05323 0      34772 1      02566 0      37650 0      05135 0

27,2600     C: 02742 1   C: 70067 1      05323 0   I: 77774 0   C: 00000 1   I: 43414 1   C: 04303 0   C: 56610 0
27,2610     I: 43514 0   C: 77775 1   I: 66370 0   C: 00044 1   C: 00051 0   C: 00006 1   I: 77775 1   C: 15336 0
27,2620     C: 06445 1   C: 06533 1   I: 67300 0   C: 56620 0   C: 00001 0   C: 02401 0   C: 02411 1   C: 02421 1
27,2630     I: 77735 0   C: 00002 0   C: 02511 0   C: 02521 0   C: 02531 1   I: 77616 0   C: 05057 0   C: 23015 1

27,2640     C: 07702 0   C: 00034 0   C: 20206 1   C: 06315 0   C: 01616 1   C: 37651 1   C: 16721 1   C: 31463 1
27,2650     C: 06315 0   C: 20000 0   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1
27,2660     C: 00000 1   C: 17676 0   C: 20113 0   C: 75766 1   C: 45544 0   C: 00000 1   C: 00000 1   C: 02011 0
27,2670     C: 32233 1   C: 17676 0   C: 20113 0   C: 00001 0   I: 77220 1   C: 02360 0   C: 02453 1   I: 53406 0

27,2700     C: 27546 0   C: 02625 1   I: 50256 0   C: 03546 0   I: 72406 0   C: 16734 0   I: 65316 0   C: 15326 1
27,2710     I: 45302 1   I: 72566 1   I: 57515 1   I: 77635 1   C: 02625 1   I: 65241 0   C: 02611 0   I: 45565 0
27,2720     C: 51045 1   C: 02625 1   I: 45115 0   C: 02617 0   C: 45320 1   C: 26746 0   I: 77614 1   C: 03666 1
27,2730     C: 36657 0   C: 25002 1   I: 53754 1   C: 03746 1   C: 57576 1   C: 00023 0   I: 76441 1   C: 03546 0

27,2740     I: 51515 1   I: 63257 1   C: 57576 1   C: 02453 1   I: 65246 1   I: 77625 0   C: 00003 1   C: 16633 0
27,2750     C: 02744 1   I: 65301 0   C: 00047 1   C: 00041 1   I: 77624 1   C: 45330 0   I: 56362 0   I: 41457 1
27,2760     C: 20174 1   I: 65225 1   C: 02633 0   I: 56302 0   C: 00005 1   I: 75406 1   I: 41275 1   C: 00007 0
27,2770     C: 00001 0   I: 65272 0   C: 00003 1   I: 65301 0   C: 00047 1   C: 03750 0   I: 56342 1   I: 65257 1
```

```
OCTAL LISTING FOR PARAGRAPH # 156,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,3000     C: 20174 1   C: 00005 1   I: 65301 0   C: 00050 1   C: 03750 0   I: 56342 1   I: 44257 1   C: 57604 1
27,3010     I: 63525 0   C: 00011 1   I: 75421 1   I: 47315 0   C: 02611 0   C: 03546 0   I: 74256 0   C: 00013 0
27,3020     I: 74315 0   C: 03546 0   C: 00011 1   I: 76455 1   I: 77626 0   C: 74231 1   I: 77651 0   C: 02533 0
27,3030     C: 37667 1   C: 02360 0   I: 45020 1   C: 03657 0   C: 47530 1   I: 77775 1   I: 45121 1   C: 01734 0

27,3040     C: 47633 1   I: 74321 1   C: 05014 1   C: 17047 1   I: 52072 0   C: 03657 0   C: 24000 1   C: 00000 1
27,3050     C: 00024 1   C: 13714 1   I: 70545 1   C: 00043 0   I: 41215 1   C: 15334 1   C: 00041 1   I: 55205 0
27,3060     C: 00021 1   C: 00045 0   I: 44246 1   C: 15334 1   C: 00017 1   I: 57516 1   I: 75415 0   C: 15326 1
27,3070     I: 43565 0   C: 00045 0      06006 1   I: 53135 0   C: 01502 1   C: 57141 1   I: 77775 1   C: 01503 0

27,3100     C: 25535 0   C: 01511 0   I: 77624 1   C: 23435 1   I: 51535 0   C: 01502 1   I: 53025 0   C: 17150 0
27,3110     C: 57115 0   I: 43174 1   C: 00000 1   C: 00223 1   C: 57120 0   I: 43174 1   C: 00002 0   C: 00063 1
27,3120     I: 50135 0   C: 01502 1   C: 57130 1   I: 77624 1   C: 26761 0   I: 52014 0   C: 01671 0   C: 57132 0
27,3130     I: 77624 1   C: 27034 0   I: 77414 0   C: 02676 1      34772 1      00006 1      01077 0      55501 0

27,3140        06006 1   I: 77624 1   C: 27525 0   I: 77776 1      05402 1   C: 04026 1      03706 0   C: 00002 0
27,3150     C: 00000 1   C: 00037 0   I: 53575 0   C: 02320 1   I: 77725 1   C: 00045 0   C: 00015 0   I: 77701 1
27,3160     C: 00047 1   C: 24041 1   C: 02326 1   I: 77761 1   C: 00037 0   C: 02362 1   I: 47361 0   C: 00041 1
27,3170     I: 47572 1   C: 14035 1   C: 15326 1   I: 63271 0   C: 00041 1   C: 02362 1   I: 57436 1   C: 00025 0

27,3200     I: 43257 0   C: 20573 1   I: 77626 0   C: 77744 0   I: 41457 1   C: 20173 0   I: 75446 0   I: 77701 1
27,3210     C: 00050 1   C: 00031 0   I: 75316 1   I: 55254 1   C: 57216 0   C: 15326 1   C: 00027 1   I: 77616 0
27,3220     I: 41345 0   C: 00033 1   C: 00035 1   I: 57457 0   C: 20571 0   I: 51415 0   C: 31771 1   I: 43366 0
27,3230     C: 15326 1   I: 55206 0   C: 00035 1   I: 53657 0   C: 20601 1   C: 20572 0   C: 14017 1   I: 41005 1

27,3240     C: 00027 1   C: 57544 0   I: 53654 0   C: 57252 0   C: 57603 0   I: 40057 1   C: 57576 1   C: 57252 0
27,3250     I: 77644 1   C: 57254 0   I: 77745 1   C: 15344 0   C: 00021 1   I: 77616 0   I: 77614 1   C: 03436 0
27,3260     C: 57263 1   I: 77614 1   C: 03676 0   C: 00023 0   I: 77657 0   C: 20201 0   C: 00021 1   I: 44205 0
27,3270     C: 00033 1   C: 15326 1   I: 41206 0   C: 00021 1   I: 53725 1   C: 00035 1   C: 20573 1   I: 43276 0

27,3300     I: 77657 0   C: 20601 1   I: 71214 0   C: 03756 0   C: 57306 0   C: 15336 0   I: 75440 0   C: 57441 1
27,3310     I: 41076 0   C: 57544 0   C: 24045 0   C: 02362 1   I: 52441 1   C: 02320 1   C: 00017 1   I: 44240 1
27,3320     C: 57341 0   C: 00045 0   C: 14043 0   C: 00033 1   I: 44205 0   C: 00041 1   I: 51406 1   I: 40015 1
27,3330     C: 31763 1   C: 57352 1   I: 65345 0   C: 15336 0   I: 57545 1   C: 00033 1   I: 71240 1   C: 57446 0

27,3340     I: 77616 0   I: 77745 1   I: 45345 1   C: 00023 0   C: 00015 0   C: 14043 0   C: 00045 0   I: 52015 1
27,3350     C: 00017 1   C: 57326 1   I: 65215 1   C: 31765 1   C: 00043 0   I: 53605 1   C: 00031 0   C: 57201 0
27,3360     I: 77671 1   I: 40145 0   C: 00043 0   C: 57444 1   I: 45471 1   C: 77732 1   I: 63406 0   I: 41206 0
27,3370     C: 00035 1   I: 75261 0   C: 20206 1   C: 00045 0   C: 14045 0   I: 41206 0   C: 00033 1   I: 77657 0
```

```
OCTAL LISTING FOR PARAGRAPH # 157,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,3400     C: 20201 0    C: 00043 0    I: 41234 1    C: 57526 1    I: 44302 0    C: 00023 0    I: 41215 1    C: 00015 0
27,3410     I: 51042 0    C: 57432 0    I: 75206 1    C: 00017 1    I: 71244 0    C: 57436 1    C: 00027 1    I: 51076 1
27,3420     C: 57436 1    I: 77676 0    I: 56205 0    C: 31761 0    C: 00031 0    I: 53657 0    C: 57602 1    C: 57602 1
27,3430     I: 43257 0    C: 57576 1    I: 40005 0    C: 00037 0    C: 57442 1    I: 77616 0    I: 77745 1    I: 7765  1

27,3440     C: 57432 0    I: 77745 1    I: 43545 1    C: 15344 0    I: 77712 0    I: 41465 0    I: 45345 1    C: 00045 0
27,3450     C: 00017 1    C: 14013 0    I: 77626 0    C: 77732 1    I: 53605 1    C: 00027 1    C: 57576 1    I: 41206 0
27,3460     C: 00045 0    I: 41057 0    C: 57576 1    C: 45761 0    C: 00043 0    I: 41234 1    C: 57526 1    C: 00043 0
27,3470     I: 45242 1    C: 31767 0    I: 41405 0    I: 41345 0    C: 00045 0    C: 00015 0    I: 43312 0    C: 00017 1

27,3500     C: 14045 0    C: 00035 1    I: 53605 1    C: 00027 1    C: 57575 1    I: 53765 0    C: 00045 0    C: 57576 1
27,3510     C: 14045 0    C: 00027 1    I: 41366 1    C: 31761 0    I: 77615 0    I: 45257 0    C: 57577 0    C: 00013 0
27,3520     I: 53605 1    C: 00027 1    C: 57601 1    I: 52057 1    C: 57602 1    C: 57432 0       07171 1    C: 00004 0
27,3530     C: 12525 0    C: 12525 0    C: 71463 0    C: 57703 1    C: 04423 0    C: 17645 0    C: 74604 0    C: 43667 1

27,3540     C: 01626 1    C: 37256 1    C: 77404 1    C: 52071 0       06030 1       06006 1    I: 77624 1    C: 27516 0
27,3550     I: 77776 1       05402 1    C: 04026 1       05547 1    C: 00230 0       00004 0       50302 0       13560 0
27,3560        13722 1       13626 1       13660 0       00006 1       22330 1       34772 1       22007 0       52025 1
27,3570        52327 0       34773 0       54001 1       40000 0       53170 1       00004 0       34772 1       22007 0

27,3600        54156 1       52315 1       52155 1       00006 1       30327 1       20155 1       00006 1       13616 1
27,3610        34772 1       52327 0       20025 1       05402 1    C: 04026 1       00330 1       07226 0       52155 1
27,3620        20025 1       05402 1    C: 04026 1       00004 0       50330 1       00001 0       30305 1       54003 0
27,3630        74350 1       54330 0       67700 1       60300 1       00006 1       13643 1       74760 0       10000 0

27,3640        13656 0       37700 1       60300 1       54154 0       50000 1       30306 1       54001 1       30154 1
27,3650        60330 1       50000 1       23400 1       10154 0       13643 1       13705 1       04362 1       13705 1
27,3660        34770 0       70300 0       10000 0       13665 0       13656 0       44767 1       60300 1       54154 0
27,3670        50000 1       30305 1       22000 1       10154 0       54154 0       50000 1       30305 1       54003 0

27,3700        74350 1       50000 1       23400 1       10154 0       13667 1       03072 1       30301 0       05347 1
27,3710        44770 1       61214 1       10000 0       10000 0       34767 0       54332 1       04415 0       74636 0
27,3720     C: 12556 1       05524 1       00006 1       40305 0       52315 1       03563 1       03656 1       00006 1
27,3730        40305 0       52317 0       00006 1       40305 0       52321 0       05402 1    C: 04026 1       34772 1

27,3740        22007 0       52317 0       21571 1       34772 1       22007 0       52321 0       21643 0       34772 1
27,3750        22007 0       52305 0       21710 1       27706 0       05402 1    C: 04026 1       03705 0       00006 1
27,3760        30305 1       52315 1       03563 1       04362 1       03706 0    C: 03765 0    C: 03766 0 CKSM 53634 0
27,3770           @             @             @             @             @             @             @             @
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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971                PAGE 1688

OCTAL LISTING FOR PARAGRAPH # 160,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,2000        06006 1    I: 47014 1    C: 00076 0    C: 76000 0       32152 0       05540 0       12012 1       34773 0
30,2010        05516 0       05205 0       52751 0       53544 1       06006 1    I: 65375 0    C: 15330 0    C: 03540 0
30,2020     C: 03542 1    I: 43125 0    C: 15336 0    C: 00076 0    C: 03546 0    I: 43014 0    C: 01663 0    C: 04343 1
30,2030     C: 60034 0    I: 71214 0    C: 01463 1    C: 20150 1    I: 77624 1    C: 55345 0    I: 41406 0    I: 53435 0

30,2040     C: 03605 1    C: 27552 0    I: 53435 0    C: 03552 0    C: 27560 1    C: 03605 1    I: 53435 0    C: 03613 0
30,2050     I: 41406 0    I: 53435 0    C: 03605 1    C: 27566 1    I: 63241 0    C: 00001 0    I: 45565 0    C: 50203 0
30,2060     C: 03605 1    I: 70414 1    C: 04343 1    C: 60064 0    C: 16152 0    C: 03542 1    I: 45014 0    C: 00662 0
30,2070     C: 26453 1    I: 45345 1    C: 03544 1    C: 00751 1    I: 51406 1    I: 50025 0    C: 20142 1    C: 60122 0

30,2100     I: 77600 1    C: 60102 1    I: 40015 1    C: 20144 1    C: 60122 0    I: 71214 0    C: 00256 0    C: 40272 1
30,2110     I: 43244 1    C: 60113 1    C: 15344 0    I: 45214 1    C: 04343 1    C: 40212 1    C: 15344 0    I: 52125 0
30,2120     C: 20150 1    C: 40214 1    I: 77776 1       53542 1       53251 1       32151 0       04636 0    C: 20743 0
30,2130        04103 1       02133 1       02004 1       32152 0       04636 0    C: 20743 0       04103 1       04103 1

30,2140        02000 0    C: 00000 1    C: 16441 1    C: 00000 1    C: 35101 1    C: 21042 1    C: 04211 1    C: 17747 0
30,2150     C: 02563 0    C: 01442 1    C: 01453 1       04636 0    C: 03731 1       06006 1    I: 43014 0    C: 04346 1
30,2160     C: 60162 1    C: 00472 0    I: 47014 1    C: 00270 1    C: 51751 0    C: 34041 0    C: 27170 1    I: 47375 0
30,2170     C: 00007 0    C: 00001 0    I: 50256 0    C: 01742 1    I: 77646 0    I: 65552 0    C: 03626 0    I: 77776 1

30,2200        32257 0       05540 0       02206 1       36214 0       05516 0       05205 0       45051 1       71751 1
30,2210        55751 1       05362 0    C: 00004 0    C: 05022 1    C: 13000 0       05547 1    C: 00025 0       05547 1
30,2220     C: 00026 0       06006 1    I: 43014 0    C: 01663 0    C: 01664 1    I: 43014 0    C: 00462 1    C: 04343 1
30,2230     C: 60240 1    I: 77614 1    C: 01463 1    I: 45145 0    C: 23513 1    C: 60332 0    I: 77650 1    C: 60242 0

30,2240     I: 77624 1    C: 60304 0    I: 77624 1    C: 31005 0    I: 45135 1    C: 23514 0    C: 60332 0    I: 66214 0
30,2250     C: 01464 0    C: 03746 1    C: 00001 0    I: 77531 0    C: 03751 1    C: 03537 0       02466 1    C: 01455 1
30,2260     I: 77634 0    C: 51751 0    C: 24007 0    C: 02026 1    C: 14001 0    C: 15334 1    I: 77624 1    C: 55345 0
30,2270     I: 77742 0    C: 02152 0    I: 77634 0    C: 51751 0    I: 77624 1    C: 26453 1    I: 77650 1    C: 03667 0

30,2300     I: 77624 1    C: 60304 0    I: 77650 1    C: 03667 0    I: 77420 1    C: 03670 0       35036 1       05535 1
30,2310        06006 1    I: 51545 1    C: 00747 0    I: 50021 1    C: 15326 1    C: 60323 0    I: 51545 1    C: 02351 1
30,2320     I: 51021 0    C: 15326 1    C: 60326 0    I: 77776 1       04362 1       02306 0    I: 77624 1    C: 62371 0
30,2330     I: 77650 1    C: 03670 0    C: 03746 1    I: 77420 1    C: 03667 0       31745 0       05540 0       02343 1

30,2340        34773 0       05516 0       05205 0       31751 0       75051 1       00006 1       74763 0       55744 0
30,2350        44773 1       61744 1       00006 1       62355 0       02567 1       05561 0    C: 00141 0       31751 0
30,2360        77673 0       00006 1       62367 1       55743 1       44753 0       61743 0       10000 0       04362 1
30,2370        02335 0       02373 1       02417 1       05547 1    C: 00141 0       47677 1       71751 1       55743 1
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OCTAL LISTING FOR PARAGRAPH # 161,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,2400        44770 1      61743 0      00006 1      62417 1      31746 0      00006 1      12367 0      34764 0
30,2410        65004 0      71743 1      40000 0      65004 0      00006 1      12427 0      02367 1      06006 1
30,2420     I: 67214 1   C: 03347 1   C: 03667 0   C: 03744 0   I: 52030 0   C: 60300 1   C: 60260 0      06006 1
30,2430     I: 45014 0   C: 04065 0   C: 31007 1   I: 77650 1   C: 60244 0   I: 45020 1   C: 01006 0   C: 56462 1

30,2440     I: 43014 0   C: 00747 0   C: 60444 0   C: 01674 0   I: 77624 1   C: 27236 0   I: 77624 1   C: 22327 1
30,2450     I: 77624 1   C: 56462 1   I: 43014 0   C: 02756 1   C: 60456 0   C: 01476 0   I: 43014 0   C: 00707 1
30,2460     C: 60462 1   C: 01674 0   I: 77624 1   C: 27236 0   I: 77650 1   C: 01006 0      05362 0   C: 00004 0
30,2470     C: 05022 1   C: 13000 0      06006 1   I: 45001 1   C: 00001 0   C: 56603 1   I: 45134 0   C: 03673 0

30,2500     C: 56462 1   I: 43014 0   C: 01751 0   C: 60506 1   C: 01436 1   C: 60513 0   I: 71214 0   C: 02676 1
30,2510     C: 02005 0   C: 34001 1   C: 56612 1   I: 77370 0   C: 00022 1   C: 15336 0   I: 77731 1   C: 00051 0
30,2520     C: 00006 1   C: 06407 1   C: 06555 1   C: 06577 1   C: 06621 1   C: 06643 0   I: 43100 1   C: 60521 1
30,2530     C: 02666 0   I: 77624 1   C: 62357 1   C: 34041 0   C: 27236 0   I: 45154 0   C: 03673 0   C: 71327 1

30,2540     I: 45140 0   C: 03750 0   C: 47017 1   C: 01072 0   I: 41535 1   C: 03746 1   I: 45335 0   C: 03745 1
30,2550     I: 43030 0   C: 61042 0   C: 02706 1   C: 61050 0   I: 77624 1   C: 22327 1   I: 77614 1   C: 01071 1
30,2560     I: 43014 0   C: 02466 1   C: 01062 1   I: 77614 1   C: 03307 0   C: 61204 0   I: 53575 0   C: 01046 1
30,2570     C: 36152 1   C: 26654 1   I: 77624 1   C: 61331 1   I: 70414 1   C: 04343 1   C: 60577 1   C: 02555 0

30,2600     I: 72441 0   C: 01072 0   C: 24037 0   C: 15336 0   I: 41401 1   C: 00001 0   I: 65206 0   C: 15334 1
30,2610     I: 77702 1   C: 00005 1   C: 00011 1   C: 24015 0   C: 01072 0   C: 24023 0   C: 02555 0   I: 77624 1
30,2620     C: 62340 1   I: 66370 0   C: 00022 1   C: 00051 0   C: 00006 1   I: 70573 1   C: 03524 1   I: 77741 0
30,2630     C: 00037 0   I: 45445 0   C: 70253 1   I: 76100 1   C: 60625 0   C: 00044 1   I: 64373 1   C: 02445 0

30,2640     C: 03502 0   I: 77732 1   C: 06621 1   I: 71300 1   C: 60636 1   C: 00041 1   I: 60414 0   C: 04343 1
30,2650     C: 60651 0   I: 57101 0   C: 00050 1   C: 00047 1   I: 41316 0   C: 24024 1   I: 76142 1   C: 00022 1
30,2660     C: 00041 1   I: 64373 1   C: 03524 1   C: 03502 0   I: 53761 1   C: 00041 1   C: 57212 1   C: 05136 0
30,2670     I: 77300 1   C: 60661 0   C: 01072 0   C: 34023 1   C: 62340 1   I: 50545 0   C: 02240 0   I: 63471 0

30,2700     C: 00037 0   I: 76005 0   C: 02010 1   C: 00022 1   C: 00041 1   I: 74373 0   C: 03524 1   C: 00041 1
30,2710     I: 77653 1   C: 01136 1   C: 05136 0   I: 40100 1   C: 60705 0   C: 60716 1   I: 50145 1   C: 01134 0
30,2720     C: 60741 0   I: 53166 0   C: 60741 0   I: 77742 0   C: 16625 1   C: 01132 0   I: 40071 0   C: 02625 1
30,2730     C: 60733 0   I: 77702 1   C: 02623 1   I: 56345 0   C: 01130 1   C: 02625 1   I: 40102 0   C: 60741 0

30,2740     C: 02621 0   I: 63545 0   C: 02623 1   I: 44312 1   C: 01124 1   I: 75440 0   C: 60763 0   I: 70454 0
30,2750     C: 60763 0   C: 16631 1   C: 02621 0   I: 62405 1   C: 02623 1   I: 56221 0   C: 01122 1   C: 02631 1
30,2760     I: 60400 0   C: 60763 0   C: 02627 0   I: 63545 0   C: 02627 0   I: 63525 0   C: 02621 0   I: 62415 0
30,2770     I: 50021 1   C: 01114 1   C: 60775 1   I: 70566 0   C: 02635 0   I: 77624 1   C: 62357 1   C: 03672 1
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OCTAL LISTING FOR PARAGRAPH # 162, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,3000    I: 77776 1     05402 1  C: 04022 0     41745 1     61747 1     00006 1     63222 0     31745 0
30,3010       64770 0     55135 0     31750 1     64774 1     55136 0     05402 1  C: 04022 0     31135 1
30,3020       55745 1     31136 1     55750 0     06006 1  I: 77624 1  C: 56462 1  I: 43014 0  C: 02746 0
30,3030    C: 61035 0  C: 01476 0  I: 77614 1  C: 01435 1  C: 60531 0  I: 43014 0  C: 01751 0  C: 60531 0

30,3040    C: 01436 1  C: 60531 0  I: 77624 1  C: 62357 1  C: 27670 0  C: 01072 0  C: 35054 0  C: 61000 1
30,3050    I: 77775 1  C: 01701 0  C: 14001 0  C: 03672 1  C: 00007 0  I: 45135 1  C: 03674 1  C: 55370 0
30,3060    I: 45006 0  C: 62357 1  C: 00007 0  I: 45135 1  C: 03674 1  C: 55345 0  C: 01701 0  I: 40014 0
30,3070    C: 02464 0  C: 61072 0  I: 77651 0  C: 01046 1  C: 03531 0  I: 47256 0  C: 01072 0  I: 40056 0

30,3100    C: 60775 1  C: 01102 0  I: 43345 1  C: 24024 1  C: 24026 0  C: 27526 0  C: 03531 0  I: 60246 1
30,3110    C: 00047 1  I: 41316 0  C: 03526 0  I: 56070 0  C: 00046 0  C: 03673 0  I: 53670 0  C: 03673 0
30,3120    C: 20601 1  I: 77751 1  C: 00155 0  C: 37526 1  C: 46756 1  I: 57575 1  C: 03502 0  C: 37516 1
30,3130    C: 75260 1  I: 77624 1  C: 22327 1  I: 45014 0  C: 01242 1  C: 61164 0  C: 22327 1  I: 51575 1

30,3140    C: 01114 1  I: 53750 0  C: 03673 0  C: 20601 1  C: 27502 0  C: 01122 1  I: 53646 0  C: 20601 1
30,3150    C: 03504 0  I: 77776 1     35030 1     04636 0  C: 21101 1     04103 1     03163 0     03321 1
30,3160       34766 1     05516 0     05205 0     06006 1  I: 77624 1  C: 75472 1  I: 45154 0  C: 03673 0
30,3170    C: 71327 1  I: 45014 0  C: 02744 1  C: 60775 1  C: 22327 1  I: 77214 0  C: 02664 1  C: 01701 0

30,3200    I: 77651 0  C: 01046 1  C: 37531 1  C: 61102 0  I: 77735 0  C: 02007 1  C: 02621 0  C: 02631 1
30,3210    C: 36641 1  C: 62357 1  I: 77624 1  C: 26524 0  I: 43175 0  C: 02152 0  C: 04343 1  C: 61066 0
30,3220    I: 52152 0  C: 61066 0     06006 1  I: 46135 1  C: 03745 1  C: 61256 1  I: 67206 1  C: 03750 0
30,3230    I: 77625 0  I: 45040 1  C: 61256 1  C: 22327 1  I: 77745 1  C: 03670 0  C: 34041 0  C: 27145 1

30,3240    I: 77775 1  C: 00017 1  C: 25046 1  C: 01054 1  C: 25072 0  C: 01701 0  I: 43046 1  C: 04343 1
30,3250    C: 61252 0  I: 77702 1  C: 36240 1  C: 61331 1  I: 77650 1  C: 61261 0  I: 77624 1  C: 62357 1
30,3260    C: 03670 0  I: 43175 0  C: 01701 0  C: 04343 1  C: 61266 1  I: 77742 0  C: 16152 0  C: 03670 0
30,3270    I: 77624 1  C: 26453 1  I: 77624 1  C: 62363 0  I: 77776 1     35036 1     04636 0  C: 20743 0

30,3300       03324 1     03315 0     06006 1  I: 77745 1  C: 03670 0  C: 24007 0  C: 01701 0  C: 00001 0
30,3310    I: 45135 1  C: 15334 1  C: 55370 0  C: 02026 1  I: 77776 1     06006 1  I: 77624 1  C: 61363 0
30,3320    I: 77776 1     05402 1  C: 04022 0     02206 1     06006 1  I: 77624 1  C: 61363 0  I: 77776 1
30,3330       04103 1  I: 77201 1  C: 00001 0  C: 01046 1  I: 50256 0  C: 01072 0  I: 57552 1  I: 63406 0

30,3340    I: 65221 0  C: 15326 1  C: 02240 0  I: 62414 1  C: 04343 1  C: 61346 1  I: 56362 0  C: 00045 0
30,3350    I: 45316 1  I: 44366 1  I: 77605 1  C: 00045 0  C: 00041 1  I: 77761 1  C: 01072 0  I: 53352 0
30,3360    C: 01046 1  C: 01701 0  I: 77616 0  I: 40220 0  C: 01053 0  C: 00001 0  I: 41575 0  C: 15336 0
30,3370    I: 41406 0  I: 77731 1  C: 00017 1  C: 00072 1  I: 66150 0  C: 00016 0  C: 00012 1  I: 77624 1
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OCTAL LISTING FOR PARAGRAPH # 163,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,3400     C: 61613 1   I: 77750 0   C: 00010 0   C: 06641 1   I: 66110 1   C: 00002 0   C: 00010 0   I: 46135 1
30,3410     C: 00013 0   C: 61426 0   I: 77625 0   C: 24022 1   C: 00013 0   I: 46025 1   C: 24020 0   C: 61422 1
30,3420     I: 77650 1   C: 61377 0   I: 52131 0   C: 00013 0   C: 00004 0   C: 61377 0   I: 46135 1   C: 00017 1
30,3430     C: 61445 0   I: 77625 0   C: 24022 1   C: 00017 1   I: 46025 1   C: 24020 0   C: 61441 1   I: 77650 1

30,3440     C: 61374 0   I: 52131 0   C: 00017 1   C: 00004 0   C: 61374 0   I: 77624 1   C: 22327 1   I: 77331 0
30,3450     C: 00017 1   C: 00072 1   C: 15336 0   C: 00011 1   I: 66370 0   C: 00154 1   C: 00051 0   C: 00006 1
30,3460     C: 06555 1   I: 77700 0   C: 61460 1   I: 66150 0   C: 00016 0   C: 00012 1   I: 77624 1   C: 61613 1
30,3470     I: 43750 1   C: 00010 0   C: 02641 0   I: 66110 1   C: 00002 0   C: 00010 0   I: 54140 0   C: 00012 1

30,3500     C: 00014 1   I: 71244 0   C: 61504 1   C: 15336 0   I: 77766 0   C: 06401 1   C: 14001 0   C: 00017 1
30,3510     I: 77630 1   C: 61577 0   I: 46135 1   C: 00013 0   C: 61555 0   I: 77625 0   C: 24022 1   C: 00013 0
30,3520     I: 46025 1   C: 24020 0   C: 61525 1   I: 77650 1   C: 61530 0   I: 77731 1   C: 00013 0   C: 00004 0
30,3530     I: 77624 1   C: 61613 1   I: 43750 1   C: 00010 0   C: 02641 0   I: 62071 0   C: 00001 0   C: 00002 0

30,3540     I: 70130 1   C: 00010 0   C: 00012 1   I: 40060 0   C: 00014 1   C: 61550 0   I: 77650 1   C: 61552 1
30,3550     I: 77745 1   C: 15336 0   C: 06401 1   I: 77650 1   C: 61512 0   I: 62150 1   C: 00014 1   C: 00006 1
30,3560     I: 67330 0   C: 00014 1   C: 00017 1   I: 77625 0   C: 24022 1   C: 00017 1   I: 46025 1   C: 24020 0
30,3570     C: 61573 1   I: 77650 1   C: 61463 1   I: 52131 0   C: 00017 1   C: 00004 0   C: 61463 1   I: 77624 1

30,3600     C: 22327 1   I: 66370 0   C: 00066 1   C: 00051 0   C: 00006 1   I: 77775 1   C: 15336 0   C: 06643 0
30,3610     I: 52100 1   C: 61607 1   C: 01053 0   I: 40131 0   C: 00007 0   C: 00377 1   C: 61617 0   I: 71140 1
30,3620     C: 00012 1   C: 00016 0   I: 41545 0   C: 15336 0   I: 56743 1   C: 02401 0   C: 75376 1   I: 41415 1
30,3630     I: 62000 0   C: 61645 1   C: 77771 0   I: 67314 0   C: 77771 0   C: 00007 0   I: 70430 1   C: 61643 1

30,3640     C: 00007 0   I: 77650 1   C: 61624 0   I: 77745 1   I: 77616 0   I: 77614 1   C: 01631 1   C: 61643 1
30,3650     I: 45020 1   C: 03730 0   C: 27145 1   I: 66134 1   C: 03746 1   C: 03745 1   I: 40375 1   C: 00001 0
30,3660     C: 00001 0   C: 03632 0   C: 27570 0   C: 00007 0   C: 03640 0   C: 03576 0   I: 65335 1   C: 15336 0
30,3670     C: 11536 1   I: 71214 0   C: 03705 0   C: 61675 1   C: 11540 0   I: 45006 0   C: 22000 1   I: 52001 1

30,3700     C: 00001 0   C: 03730 0   I: 46145 0   C: 00045 0   C: 61707 0   I: 43575 1   C: 00007 0   I: 53575 0
30,3710     C: 03632 0   I: 53515 0   C: 03640 0   I: 53322 1   I: 53435 0   C: 03713 1   I: 77676 0   C: 00007 0
30,3720     I: 77616 0   I: 67214 1   C: 01310 1   C: 61736 1   C: 03326 0   I: 74301 0   C: 00047 1   C: 03705 0
30,3730     I: 53257 1   C: 20563 0   C: 03646 0   I: 77651 0   C: 03327 1   C: 03721 0   I: 77776 1      34754 0

30,3740        05135 0   C: 02400 1   C: 34066 0      05362 0   C: 00051 0   C: 10035 0      06006 1   I: 77775 1
30,3750     C: 01030 0   C: 27570 0   C: 01036 0   C: 17576 0   C: 01044 0   C: 03474 0   I: 77621 1   C: 03656 1
30,3760     C: 27423 1   C: 15336 0   C: 17327 1   C: 15336 0   C: 03325 0   I: 77650 1   C: 34360 0   C: 03767 1
30,3770     C: 03770 1 CKSM 46001 1       @            @            @            @            @            @
```

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OCTAL LISTING FOR PARAGRAPH # 164,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,2000       35045 0       05135 0    C: 02031 1    C: 62064 1       04636 0    C: 01730 1       31247 1       74755 0
31,2010       00006 1       12004 0       30105 0       74765 0       00006 1       12020 0       32135 1       02021 0
31,2020       32136 1       04636 0    C: 20576 1       05626 0       05626 0       12012 1       06006 1    I: 77650 1
31,2030    C: 62177 1       06006 1    I: 77650 1    C: 62146 0    I: 52375 1    C: 00001 0    C: 02320 1    I: 51406 1

31,2040    C: 02312 0    I: 77301 0    C: 00047 1    I: 77762 1    I: 53457 1    C: 20201 0    I: 52315 1    C: 00007 0
31,2050    C: 02326 1    I: 77641 1    I: 77752 1    C: 36314 1    C: 47530 1    I: 77624 1    C: 62317 0    I: 53575 0
31,2060    C: 02320 1    I: 77715 1    C: 15334 1    I: 77214 0    C: 04713 0    C: 62067 1    C: 00015 0    I: 77624 1
31,2070    C: 47647 1    I: 41505 1    C: 01734 0    I: 72431 1    C: 00001 0    I: 53445 1    C: 00007 0    I: 47315 0

31,2100    C: 02320 1    C: 02326 1    I: 47256 0    C: 02320 1    I: 63241 0    C: 00015 0    I: 50372 1    C: 00007 0
31,2110    I: 72565 1    C: 00015 0    I: 77726 1    C: 26316 1    C: 02320 1    I: 51041 0    C: 00007 0    C: 62124 1
31,2120    I: 44345 0    C: 02316 1    C: 15344 0    C: 02316 1    I: 77776 1       34764 0       71247 0       00006 1
31,2130       12137 1       41247 0       74755 0       27247 0       12026 0    C: 04066 0    C: 04065 0       05354 0

31,2140    C: 00117 0       15524 0       05527 1       05561 0    C: 00226 1       14103 0    I: 43034 1    C: 51751 0
31,2150    C: 03751 1    C: 62154 0    I: 77624 1    C: 62301 1    C: 02334 1    C: 34041 0    C: 27161 1    I: 77775 1
31,2160    C: 00017 1    C: 26224 1    C: 00025 0    C: 02240 0    I: 71214 0    C: 03711 0    C: 62034 1    C: 00015 0
31,2170    C: 34041 0    C: 27145 1    I: 77775 1    C: 00017 1    C: 26254 0    C: 00025 0    C: 02262 0    I: 47014 1

31,2200    C: 03711 0    C: 62264 0    C: 51751 0    C: 34041 0    C: 27516 0    I: 43175 0    C: 02254 0    C: 00263 0
31,2210    C: 25535 0    C: 02262 0    C: 15543 1    C: 02334 1    I: 43014 0    C: 04343 1    C: 62220 0    C: 00063 1
31,2220    I: 77614 1    C: 01673 1    I: 43014 0    C: 04307 1    C: 62226 0    C: 01473 0    C: 35517 1    C: 27211 0
31,2230    I: 77775 1    C: 00001 0    C: 26320 1    C: 00007 0    C: 16326 1    C: 00015 0    I: 45014 0    C: 04307 1

31,2240    C: 62275 0    C: 27516 0    I: 77614 1    C: 01473 0    C: 00041 1    I: 43175 0    C: 02224 1    C: 00263 0
31,2250    C: 25535 0    C: 02240 0    C: 15543 1    C: 02334 1    I: 43014 0    C: 04343 1    C: 62260 1    C: 00063 1
31,2260    C: 35517 1    C: 27211 0    I: 77650 1    C: 62034 1    I: 77624 1    C: 62301 1    I: 45014 0    C: 04307 1
31,2270    C: 62275 0    C: 27516 0    I: 52014 0    C: 01673 1    C: 62244 1    C: 34041 0    C: 27161 1    I: 77650 1

31,2300    C: 62034 1    I: 77620 0    C: 00000 1    I: 52175 0    C: 01030 0    C: 62306 0    C: 36320 0    C: 62310 1
31,2310    I: 52175 0    C: 01036 0    C: 62313 1    C: 16326 1    C: 01044 0    I: 77650 1    C: 00000 1    I: 77776 1
31,2320       30036 1       50120 1       54011 0       30035 1       50120 1       54013 1       30120 1       66211 0
31,2330       40000 0       50120 1       54046 1       06006 1    I: 77624 1    C: 46000 0    C: 34015 1    C: 62057 1

31,2340    C: 00031 0    I: 77131 1    C: 00052 0    C: 00002 0    C: 00006 1    I: 77770 1    C: 00022 1    I: 73775 0
31,2350    C: 00031 0    C: 77746 1    C: 07524 0    I: 61110 0    C: 77771 0    C: 62347 0    I: 77616 0    I: 70740 0
31,2360    C: 03750 0    C: 00001 0    I: 77616 0    I: 70545 1    C: 00751 1    C: 16351 1    C: 00753 0    C: 02353 0
31,2370    I: 77616 0    I: 72545 0    C: 02351 1    C: 14751 1    C: 02353 0    C: 00753 0    I: 77616 0       04636 0
```

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OCTAL LISTING FOR PARAGRAPH # 165,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,2400     C: 03731 1     06006 1     I: 71214 0  C: 05667 0  C: 15336 0  C: 03740 1  C: 03742 0  I: 77776 1
31,2410        32443 0     04636 0     C: 21101 1     05524 1     12421 0     02410 0     34766 1     05516 0
31,2420        05205 0     06006 1     I: 43234 0  C: 51751 0  C: 07144 1  C: 36307 0  C: 73171 1  I: 77776 1
31,2430        35031 0     04636 0     C: 20743 0     05524 1     02436 1     02421 1     05561 0  C: 00124 0

31,2440        04636 0  C: 56074 1        15524 0  C: 01516 1     05561 0  C: 00010 0     05362 0  C: 00004 0
31,2450     C: 00012 1     35052 0        55262 1     05561 0  C: 00131 1     06006 1  I: 45014 0  C: 01702 0
31,2460     C: 62466 1  C: 76167 0     I: 77624 1  C: 31571 0  I: 77650 1  C: 62567 1  I: 45014 0  C: 04665 0
31,2470     C: 76167 0  I: 45135 1     C: 23513 1  C: 63355 1  I: 77634 0  C: 51751 0  C: 35062 0  C: 63002 0

31,2500     C: 03642 1  I: 77776 1        33514 1     04636 0  C: 21067 0     04103 1     02510 1     02552 1
31,2510        06006 1  I: 53575 0     C: 03642 1  C: 36706 0  C: 62614 0  I: 53435 0  C: 02706 1  C: 02700 1
31,2520     I: 53435 0  C: 02706 1     C: 02672 0  I: 76131 0  C: 00051 0  C: 00006 1  C: 00022 1  I: 61373 1
31,2530     C: 06322 1  C: 02672 0     I: 77656 1  C: 06736 0  I: 76100 1  C: 62527 0  C: 00022 1  I: 77773 1

31,2540     C: 01756 1  C: 06714 0     I: 45100 1  C: 62537 1  C: 47344 1  I: 45014 0  C: 02471 1  C: 62765 1
31,2550     I: 77650 1  C: 62556 0        06006 1  I: 45175 0  C: 03642 1  C: 62756 1  I: 77624 1  C: 22327 1
31,2560     I: 43014 0  C: 00666 1     C: 04464 0  I: 77624 1  C: 31005 0  I: 77614 1  C: 04664 1  I: 77776 1
31,2570        00004 0     00006 1        31723 0     53062 0     31727 1     57754 0     00003 1     36211 0

31,2600        05607 0  C: 01722 1     C: 01674 0     06006 1  I: 45014 0  C: 04465 1  C: 22327 1  I: 45135 1
31,2610     C: 23514 0  C: 63355 1     I: 77624 1  C: 63002 0  I: 63256 0  C: 00043 0  C: 24037 0  C: 03634 0
31,2620     I: 54361 1  C: 23475 0     C: 20620 1  I: 77655 1  I: 77656 1  C: 27642 1  C: 03634 0  I: 52342 0
31,2630     C: 02141 1  I: 54361 1     C: 23475 0  C: 20616 1  I: 53455 0  C: 02617 0  I: 77614 1  C: 04745 0

31,2640     C: 62515 1  C: 03650 1     I: 72441 0  C: 03642 1  I: 74315 0  C: 03642 1  I: 51372 0  C: 03650 1
31,2650     I: 77656 1  C: 27502 0     C: 15336 0  C: 03510 0  C: 17516 0  C: 00001 0  I: 57526 1  I: 77525 0
31,2660     C: 15336 0     33505 1        54001 1     31754 0     00006 1     20001 1     54154 0     06006 1
31,2670     I: 67206 1  C: 01025 1     I: 77621 1  I: 43242 1  I: 41215 1  C: 23505 0  C: 00041 1  I: 52405 1

31,2700     C: 07016 1  I: 62414 1     C: 04343 1  C: 62704 0  C: 17524 1  C: 00037 0  I: 47005 1  C: 23511 0
31,2710     C: 45657 1  I: 43171 1     C: 23506 0  C: 02666 0  C: 37526 1  C: 75260 1  I: 77624 1  C: 22327 1
31,2720     I: 51575 1  C: 01122 1     I: 60414 0  C: 04343 1  C: 62725 0  C: 27504 0  C: 01114 1  I: 77646 0
31,2730     I: 60414 0  C: 04343 1     C: 62733 1  C: 03502 0  I: 77776 1     35030 1     04636 0  C: 21101 1

31,2740        04103 1     02750 1        04103 1     34766 1     05516 0     05402 1  C: 00012 1     05205 0
31,2750        06006 1  I: 45014 0     C: 00467 1  C: 75472 1  I: 77776 1     04103 1  I: 53521 1  C: 01734 0
31,2760     C: 27357 0  C: 23517 0     C: 03351 0  I: 77614 1  C: 02671 0  I: 77420 1  C: 02657 1     33524 1
31,2770        54373 1     05402 1     C: 00012 1     04611 0     04636 0  C: 56074 1     04606 0     06006 1
```

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OCTAL LISTING FOR PARAGRAPH # 166,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,3000      I: 77650 1    C: 02657 1    I: 77620 0    C: 01006 0    I: 71214 0    C: 01711 1    C: 63012 1    C: 03001 0
31,3010      C: 34001 1    C: 56612 1    I: 77624 1    C: 56462 1    I: 43014 0    C: 01451 0    C: 63020 0    C: 01476 0
31,3020      I: 77624 1    C: 27236 0    I: 77776 1       05402 1    C: 04022 0       06006 1    I: 77014 1    C: 04343 1
31,3030      C: 63040 0    C: 77775 1    I: 77614 1    C: 01743 0    C: 63044 1    I: 52014 0    C: 00265 0    C: 63046 0

31,3040      I: 43174 1    C: 00000 1    C: 01743 0    C: 63035 1    I: 77614 1    C: 00065 1    I: 44575 0    C: 01573 1
31,3050      I: 53257 1    C: 57176 0    C: 01607 1    I: 77657 0    C: 57176 0    C: 27626 0    C: 01601 1    I: 53702 1
31,3060      C: 57176 0    I: 53655 1    C: 01615 1    C: 57176 0    C: 03634 0    I: 77614 1    C: 00345 0    C: 63101 1
31,3070      I: 45145 0    C: 01062 1    C: 54141 1    I: 57414 1    C: 04303 0    C: 63076 0    I: 77655 1    C: 03626 0

31,3100      C: 03626 0    I: 67201 0    C: 00001 0    C: 03752 1    I: 43030 0    C: 63114 0    C: 00462 1    I: 45145 0
31,3110      C: 01062 1    C: 26524 0    I: 77650 1    C: 63337 0    I: 65345 0    C: 01712 1    C: 01714 1    I: 63325 0
31,3120      C: 15344 0    C: 02617 0    I: 53435 0    C: 03626 0    C: 27620 0    I: 53435 0    C: 03620 0    C: 27604 0
31,3130      C: 03620 0    I: 53435 0    C: 03604 0    C: 03612 1    I: 50214 0    C: 01703 1    C: 63324 1    C: 00001 0

31,3140      C: 26156 1    C: 03626 0    I: 41246 1    C: 03376 0    I: 43276 0    C: 01346 1    C: 34772 1    C: 26570 1
31,3150      I: 65215 1    C: 00772 0    C: 23477 1    I: 41415 1    C: 00772 0    I: 64375 1    C: 03626 0    C: 03604 0
31,3160      I: 63372 1    C: 02617 0    I: 76521 0    C: 03604 0    I: 77725 1    C: 00003 1    C: 14043 0    C: 00005 1
31,3170      I: 77624 1    C: 63344 1    I: 63457 1    C: 20611 0    C: 14037 0    C: 00001 0    C: 14043 0    C: 00007 0

31,3200      I: 77624 1    C: 63344 1    I: 63457 1    C: 20611 0    I: 41415 1    C: 00037 0    I: 75425 0    C: 23503 0
31,3210      I: 77725 1    C: 00021 1    C: 14043 0    C: 00005 1    I: 77624 1    C: 63344 1    I: 65257 1    C: 20622 0
31,3220      C: 00007 0    I: 77624 1    C: 63344 1    I: 65257 1    C: 20622 0    C: 00023 0    I: 77624 1    C: 63344 1
31,3230      I: 77657 0    C: 20611 0    C: 14035 1    C: 00001 0    C: 14043 0    C: 00003 1    I: 77624 1    C: 63344 1

31,3240      I: 41257 1    C: 20601 1    C: 00035 1    I: 72405 0    C: 00007 0    I: 77725 1    C: 00003 1    C: 14043 0
31,3250      C: 00001 0    I: 77624 1    C: 63344 1    I: 41257 1    C: 20601 1    C: 00035 1    I: 72405 0    C: 00005 1
31,3260      I: 43325 1    C: 00025 0    C: 00031 0    I: 45325 1    C: 00027 1    C: 00033 1    I: 40206 1    C: 00021 1
31,3270      I: 45345 1    C: 00025 0    C: 00031 0    I: 43325 1    C: 00027 1    C: 00033 1    I: 41525 0    C: 15336 0

31,3300      C: 24041 1    C: 00035 1    I: 53451 1    C: 00005 1    I: 63241 0    C: 00013 0    C: 00021 1    I: 53451 1
31,3310      C: 00005 1    I: 41441 0    C: 00013 0    I: 50021 1    C: 00027 1    C: 63330 1    I: 77614 1    C: 00304 0
31,3320      C: 63333 1    I: 52175 0    C: 00035 1    C: 63335 1    I: 41545 0    C: 23501 1    I: 52006 0    C: 63155 0
31,3330      I: 77614 1    C: 00304 0    C: 63321 1    I: 77775 1    C: 00021 1    I: 76505 0    C: 03604 0    I: 40251 0

31,3340      C: 03626 0    C: 00001 0    I: 77650 1    C: 01006 0    I: 70501 1    C: 00047 1    C: 14045 0    C: 00043 0
31,3350      I: 55301 0    C: 00051 0    C: 00045 0    I: 43460 1    C: 00050 1    C: 03744 0    I: 77420 1    C: 01006 0
31,3360         31743 0       05535 1       05547 1    C: 00060 1       31751 0       00006 1       13375 1       31752 0
31,3370         00006 1       13373 1       03445 1       31751 0       03400 0       31752 0       00006 1       13445 0
```

```
OCTAL LISTING FOR PARAGRAPH # 167,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,3400        73526 1     65221 0        00006 1        13410 0        65221 0        00006 1        13412 1        03445 1
31,3410        05561 0  C: 00060 1        05547 1     C: 00004 0        31752 0        00006 1        13427 1        73527 0
31,3420        66171 0     00006 1        13433 1        66171 0        00006 1        13435 1        03445 1        06006 1
31,3430     I: 77624 1  C: 60304 0     I: 77776 1        05561 0     C: 00004 0        31140 0        00006 1        13464 0

31,3440        00006 1     63445 1        63525 0        00006 1        63447 0        04362 1        03360 1        06006 1
31,3450     I: 41535 1  C: 01141 1     I: 41335 1     C: 23516 1     I: 66150 0     C: 00155 0     C: 00302 0     I: 77624 1
31,3460     C: 30000 1  C: 02617 0     I: 77650 1     C: 01006 0        35035 1        05535 1        06006 1     I: 74375 0
31,3470     C: 03705 0  C: 23531 1     I: 52056 0     C: 63461 1     C: 26305 0     C: 05432 1     C: 00302 0     C: 24533 1

31,3500     C: 00065 1  C: 01265 1     C: 00000 1     C: 02000 0     C: 01604 1     C: 00000 1     C: 01505 0     C: 14100 0
31,3510     C: 00012 1  C: 27462 1     C: 01306 0     C: 01307 1     C: 00202 1     C: 00006 1     C: 10464 0     C: 12467 1
31,3520     C: 00000 1  C: 00000 1     C: 15373 1     C: 11346 0     C: 62776 0     C: 77732 1     C: 00700 0     C: 00070 0
31,3530     C: 22363 1  C: 11623 0        06006 1     I: 77650 1     C: 62474 1     I: 50023 0     C: 33553 1     C: 63566 1

31,3540     I: 71374 1  C: 00003 1     C: 03472 0     I: 50023 0     C: 33553 1     C: 63566 1     I: 45345 1     C: 02461 0
31,3550     C: 02463 1  C: 02547 0     I: 45374 0     C: 00004 0     C: 36161 1     I: 77040 0     C: 63566 1     C: 00005 1
31,3560     I: 45345 1  C: 03663 1     C: 02461 0     I: 51025 1     C: 36161 1     C: 11463 0     I: 43014 0     C: 05702 1
31,3570     C: 11411 0  C: 05743 1     C: 11411 0     I: 71334 0     C: 03664 0     C: 15336 0     I: 43014 0     C: 05660 1

31,3600     C: 05461 1  I: 43014 0     C: 05662 0     C: 05663 1     C: 37764 0     C: 15704 0     I: 65325 0     C: 02463 1
31,3610     C: 02461 0  I: 41525 0     C: 33143 1     I: 77650 1     C: 72740 1     I: 65325 0     C: 02461 0     C: 03663 1
31,3620     I: 41525 0  C: 33143 1     I: 77650 1     C: 72740 1     I: 45020 1     C: 03547 1     C: 27516 0     I: 43175 0
31,3630     C: 03640 0  C: 01473 0     I: 77650 1     C: 63660 1     I: 45020 1     C: 03547 1     C: 27516 0     I: 77214 0

31,3640     C: 01673 1  C: 03656 1     C: 25535 0     C: 03710 1     C: 15543 1     C: 03552 0     C: 01517 0     I: 77615 0
31,3650     I: 77650 1  C: 63666 1     I: 45020 1     C: 03547 1     C: 27516 0     I: 43175 0     C: 03640 0     C: 01673 1
31,3660     C: 25535 0  C: 03700 0     C: 15543 1     C: 03716 1     C: 15517 0     C: 03552 0     C: 00041 1     I: 45014 0
31,3670     C: 00263 0  C: 27211 0     I: 77775 1     C: 00001 0     C: 03656 1     I: 70125 0     C: 00015 0     C: 03550 1

31,3700     C: 27552 0  C: 00007 0     C: 03710 1     I: 77650 1     C: 03547 1     I: 51575 1     C: 02707 0     C: 24045 0
31,3710     C: 02715 0  I: 41446 1     I: 50025 0     C: 00045 0     C: 63717 0     I: 45545 1     C: 77732 1     I: 51575 1
31,3720     C: 02723 0  I: 45206 1     C: 00045 0     I: 71240 1     C: 63730 0     I: 77626 0     C: 43732 0     C: 63730 0
31,3730     I: 66145 1  C: 00045 0     C: 00044 1     I: 62101 0     C: 00047 1     C: 00002 0     I: 53775 1     C: 02707 0

31,3740     C: 20201 0  C: 26707 0     C: 02715 0     I: 77657 0     C: 20201 0     C: 26715 0     C: 02723 0     I: 66057 0
31,3750     C: 20201 0  C: 00045 0     C: 02723 0     I: 54150 1     C: 02214 1     C: 00045 0     I: 77660 1     C: 00045 0
31,3760     I: 70130 1  C: 02214 1     C: 00045 0     I: 40270 0     C: 00044 1     C: 00003 1     I: 77650 1     C: 75416 0
31,3770     C: 03770 1  C: 03771 0  CKSM 21553 1           @              @              @              @              @
```

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OCTAL LISTING FOR PARAGRAPH # 170,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,2000      I: 65345 0   C: 26663 0   C: 02403 1   I: 57546 1   I: 73525 1   C: 02403 1   I: 74266 0   C: 26224 1
32,2010      C: 02405 1   I: 77634 0   C: 51751 0   C: 26443 0   C: 26663 0   C: 02650 0   I: 77616 0   C: 00064 0
32,2020      C: 00000 1   C: 00002 0   C: 00000 1   C: 10306 0   C: 36750 0   C: 00253 0   C: 31436 1   C: 00011 1
32,2030      I: 45244 1   C: 64077 0   C: 16425 0   I: 45000 0   C: 64077 0   C: 55054 0   I: 45006 0   C: 57052 1

32,2040      I: 77624 1   C: 64105 1   I: 65525 0   C: 00017 1   I: 77615 0   C: 00005 1   C: 26341 0   C: 03401 1
32,2050      C: 14747 0   C: 15336 0   C: 14753 0   C: 01044 0   I: 71214 0   C: 03711 0   C: 64060 0   C: 02316 1
32,2060      I: 43225 0   C: 00011 1   I: 45014 0   C: 00662 0   C: 26524 0   I: 63256 0   C: 02320 1   I: 50256 0
32,2070      I: 65552 0   I: 77621 1   C: 02341 0   C: 36347 1   C: 27525 0   I: 77624 1   C: 46616 1   I: 65345 0

32,2100      C: 15334 1   C: 15336 0   I: 77606 1   C: 34011 0   C: 64046 1   I: 77775 1   C: 24266 0   C: 14045 0
32,2110      C: 00001 0   I: 50025 0   C: 24260 0   C: 64140 0   I: 65060 1   C: 00050 1   C: 00046 0   I: 45324 0
32,2120      C: 00050 1   C: 24246 1   I: 65040 0   C: 64140 0   C: 00050 1   I: 50025 0   C: 24256 0   C: 64140 0
32,2130      I: 65124 0   C: 00050 1   C: 00046 0   I: 50025 0   C: 24242 0   C: 64140 0   I: 77730 0   C: 00050 1

32,2140      I: 52110 0   C: 00001 0   C: 64145 0   I: 77730 0   C: 00050 1   I: 44745 1   C: 00001 0   C: 24255 0
32,2150      I: 42603 1   C: 24241 0   C: 24225 1   I: 60125 1   C: 00003 1   C: 64143 0   I: 55225 1   I: 40006 0
32,2160      C: 64203 1   I: 45240 0   C: 64203 1   C: 24210 1   I: 77644 1   C: 64203 1   I: 45345 1   C: 00001 0
32,2170      C: 24266 0   I: 71244 0   C: 64200 1   C: 24262 1   I: 77671 1   C: 00001 0   I: 43405 1   C: 00005 1

32,2200      I: 52145 0   C: 24264 1   C: 64176 0   I: 65345 0   C: 24210 1   I: 77650 1   C: 64166 1   C: 02755 1
32,2210      C: 01307 1   C: 00013 0   C: 22652 0   C: 00005 1   C: 01642 0   C: 00005 1   C: 01642 0   C: 77556 1
32,2220      C: 53522 1   C: 00055 1   C: 20266 1   C: 00155 0   C: 07202 0   C: 00000 1   C: 00000 1   C: 77730 0
32,2230      C: 71525 0   C: 00000 1   C: 00000 1   C: 04445 0   C: 10102 0   C: 03726 1   C: 31201 0   C: 01040 1

32,2240      C: 26313 1   C: 00234 1   C: 01660 0   C: 25254 0   C: 01014 0   C: 02222 1   C: 15646 1   C: 22223 1
32,2250      C: 16457 0   C: 25254 0   C: 01014 0   C: 30304 0   C: 23351 1   C: 03030 1   C: 22335 1   C: 20001 1
32,2260      C: 00611 1   C: 00033 1   C: 05763 0   C: 00053 1   C: 36200 0   C: 23637 1   C: 27636 1   C: 00012 1
32,2270      C: 00010 0   C: 00006 1   I: 77776 1      30154 1      05770 1      35023 0      04636 0   C: 20743 0

32,2300         14103 0      12275 1      04655 0   C: 74476 1   I: 43020 1   C: 03547 1   C: 03666 1   I: 67164 0
32,2310      C: 20000 0   C: 02756 1   I: 45140 0   C: 03550 1   C: 25607 1   C: 27710 1   I: 77626 0   C: 60121 0
32,2320      C: 00037 0   C: 37724 1   C: 03547 1   I: 77220 1   C: 03752 1   C: 03710 1   I: 65256 0   C: 00045 0
32,2330      C: 17757 1   C: 03552 0   I: 77625 0   C: 03413 1   C: 26641 0   C: 03656 1   I: 50256 0   I: 77752 1

32,2340      I: 44326 0   C: 15326 1   C: 27761 1   C: 03700 0   I: 41451 1   C: 03672 1   I: 57441 1   C: 03554 0
32,2350      I: 41515 0   I: 63345 0   C: 15330 0   I: 55441 0   C: 03562 0   I: 77772 0   C: 17405 0   C: 03405 0
32,2360      I: 57414 1   C: 02741 1   C: 64364 1   C: 03405 0   I: 51575 1   C: 03405 0   C: 27763 0   C: 03656 1
32,2370      C: 02657 1   I: 45246 0   C: 33620 0   C: 26760 1   C: 03710 1   C: 36746 1   C: 64304 1   I: 53575 0
```

```
OCTAL LISTING FOR PARAGRAPH # 171,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,2400     C: 03656 1    I: 53515 0    C: 03710 1    I: 72441 0    I: 65336 1    C: 00045 0    I: 51525 1    I: 45006 0
32,2410     C: 64105 1    I: 43215 0    C: 03724 0    C: 03552 0    C: 00003 1    I: 53135 0    C: 03013 0    C: 64421 1
32,2420     C: 00005 1    I: 73545 1    C: 00005 1    C: 17403 0    I: 77746 1    C: 03401 1    I: 53575 0    C: 03656 1
32,2430     I: 41406 0    I: 53515 0    C: 03710 1    I: 47315 0    I: 53435 0    I: 63361 0    C: 03403 0    I: 53361 0

32,2440     C: 03401 1    I: 43014 0    C: 00662 0    C: 01663 0    C: 16152 0    I: 77624 1    C: 26453 1    I: 77745 1
32,2450     C: 00747 0    C: 17401 1    C: 00751 1    C: 37403 1    C: 03752 1    I: 71220 1    C: 03752 1    C: 03413 1
32,2460     C: 34041 0    C: 27145 1    I: 67175 0    C: 00001 0    C: 03745 1    C: 27640 0    C: 00007 0    C: 17672 1
32,2470     C: 00015 0    C: 03716 1    I: 53135 0    C: 03746 1    C: 64500 0    I: 52135 1    C: 33631 0    C: 64272 1

32,2500     I: 53575 0    C: 03640 0    C: 17554 0    C: 00045 0    C: 27646 0    C: 03672 1    I: 77656 1    C: 03562 0
32,2510     I: 72441 0    C: 03554 0    C: 03747 0    I: 45246 0    C: 33644 1    I: 71240 1    C: 64525 1    C: 15326 1
32,2520     I: 41525 0    C: 15330 0    I: 41466 0    I: 77650 1    C: 64531 1    I: 47375 0    C: 03554 0    C: 03562 0
32,2530     I: 77606 1    I: 71214 0    C: 02661 1    I: 51006 0    C: 64540 1    I: 57575 1    I: 43006 0    C: 02461 0

32,2540     I: 77775 1    I: 53435 0    C: 03554 0    C: 03562 0    I: 77650 1    C: 03752 1    I: 71220 1    C: 03752 1
32,2550     C: 33606 1    C: 17730 0    C: 03636 1    C: 03664 0    I: 77745 1    C: 15344 0    C: 17650 1    C: 33604 0
32,2560     C: 37546 1    C: 63652 0    I: 77624 1    C: 37727 1    I: 77745 1    C: 02742 1    C: 14033 1    C: 02744 1
32,2570     C: 14035 1    C: 00041 1    C: 14031 0    C: 03770 1    I: 77661 0    C: 20206 1    C: 03724 0    I: 43276 0

32,2600     C: 03726 1    I: 45246 0    C: 33652 0    I: 50000 1    C: 64606 0    C: 64775 0    I: 50145 1    C: 03546 0
32,2610     C: 64614 0    I: 52135 1    C: 33630 1    C: 65100 0    I: 53145 1    C: 03730 0    C: 64654 1    I: 62545 1
32,2620     C: 00033 1    I: 72405 0    C: 03744 0    I: 71206 0    C: 00035 1    I: 41212 0    C: 00001 0    I: 50021 1
32,2630     C: 31771 1    C: 64644 0    I: 75512 0    I: 44205 0    C: 03751 1    C: 31767 0    I: 65301 0    C: 00047 1

32,2640     I: 56342 1    I: 52057 1    C: 20200 1    C: 64662 1    I: 60345 0    C: 00035 1    C: 00047 1    I: 53665 1
32,2650     C: 15334 1    C: 20173 0    I: 77650 1    C: 64662 1    I: 60345 0    C: 00031 0    C: 00047 1    I: 53665 1
32,2660     C: 03664 0    C: 20200 1    I: 41401 1    C: 00001 0    I: 57425 0    C: 15334 1    C: 03755 0    I: 71240 1
32,2670     C: 64701 0    C: 03724 0    I: 71240 1    C: 64677 0    C: 03755 0    I: 77676 0    C: 03755 0    I: 77745 1

32,2700     C: 03755 0    I: 45246 0    C: 33654 0    I: 71240 1    C: 64775 0    I: 72405 0    C: 00031 0    I: 77606 1
32,2710     I: 43345 1    C: 03546 0    C: 33600 1    C: 03546 0    I: 43175 0    C: 03656 1    C: 03466 0    C: 26657 1
32,2720     C: 03710 1    I: 77765 0    C: 03755 0    C: 16746 0    C: 15334 1    I: 57565 0    C: 03755 0    I: 71354 0
32,2730     C: 00154 1    I: 67140 0    C: 03550 1    C: 02756 1    C: 36760 0    C: 25607 1    I: 75345 1    C: 00037 0

32,2740     C: 03755 0    I: 60325 0    C: 03650 1    C: 00047 1    I: 53665 1    C: 00001 0    C: 20176 0    I: 50006 1
32,2750     C: 64755 1    I: 65345 0    C: 15344 0    I: 77650 1    C: 64757 0    I: 65345 0    C: 33610 0    I: 45271 1
32,2760     C: 00003 1    C: 31767 0    I: 71240 1    C: 64767 0    I: 77605 1    C: 03650 1    C: 00001 0    I: 41545 0
32,2770     C: 00001 0    C: 37650 0    C: 63634 0    I: 77650 1    C: 64562 1    I: 45345 1    C: 00031 0    C: 03664 0
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OCTAL LISTING FOR PARAGRAPH # 172,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,3000     I: 51406 1   I: 50025 0   C: 33656 1   C: 35022 1   I: 53145 1   C: 03730 0   C: 64611 0   I: 53025 0
32,3010     C: 33606 1   C: 65044 1   I: 45345 1   C: 03670 0   C: 00031 0   I: 55301 0   C: 00050 1   C: 03666 1
32,3020     I: 41457 1   C: 57600 0   I: 40015 1   C: 15334 1   C: 65031 0   I: 45246 0   C: 15334 1   I: 77640 0
32,3030     C: 65034 0   I: 57545 1   C: 15344 0   I: 77725 1   I: 41345 0   I: 77712 0   C: 03666 1   I: 77615 0

32,3040     C: 03636 1   C: 03636 1   I: 77650 1   C: 65063 1   I: 63545 0   C: 03664 0   I: 70501 1   C: 00047 1
32,3050     I: 60325 0   C: 00031 0   C: 00050 1   I: 55260 0   C: 00047 1   I: 77657 0   C: 20600 0   C: 03636 1
32,3060     I: 77625 0   C: 03664 0   C: 03666 1   I: 77745 1   C: 00031 0   C: 17670 0   C: 03730 0   I: 77625 0
32,3070     C: 33600 1   C: 37730 1   C: 65102 1   I: 52030 0   C: 64554 1   C: 65100 0   I: 77745 1   C: 15330 0

32,3100     I: 77650 1   C: 03752 1   I: 71220 1   C: 00041 1   C: 03636 1   I: 45240 0   C: 65112 0   C: 03646 0
32,3110     I: 77640 0   C: 65115 1   I: 77776 1      05726 1   C: 20610 1   I: 43001 1   C: 00001 0   C: 00272 0
32,3120     I: 60345 0   C: 03636 1   C: 00047 1   I: 60325 0   C: 03646 0   C: 00051 0   C: 00013 0   I: 56342 1
32,3130     I: 65260 0   C: 00050 1   C: 03726 1   I: 77716 1   I: 43342 0   C: 15334 1   C: 03744 0   I: 77605 1

32,3140     C: 00001 0   C: 00035 1   I: 53605 1   C: 00001 0   C: 20172 1   I: 45257 0   C: 20172 1   C: 33574 1
32,3150     I: 65234 1   C: 45657 1   C: 15334 1   I: 57457 0   C: 20601 1   I: 41215 1   C: 00001 0   C: 03646 0
32,3160     I: 47057 0   C: 20172 1   C: 45657 1   I: 77725 1   C: 33674 1   I: 70501 1   C: 00050 1   I: 56264 1
32,3170     C: 00050 1   C: 00013 0   I: 65257 1   C: 57170 0   C: 03652 0   I: 41406 0   I: 77624 1   C: 65741 0

32,3200     I: 41476 1   I: 40476 0   I: 41525 0   C: 03654 0   I: 45006 0   C: 65741 0   I: 50125 1   C: 03730 0
32,3210     C: 65213 1   I: 77650 1   C: 65225 1   I: 77745 1   C: 03632 0   I: 52054 1   C: 65220 1   C: 65321 1
32,3220     I: 50145 1   C: 03747 0   C: 65321 1   I: 77650 1   C: 65327 1   I: 47145 1   C: 33574 1   C: 45657 1
32,3230     I: 65276 1   C: 15344 0   I: 45257 0   C: 20601 1   C: 00001 0   I: 53605 1   C: 00035 1   C: 20172 1

32,3240     I: 76257 0   C: 20172 1   I: 65234 1   C: 45657 1   C: 03722 0   C: 00001 0   I: 77751 1   I: 53040 0
32,3250     C: 65255 0   C: 65255 0   I: 52061 1   C: 20210 0   C: 65266 0   I: 50145 1   C: 03751 1   C: 65277 0
32,3260     I: 77676 0   C: 17751 1   C: 33606 1   C: 03730 0   I: 77650 1   C: 65277 0   I: 47166 0   C: 45765 1
32,3270     I: 50125 1   C: 03751 1   C: 65305 1   I: 45545 1   C: 77760 0   I: 77676 0   C: 00013 0   I: 53145 1

32,3300     C: 03722 0   C: 65321 1   I: 52040 1   C: 65321 1   C: 65327 1   I: 53145 1   C: 03722 0   C: 65316 0
32,3310     I: 71240 1   C: 65316 0   I: 77626 0   C: 77764 1   I: 77650 1   C: 65327 1   I: 57545 1   I: 77626 0
32,3320     C: 77760 0   I: 77745 1   C: 00013 0   C: 17722 0   C: 00015 0   I: 52006 0   C: 65334 0   I: 77745 1
32,3330     C: 00017 1   C: 17722 0   C: 00015 0   I: 41476 1   I: 77624 1   C: 65464 1   I: 53145 1   C: 03632 0

32,3340     C: 65462 1   I: 50025 0   C: 03706 0   C: 65346 0   I: 77650 1   C: 65401 1   I: 50145 1   C: 03730 0
32,3350     C: 65353 1   I: 77650 1   C: 65423 1   I: 53145 1   C: 03722 0   C: 65361 0   I: 52040 1   C: 65361 0
32,3360     C: 65460 0   I: 53145 1   C: 03747 0   C: 65460 0   I: 71240 1   C: 65460 0   C: 00017 1   C: 17722 0
32,3370     C: 00015 0   I: 77676 0   C: 34021 0   C: 65464 1   I: 45345 1   C: 03632 0   C: 03706 0   I: 77640 0
```

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OCTAL LISTING FOR PARAGRAPH # 173,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,3400     C: 65460 0    I: 71214 0    C: 00072 1    C: 03722 0    I: 77614 1    C: 02742 1    C: 65413 1    C: 14013 0
32,3410     C: 00015 0    I: 77650 1    C: 65416 1    C: 14017 1    C: 00015 0    I: 77676 0    C: 34021 0    C: 65464 1
32,3420     I: 50145 1    C: 03730 0    C: 65460 0    I: 45345 1    C: 03722 0    C: 00001 0    I: 65246 1    C: 00015 0
32,3430     I: 44352 0    I: 71240 1    C: 65460 0    C: 00001 0    C: 03722 0    I: 50025 0    C: 00017 1    C: 65445 1

32,3440     I: 77745 1    C: 00017 1    C: 03722 0    I: 77650 1    C: 65456 0    I: 45345 1    C: 03722 0    C: 00013 0
32,3450     I: 52040 1    C: 65453 0    C: 65456 0    I: 77745 1    C: 00013 0    C: 03722 0    I: 77624 1    C: 65665 1
32,3460     I: 77745 1    C: 15330 0    I: 77650 1    C: 00041 1    I: 77620 0    C: 00037 0    I: 45001 1    C: 00023 0
32,3470     C: 65665 1    I: 45345 1    C: 00017 1    C: 00013 0    I: 77600 1    C: 65515 0    I: 45206 1    C: 33576 0

32,3500     I: 71240 1    C: 65663 1    C: 00023 0    I: 50025 0    C: 00015 0    C: 65511 1    I: 52001 1    C: 00023 0
32,3510     C: 65515 0    I: 77745 1    I: 70565 0    C: 00021 1    C: 00021 1    I: 77745 1    C: 33602 0    C: 03546 0
32,3520     I: 43345 1    C: 03546 0    C: 33600 1    I: 67240 0    C: 65530 1    C: 33630 1    I: 77650 1    C: 65462 1
32,3530     C: 03546 0    I: 65345 0    C: 03722 0    C: 03706 0    I: 43325 1    C: 03722 0    C: 00021 1    C: 37722 1

32,3540     C: 65665 1    I: 71214 0    C: 00312 1    C: 65557 0    C: 03706 0    I: 50025 0    C: 00025 0    C: 65554 0
32,3550     I: 57545 1    C: 00021 1    I: 77742 0    C: 00021 1    I: 52001 1    C: 00023 0    C: 65622 1    I: 45345 1
32,3560     C: 03632 0    C: 03706 0    I: 41525 0    I: 51545 1    C: 00025 0    I: 50025 0    C: 33660 1    C: 65663 1
32,3570     I: 71204 1    C: 57544 0    I: 60221 0    C: 03706 0    C: 00050 1    I: 77725 1    I: 70501 1    C: 00047 1

32,3600     I: 65271 0    I: 41221 0    C: 03722 0    I: 77660 1    C: 00047 1    C: 00021 1    I: 40057 1    C: 20600 0
32,3610     C: 65616 0    C: 00021 1    I: 45246 0    C: 00015 0    I: 77640 0    C: 65622 1    I: 75345 1    C: 00015 0
32,3620     C: 00021 1    C: 00021 1    I: 41345 0    C: 00021 1    C: 33612 1    I: 43352 1    C: 03722 0    C: 00031 0
32,3630     I: 50025 0    C: 00017 1    C: 65641 1    I: 45345 1    C: 00017 1    C: 03722 0    I: 77742 0    C: 34021 0

32,3640     C: 65654 0    I: 45345 1    C: 00031 0    C: 00013 0    I: 52040 1    C: 65647 1    C: 65654 0    I: 45345 1
32,3650     C: 00013 0    C: 03722 0    I: 77742 0    C: 00021 1    I: 51545 1    C: 00021 1    I: 50025 0    C: 33576 0
32,3660     C: 65663 1    I: 77650 1    C: 65520 0    I: 77650 1    C: 00037 0    I: 71220 1    C: 00040 0    C: 03722 0
32,3670     I: 54316 1    C: 20610 1    I: 76276 0    C: 00003 1    I: 41501 0    C: 00047 1    I: 60351 0    C: 00006 1

32,3700     C: 00050 1    I: 70434 0    C: 45765 1    I: 56264 1    C: 00046 0    I: 77657 0    C: 57170 0    C: 03720 1
32,3710     I: 41366 1    C: 00011 1    I: 77701 1    C: 00047 1    C: 14035 1    C: 03722 0    I: 74301 0    C: 00050 1
32,3720     C: 03554 0    I: 74274 0    C: 00046 0    C: 00035 1    I: 63257 1    C: 57207 0    C: 03562 0    I: 53761 1
32,3730     C: 00035 1    C: 20575 1    I: 45455 1    C: 74077 1    I: 51451 0    C: 03672 1    C: 03706 0    I: 77650 1

32,3740     C: 00040 0    I: 71220 1    C: 00024 1    C: 03636 1    I: 44342 1    I: 65301 0    C: 00050 1    I: 70525 1
32,3750     C: 03646 0    I: 56221 0    I: 41257 1    C: 57601 1    C: 00035 1    I: 45257 0    C: 20173 0    C: 33577 1
32,3760     I: 40152 0    C: 65765 0    I: 52040 1    C: 65771 0    C: 65767 1    I: 77745 1    C: 15344 0    I: 52166 1
32,3770     C: 65773 1    I: 77745 1    C: 15330 0    I: 77650 1    C: 00024 1    C: 03775 1    C: 03776 1  CKSM 63037 0
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OCTAL LISTING FOR PARAGRAPH # 174,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,2000        03212 0      02703 1      04636 0   C: 16627 0      02126 0      34772 1      55421 0      55450 0
33,2010        55451 1      34352 1      55655 1      32221 1      02134 0      34753 1      55713 1      06006 1
33,2020     I: 73545 1   C: 02401 0   C: 02724 1   C: 16734 0   C: 02401 0   I: 77746 1   C: 02726 0   I: 77676 0
33,2030     C: 02732 0   I: 77776 1      05354 0   C: 00003 1      12036 1      13217 1      06006 1   I: 77624 1

33,2040     C: 47344 1   I: 77776 1      04636 0   C: 16724 1      34753 1      70077 0      00006 1      12051 0
33,2050        25421 1      05561 0   C: 00056 1      02126 0      11421 0      02103 1      04636 0   C: 17133 0
33,2060        02126 0      00006 1      31657 1      05332 0   C: 02070 1   C: 66065 1      32073 1      05163 0
33,2070        32073 1      05167 1      05314 1   C: 66227 0      34772 1      55253 0      31514 0      55254 1

33,2100        51423 0      55430 0      02205 1      34756 1      54003 0      01400 1      31512 0      55254 1
33,2110        34772 1      55253 0      02205 1      05561 0   C: 00007 0      44772 0      05347 1      04636 0
33,2120     C: 16073 1      05524 1   I: 43215 0   C: 15344 0   C: 26670 1   I: 77616 0      00006 1      23425 0
33,2130        04636 0   C: 17644 1      02655 0      01425 0      54001 1      12137 1      55655 1      34772 1

33,2140        50001 0      54000 0      24001 0      11655 1      12136 0      00002 0   I: 47020 0   C: 00051 0
33,2150     C: 51751 0   C: 02441 1   I: 51025 1   C: 02443 0   C: 66157 1   I: 77624 1   C: 66122 0   I: 74261 1
33,2160     C: 20212 1   C: 02405 1   I: 53321 1   C: 02672 0   C: 02650 0   C: 16650 0   C: 02441 1   C: 02443 0
33,2170     I: 47170 1   C: 02647 0   C: 45722 1   I: 77650 1   C: 00051 0      00006 1      23426 0      06006 1

33,2200     I: 77624 1   C: 66146 1   I: 77776 1      02126 0      01426 0      00006 1      23425 0      31423 0
33,2210        55255 0      32217 1      04636 0   C: 20743 0      02113 0      01425 0      12207 1   C: 01542 0
33,2220     C: 02757 0   C: 01713 0   C: 01671 0   C: 07623 1   C: 26552 1      04636 0   C: 70115 0      05362 0
33,2230     C: 00075 0   C: 00004 0      00004 0      30025 0      55645 0      34772 1      54037 1      54040 1

33,2240        54041 0      00003 1      32701 0      55655 1      32702 0      02134 0      06006 1   I: 77735 0
33,2250     C: 26663 0   C: 25477 1   C: 26674 0   C: 26455 1   C: 26663 0   C: 01472 1   C: 01315 1   I: 77776 1
33,2260        11643 0      02263 1      02277 1      06006 1   I: 77624 1   C: 64000 0   I: 77776 1      31412 1
33,2270        55646 0      05344 1   C: 00002 0      04636 0   C: 17214 0      03157 1      55412 0      05402 1

33,2300     C: 00135 0      11450 0      02175 0      03162 1      02306 0      05205 0      00006 1      22154 1
33,2310        00004 0      40025 1      61645 1      00006 1      62316 1      64752 0      61644 0      00006 1
33,2320        62324 0      05223 1   C: 02350 0      00154 1      34766 1      02321 0      34125 0      54154 0
33,2330        50154 1      31460 1      50154 1      55577 1      10154 0      12327 1      00002 0      34125 0

33,2340        54154 0      50154 1      31577 0      50154 1      55460 0      10154 0      12340 0      00002 0
33,2350        30025 0      55645 0      31540 1      55631 0      05402 1   C: 00115 1      31631 1      55540 0
33,2360        10000 0      30000 1      55541 1      40000 0      55540 0      34772 1      56037 0      55314 1
33,2370        34772 1      56040 0      55316 0      34772 1      56041 1      55320 0      34351 1      04126 0
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OCTAL LISTING FOR PARAGRAPH # 175,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,2400      C: 00005 1      37644 0      05135 0   C: 02406 1   C: 66065 1      05314 1      02326 1      05402 1
33,2410      C: 00215 1      12413 1      02337 1      11643 0      02416 0      02421 1      03162 1      04636 0
33,2420      C: 15276 0      06006 1   I: 77745 1   C: 26672 0   C: 24051 0   C: 01315 1   I: 76505 0   C: 02672 0
33,2430      I: 57545 1   C: 00160 0   C: 16533 0   C: 00162 1   C: 02537 1   I: 76001 1   C: 00001 0   C: 00010 0

33,2440      I: 57535 0   C: 02644 0   I: 77640 0   C: 66764 1   I: 50135 0   C: 02542 0   C: 66461 1   I: 72174 0
33,2450      C: 00014 1   C: 02454 0   I: 62143 0   C: 02243 0   C: 77775 1   C: 12555 1   I: 66104 1   C: 66452 1
33,2460      C: 02454 0   I: 77770 1   C: 00010 0   I: 41343 0   C: 02543 1   C: 27427 0   I: 43661 1   C: 21212 0
33,2470      C: 02511 0   C: 06511 1   I: 40725 0   C: 27431 1   C: 02531 1   I: 77732 1   I: 45425 0   C: 71206 0

33,2500      C: 06573 0   I: 77100 0   C: 66463 0   C: 00004 0   I: 56743 1   C: 75314 0   C: 75230 1   C: 12463 0
33,2510      I: 77104 1   C: 66504 0   C: 00010 0   I: 66140 1   C: 02455 1   C: 02455 1   I: 56743 1   C: 02460 1
33,2520      C: 75206 1   I: 77613 0   C: 75266 1   C: 12511 1   I: 42743 1   C: 75304 1   C: 75220 0   C: 12473 1
33,2530      I: 42673 0   C: 75206 1   C: 75256 1   C: 12521 1   I: 40743 0   C: 27434 1   C: 75206 1   I: 42772 0

33,2540      C: 75246 0   C: 12531 0   I: 76104 0   C: 66513 0   C: 00010 0   I: 64743 0   C: 02533 0   C: 02531 1
33,2550      I: 55523 0   C: 02541 0   I: 76521 0   C: 02001 1   I: 77745 1   C: 00155 0   C: 06541 1   I: 77745 1
33,2560      C: 00160 0   C: 06531 0   I: 77745 1   C: 00162 1   C: 06533 1   I: 77700 0   C: 66545 0   I: 76174 1
33,2570      C: 00006 1   C: 00002 0   I: 57343 1   C: 02513 1   C: 27437 1   I: 77722 0   I: 73406 1   I: 56072 1

33,2600      C: 00046 0   C: 10021 0   I: 77745 1   I: 77746 1   C: 10027 0   I: 77704 1   C: 66572 1   I: 77776 1
33,2610         04606 0      01400 1      11412 0      02276 0      11450 0      12617 1      02621 0      30032 0
33,2620         55414 0      06006 1   I: 65345 0   C: 02503 0   C: 02507 1   I: 55525 0   C: 02511 0   I: 74276 1
33,2630      C: 27437 1   I: 74521 1   C: 02672 0   C: 02760 1   I: 77776 1      05402 1   C: 00005 1      32220 0

33,2640         04636 0   C: 17244 0      02126 0      11450 0      02106 1      06006 1   I: 77624 1   C: 64000 0
33,2650      I: 77776 1      02074 0      05671 1   C: 01600 0      02657 1      05671 1   C: 01601 1      05402 1
33,2660      C: 00005 1      02113 0   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1
33,2670      C: 00001 0   C: 00004 0   C: 00002 0   C: 00220 1   C: 77776 1   C: 35730 0   C: 00035 1   C: 10317 0

33,2700      C: 17550 1   C: 00115 1   C: 01453 1      30075 0      74755 0      00006 1      12711 0      05726 1
33,2710      C: 21521 1      34753 1      05176 1      34770 0      55643 0      33211 0      55277 0      34761 0
33,2720         55412 0      35011 1      55644 1      34770 0      55632 0      55657 0      34772 1      55656 1
33,2730         00006 1      31634 1      53636 1      00006 1      31634 1      53640 0      34352 1      55655 1

33,2740         32222 1      02134 0      02744 1      02002 1      00006 1      23425 0      44753 0      55705 0
33,2750         06006 1   I: 41545 0   C: 02636 0   I: 77756 0   C: 02676 1   C: 16702 0   I: 77746 1   C: 02704 0
33,2760      I: 77676 0   C: 02674 0   I: 77776 1      01425 0   I: 44743 1   C: 02543 1   C: 02505 0   I: 42675 0
33,2770      C: 27441 0   C: 02505 0   C: 06505 1   I: 77613 0   C: 02507 1   C: 06507 0   I: 42675 0   C: 27443 1
```

```
OCTAL LISTING FOR PARAGRAPH # 176,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,3000     C: 02505 0   I: 41475 1   C: 15334 1   I: 67300 0   C: 66764 1   C: 02647 0   I: 71254 1   C: 67020 1
33,3010     C: 02471 1   I: 45425 0   C: 61306 0   I: 77621 1   C: 02473 0   C: 02473 0   I: 77650 1   C: 67042 0
33,3020     I: 43345 1   C: 02467 0   C: 02475 0   C: 16467 0   C: 02475 0   I: 44275 1   C: 27445 1   C: 02473 0
33,3030     C: 16473 0   C: 02501 1   I: 44275 1   C: 27445 1   C: 02471 1   I: 57325 1   C: 02503 0   C: 27447 0

33,3040     I: 45421 1   C: 75306 0   I: 77776 1      11412 0      02276 0      03162 1      11324 1      12277 0
33,3050        06006 1   I: 77775 1   C: 02650 0   C: 16461 0   C: 02443 0   C: 02457 0   I: 77776 1      05402 1
33,3060     C: 00275 1      06006 1   I: 64375 1   C: 02467 0   C: 02672 0   I: 53372 1   C: 02461 0   C: 16650 0
33,3070     C: 02457 0   C: 02443 0   I: 77776 1      02175 0      31646 1      55631 0      05402 1   C: 00155 0

33,3100        06006 1   I: 77775 1   C: 26663 0   C: 02467 0   I: 77776 1      11632 0      03155 0      05402 1
33,3110     C: 00255 0      06006 1   I: 77745 1   C: 02634 1   I: 53025 0   C: 02640 1   C: 67152 0   C: 00001 0
33,3120     I: 43335 0   C: 26671 0   C: 02633 0   C: 16633 0   C: 02634 1   C: 16636 0   C: 00001 0   C: 02654 1
33,3130     I: 77776 1      02744 1      05402 1   C: 00335 1      00006 1      31636 0      53640 0      34762 0

33,3140        55412 0      05402 1   C: 00075 0      33210 1      04636 0   C: 17244 0      04636 0   C: 17644 1
33,3150        02655 0      02227 1   I: 77776 1      34770 0      55632 0      11631 0      55646 0      34322 0
33,3160        55412 0      02277 1      00004 0      41214 0      64774 1      00006 1      13202 0      44772 0
33,3170        00006 1      06030 1      74764 1      10000 0      13203 1      34764 0      70101 0      10000 0

33,3200        13203 1      00003 1      00002 0      37644 0      05176 1      00004 0      04655 0   C: 70000 0
33,3210     C: 02647 0   C: 06200 0      05402 1   C: 00154 1      05344 1   C: 00003 1      02011 0      04636 0
33,3220     C: 16073 1      34770 0      22007 0      23427 1      55252 1      00006 1      51427 1      31433 1
33,3230        53251 1      33252 1      04636 0   C: 20705 1      35032 0      04636 0   C: 20743 0      03370 0

33,3240        03242 0      13231 0      53251 1      51427 1      53433 0      11427 0      13313 1      34767 0
33,3250        54001 1      13223 0   C: 01236 1      06006 1   I: 77170 1   C: 00002 0   C: 00014 1   I: 40331 1
33,3260     C: 00052 0   C: 00006 1   C: 00001 0   I: 60533 1   C: 02436 1   C: 00001 0   I: 77756 0   C: 10023 1
33,3270     I: 77745 1   C: 00001 0   I: 41546 0   I: 47133 0   C: 02435 1   C: 51754 0   C: 00003 1   I: 41356 1

33,3300     C: 00001 0   I: 77752 1   C: 10027 0   I: 71545 0   C: 00003 1   I: 72405 0   I: 76076 1   C: 00000 1
33,3310     C: 10025 1   I: 43504 1   C: 67263 1      34770 0      55140 1      34772 1      03375 0      06006 1
33,3320     I: 77624 1   C: 67254 0   I: 64375 1   C: 00007 0   C: 02672 0   I: 77772 0   C: 26736 1   C: 00015 0
33,3330     I: 76521 0   C: 02672 0   C: 36744 0   C: 67450 1   C: 02414 1   I: 77776 1      34767 0      55140 1

33,3340        36211 0      03375 0      06006 1   I: 77624 1   C: 67450 1   C: 24015 0   C: 02414 1   C: 34007 1
33,3350     C: 47432 1   I: 77624 1   C: 47240 1   I: 77776 1      35040 0      04636 0   C: 20743 0      03370 0
33,3360        13362 1      13354 1      06006 1   I: 53375 0   C: 02760 1   C: 02650 0   C: 02650 0   I: 77776 1
33,3370        05344 1   C: 00002 0      05402 1   C: 00004 0      05205 0      00006 1      23424 1      55431 1
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OCTAL LISTING FOR PARAGRAPH # 177,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,3400        06006 1     I: 77624 1     C: 67254 0     I: 76740 0     C: 02431 0     C: 00007 0     C: 36766 0     C: 46053 0
33,3410     I: 77776 1        31773 0        55313 0        31775 0        55312 1        34772 1        55323 0        04636 0
33,3420     C: 16000 0        10301 1        03415 1        04636 0     C: 16073 1        01424 1     C: 30341 1     C: 22444 0
33,3430     C: 57223 0     C: 66451 1     C: 05427 0     C: 12577 1     C: 77567 0     C: 44202 1     C: 24276 1     C: 14066 1

33,3440     C: 03146 1     C: 14632 0     C: 00121 0     C: 35341 1     C: 01767 0     C: 31666 0     C: 00004 0     C: 35223 1
33,3450     I: 74020 0     C: 00300 1     C: 03722 0     I: 77650 1     C: 36073 0        35026 0        05535 1        06006 1
33,3460     I: 43345 1     C: 03413 1     C: 27533 1     C: 03464 1     I: 44234 1     C: 51751 0     C: 03413 1     C: 03673 0
33,3470     I: 77776 1        52155 1        05332 0     C: 02311 0     C: 40067 1        05362 0     C: 00153 0     C: 24024 1

33,3500        00006 1        31464 0        53413 1        33536 1        05535 1        06006 1     I: 51575 1     C: 01563 0
33,3510     C: 03723 1     I: 43021 0     C: 02356 0     C: 03464 1     C: 17725 1     C: 27535 1     C: 01062 1     I: 77776 1
33,3520        33537 0        54777 1        34770 0        05233 0     C: 03225 1     C: 50067 0        05362 0     C: 40036 0
33,3530     C: 00004 0        15205 1     C: 00003 1     C: 20640 1     C: 03540 0     C: 66067 0     C: 01416 0     C: 01537 1

33,3540        06006 1     I: 45345 1     C: 03661 0     C: 27667 0     I: 43040 1     C: 67547 0     C: 01064 1     I: 77624 1
33,3550     C: 70537 1     I: 44345 0     C: 03723 1     C: 02356 0     C: 17725 1     C: 03723 1     I: 45214 1     C: 01344 0
33,3560     C: 67605 0     C: 03462 1     I: 41440 1     C: 67605 0     I: 54345 1     C: 03725 1     C: 20612 0     I: 77671 1
33,3570     I: 41200 0     C: 67605 0     C: 27671 1     I: 67206 1     C: 02355 0     I: 44261 1     C: 20617 0     I: 43206 1

33,3600     C: 01044 0     C: 17413 1     I: 50025 0     C: 27665 1     C: 67611 0     I: 77745 1     C: 03723 1     C: 37462 0
33,3610     C: 51603 0     I: 77776 1        00004 0        00006 1        31413 0        52155 1        00006 1        40025 1
33,3620        20155 1        07224 1        30155 0        00006 1        63626 0        13627 0        34770 0        55460 0
33,3630        05223 1     C: 03637 0        05362 0     C: 40614 0     C: 10035 0        04655 0     C: 51134 0        34753 1

33,3640        00006 1        05012 1        00006 1        30025 0        53022 1        05255 0     C: 00372 1        34772 1
33,3650        54777 1        44756 0        70103 1        54103 1        05402 1     C: 05014 1     C: 77777 0        34664 1
33,3660        05121 0     C: 02012 0     C: 74067 0        05314 1     C: 00000 1     C: 00620 0     C: 00000 1     C: 01750 1
33,3670     C: 00006 1     C: 10000 0     I: 57546 1     C: 14017 1     I: 77756 0     C: 14013 0     C: 15336 0     C: 00015 0

33,3700     I: 41335 1     C: 03305 1     C: 03301 0     I: 45261 0     C: 20217 1     C: 15334 1     I: 45215 0     C: 02634 1
33,3710     C: 02401 0     I: 77634 0     C: 70601 1     I: 71406 0     I: 77606 1     I: 72405 0     C: 00017 1     C: 14027 1
33,3720     I: 77676 0     C: 00023 0     I: 72405 0     C: 00013 0     C: 14033 1     I: 41556 1     C: 00031 0     I: 72405 0
33,3730     C: 00017 1     C: 14021 1     I: 77676 0     I: 72405 0     C: 00013 0     C: 24025 0     C: 00013 0     I: 77656 1

33,3740     C: 26714 1     C: 00021 1     I: 77656 1     C: 26722 1     C: 00027 1     I: 77656 1     C: 36730 0     C: 47240 1
33,3750     I: 41575 0     C: 02760 1     I: 45006 0     C: 47530 1     I: 47175 1     C: 00003 1     C: 45644 0     C: 27306 1
33,3760     C: 15336 0     C: 24001 0     C: 01172 1     I: 47034 0     C: 45644 0     C: 70561 1     C: 14013 0     C: 01144 1
33,3770     I: 72405 0     C: 00001 0     I: 60415 1     C: 00005 1     I: 77650 1     C: 70413 0     C: 03776 1  CKSM 32430 1
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OCTAL LISTING FOR PARAGRAPH # 200,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

34,2000       35024 1      54003 0      00006 1      32274 1      53162 1      44772 0      22007 0      55126 1
34,2010       53166 0      00006 1      32276 0      53022 1      00006 1      30025 0      53127 0      34772 1
34,2020       22007 0      52025 1      53022 1      53162 1      00004 0      00006 1      31710 0      53132 1
34,2030       31706 1      57130 1      00006 1      31022 0      21132 1      27130 0      05402 1   C: 05023 0

34,2040    C: 22000 1      00004 0      00006 1      31131 0      53707 1      31132 0      57710 0      35046 0
34,2050       54003 0      04714 1   C: 76630 0      05402 1   C: 05023 0   C: 22000 1      35011 1      05233 0
34,2060    C: 02315 1   C: 70066 0      05344 1   C: 00013 0      05547 1   C: 00022 1      36214 0      54332 1
34,2070       04636 0   C: 20715 0      05362 0   C: 40514 0   C: 00073 0      35043 0      54003 0      32277 1

34,2100       55426 1      06006 1   I: 64375 1   C: 02467 0   C: 02672 0   I: 53372 1   C: 02650 0   C: 16650 0
34,2110    C: 01022 0   I: 52131 0   C: 00052 0   C: 66202 1   C: 66151 1      22007 0      30032 0      53760 0
34,2120       22007 0      30033 1      53762 1      22007 0      30034 0      53764 1      06006 1   I: 74575 0
34,2130    C: 02760 1   C: 02760 1   I: 77731 1   C: 03747 0   C: 00000 1   I: 65345 0   C: 01134 0   C: 01136 1

34,2140    I: 55525 0   C: 02403 1   C: 14747 0   C: 15336 0   I: 45014 0   C: 00662 0   C: 26524 0   C: 35071 1
34,2150    C: 70331 1   I: 53476 1   C: 25750 1   C: 01071 0   I: 74235 0   C: 01712 1   C: 30301 0   I: 77712 0
34,2160    C: 25077 0   C: 01750 1   I: 53435 0   C: 01712 1   I: 47206 0   C: 01750 1   I: 65256 0   C: 02634 1
34,2170    I: 74346 0   I: 77626 0   C: 62043 1   C: 02634 1   I: 74356 1   I: 53455 0   C: 01734 0   C: 01734 0

34,2200    I: 53435 0   C: 01750 1   I: 77676 0   C: 01742 1   I: 45345 1   C: 15334 1   C: 02634 1   I: 65215 1
34,2210    C: 02401 0   C: 03301 0   I: 45565 0   C: 74476 1   I: 77414 0   C: 01462 0      05402 1   C: 04023 1
34,2220       00006 1      32303 0      53062 0      37652 1      55277 0      04611 0      00004 0      44772 0
34,2230       55267 1      40025 1      65017 1      10000 0      12237 1      12237 1      34772 1      64770 0

34,2240       05233 0   C: 02652 1   C: 76066 0      05362 0   C: 00003 1   C: 00025 0      04655 0   C: 77154 1
34,2250       00004 0      11166 0      05205 0      11126 1      12260 0      12260 0      12260 0      12011 1
34,2260       41021 1      00006 1      62270 0      10024 0      12017 1      00006 1      31127 1      12022 1
34,2270       00006 1      32276 0      12023 0   C: 77766 0   C: 00011 1   C: 77764 1   C: 00013 0   C: 02225 0

34,2300    C: 71704 1   C: 41735 0   C: 02304 1   C: 70066 0      06006 1   I: 77624 1   C: 70537 1   I: 77776 1
34,2310       05402 1   C: 00035 1      32617 0      04636 0   C: 20721 1      34757 0      05135 0   C: 02342 0
34,2320    C: 70066 0      41501 0      74766 0      27501 0      04714 1   C: 42425 1      34770 0      55714 0
34,2330       05314 1   I: 40220 0   C: 02241 1   C: 00001 0   I: 77745 1   C: 15336 0   C: 14007 0   C: 15334 1

34,2340    C: 34011 0   C: 26531 1      30102 1      74076 0      00006 1      12347 1      05205 0      34757 0
34,2350       00006 1      02030 0      00006 1      12505 1      11714 0      12360 1      12510 0      12510 0
34,2360       41702 1      60025 0      00006 1      62612 0      54154 0      55704 1      61703 1      00006 1
34,2370       62372 0      02612 0      30024 1      00006 1      62376 1      02612 0      31661 1      54001 1
```

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OCTAL LISTING FOR PARAGRAPH # 201,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

34,2400       32616 1      07164 0      34772 1      54163 1      06006 1   I: 54201 0   C: 00001 0   C: 20206 1
34,2410    I: 77606 1   I: 77650 1   C: 67672 0   C: 14021 1   C: 01152 0   I: 41405 0   C: 00001 0   I: 72405 0
34,2420    C: 01154 0   I: 41325 0   C: 01146 0   C: 00003 1   I: 72415 1   I: 77626 0   C: 63755 0   I: 72405 0
34,2430    C: 01146 0   I: 41325 0   C: 01154 0   C: 00003 1   I: 72425 1   I: 77626 0   C: 77754 1   I: 77751 1

34,2440    C: 00021 1   C: 03077 1   I: 77776 1      31714 1      10000 0      02466 1      02474 1      06006 1
34,2450    I: 76351 1   C: 03316 0   C: 03077 1   C: 03077 1   I: 77776 1      31476 0      02620 1      55476 1
34,2460       31477 1      02620 1      55477 0      31500 0      02620 1      55500 1      04636 0   C: 42425 1
34,2470       34125 0      04636 0   C: 01731 0      02342 0      41476 1      55715 1      41477 0      55716 1

34,2500       41500 1      55717 0      44770 1      55714 0      02447 1      31714 1      00006 1      62360 0
34,2510       41501 0      74766 0      27501 0      04636 0   C: 42425 1      36211 0      04636 0   C: 01731 0
34,2520       11714 0      02531 1      02523 1      34770 0      55714 0      44760 0      00006 1      03012 1
34,2530       02466 1      34760 1      00006 1      05012 1      34772 1      55714 0      02466 1   I: 51575 1

34,2540    C: 01036 0   C: 27723 1   C: 01030 0   I: 50256 0   C: 01036 0   I: 77752 1   C: 17741 0   C: 05173 1
34,2550    I: 77214 0   C: 00355 1   C: 70555 0   C: 02026 1   I: 60446 1   I: 77621 1   C: 00045 0   C: 03737 1
34,2560    I: 77616 0      31705 1      00006 1      20154 0      50120 1      54000 0      31706 1      00006 1
34,2570       20155 1      50120 1      54002 1      31707 0      00006 1      20156 1      50120 1      54004 1

34,2600       16030 0      30154 1      00006 1      71701 1      00006 1      66030 1      22007 0      34772 1
34,2610       52155 1      06030 1      06006 1   I: 52001 1   C: 00001 0   C: 67750 1   C: 01673 1   C: 01476 0
34,2620       00006 1      71720 1      20001 1      20001 1      00002 0      37650 0      55262 1      05176 1
34,2630       37700 1      55722 0      06006 1   I: 77634 0   C: 51751 0   C: 01010 1   I: 77624 1   C: 22327 1

34,2640    I: 77624 1   C: 56523 0   I: 77776 1      31722 1      00006 1      12650 1      00006 1      62666 0
34,2650       36211 0      05607 0   C: 01722 1   C: 01061 1      37700 1      55722 0      05547 1   C: 00217 0
34,2660       06006 1   I: 45014 0   C: 04667 1   C: 22327 1   I: 77650 1   C: 70761 0      06006 1   I: 77624 1
34,2670    C: 22327 1   I: 77624 1   C: 56523 0   I: 43014 0   C: 04746 0   C: 70642 0   C: 05346 0   C: 70642 0

34,2700    I: 77634 0   C: 51751 0   I: 45225 0   C: 14651 0   C: 01010 1   I: 77440 1   C: 70642 0      00004 0
34,2710       44777 0      00006 1      03013 0      00006 1      00004 0      54001 1      74342 1      40000 0
34,2720       64763 1      74342 1      55064 0      67701 0      00006 1      62713 0      34322 0      00006 1
34,2730       05013 0      40001 1      55063 1      00003 1      00006 1      30025 0      53062 0      05561 0

34,2740    C: 00043 0      05205 0      05632 0      11703 0      02750 1      03424 0      03406 0      03406 0
34,2750       06006 1   I: 41335 1   C: 03704 1   C: 16535 0   C: 01114 1   I: 71214 0   C: 04467 0   C: 01062 1
34,2760    C: 01010 1   I: 77624 1   C: 60435 0   I: 77624 1   C: 56603 1   I: 45014 0   C: 01671 0   C: 71327 1
34,2770    I: 45014 0   C: 02464 0   C: 71336 1   I: 77614 1   C: 05310 0   C: 47030 1   I: 77614 1   C: 02716 0
```

OCTAL LISTING FOR PARAGRAPH # 202, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
34,3000     C: 71017 1   I: 77745 1   C: 15336 0   C: 14772 0   C: 02001 1   C: 34001 1   C: 56612 1   I: 71214 0
34,3010     C: 05267 1   C: 01062 1   C: 03736 0   I: 66214 0   C: 05273 1   C: 02551 1   C: 00001 0   I: 77614 1
34,3020     C: 02476 0   I: 52375 1   C: 01054 1   C: 01046 1   C: 03531 0   I: 43056 0   C: 04707 0   C: 71251 1
34,3030     C: 01130 1   I: 74014 1   C: 02744 1   C: 71047 1   C: 01061 1   I: 77624 1   C: 47017 1   C: 25072 0

34,3040     C: 01130 1   I: 40035 0   C: 01072 0   C: 71044 1   I: 40056 0   C: 71375 0   C: 01102 0   I: 77624 1
34,3050     C: 46756 1   I: 77214 0   C: 00707 1   C: 71057 0   C: 03502 0   I: 77676 0   C: 03502 0   I: 77624 1
34,3060     C: 22327 1   I: 77614 1   C: 01341 0   C: 71302 0   I: 43345 1   C: 16457 0   C: 16461 0   C: 27526 0
34,3070     C: 03531 0   I: 60246 1   C: 00047 1   I: 41316 0   C: 03526 0   I: 45070 1   C: 00046 0   C: 56603 1

34,3100     I: 56070 0   C: 00047 1   C: 00047 1   I: 72257 1   C: 20577 0   C: 00155 0   C: 03526 0   I: 54335 0
34,3110     C: 02400 1   C: 20632 1   I: 47171 0   C: 03526 0   C: 45657 1   C: 03526 0   I: 76214 1   C: 04747 1
34,3120     C: 71127 0   C: 03005 1   I: 72244 0   C: 71127 0   C: 03005 1   I: 77646 0   C: 03526 0   I: 45014 0
34,3130     C: 02666 0   C: 75260 1   I: 77624 1   C: 22327 1   I: 45014 0   C: 02744 1   C: 71176 1   C: 56603 1

34,3140     I: 51575 1   C: 01122 1   I: 77657 0   C: 57176 0   C: 27504 0   C: 01114 1   I: 53646 0   C: 57176 0
34,3150     C: 03502 0   I: 43131 0   C: 03506 1   C: 00002 0   C: 04707 0   C: 71163 0   I: 66214 0   C: 05303 1
34,3160     C: 71375 0   C: 03506 1   C: 00001 0   I: 77735 0   C: 02003 0   I: 45261 0   C: 20613 1   C: 03502 0
34,3170     I: 67240 0   C: 71345 0   C: 02004 1   I: 50025 0   C: 03504 0   C: 71345 0   I: 77624 1   C: 75472 1

34,3200     I: 71214 0   C: 02744 1   C: 71217 0   C: 01062 1   C: 03734 1   I: 67214 1   C: 05272 0   C: 02551 1
34,3210     I: 45254 0   C: 71217 0   C: 07142 1   I: 66240 1   C: 71237 1   C: 02551 1   C: 00000 1   I: 43014 0
34,3220     C: 04707 0   C: 71307 0   C: 02744 1   C: 71315 0   I: 77624 1   C: 56603 1   I: 45014 0   C: 00707 1
34,3230     C: 71323 0   C: 71336 1   I: 77624 1   C: 22327 1   I: 77614 1   C: 02624 0   C: 71021 1   I: 77735 0

34,3240     C: 02551 1   C: 37732 0   C: 22327 1   I: 62150 1   C: 03731 1   C: 00001 0   I: 52130 1   C: 02550 0
34,3250     C: 71217 0   C: 27502 0   C: 15336 0   C: 03510 0   C: 27516 0   C: 03531 0   I: 71256 0   C: 01114 1
34,3260     I: 60414 0   C: 04303 0   C: 71263 0   I: 43025 1   C: 00045 0   C: 02464 0   C: 03524 1   I: 77214 0
34,3270     C: 00747 0   C: 71275 1   C: 03502 0   I: 77676 0   C: 03502 0   I: 77624 1   C: 22327 1   I: 52145 0

34,3300     C: 03003 1   C: 71067 0   I: 43335 0   C: 01350 0   C: 16461 0   I: 77650 1   C: 71067 0   I: 62150 1
34,3310     C: 00771 0   C: 00001 0   I: 52130 1   C: 00771 0   C: 71375 0   I: 62150 1   C: 00772 0   C: 00001 0
34,3320     I: 52130 1   C: 00772 0   C: 71375 0   I: 77624 1   C: 71327 1   I: 77650 1   C: 71232 1   I: 53775 1
34,3330     C: 01573 1   C: 57167 0   I: 77655 1   C: 01607 1   C: 01046 1   I: 77616 0   I: 53775 1   C: 01645 1

34,3340     C: 57167 0   I: 77655 1   C: 01661 1   C: 01054 1   I: 77616 0   I: 77776 1      34772 1      55135 0
34,3350        05402 1   C: 04022 0      37651 1      05121 0   C: 03366 1   C: 70067 1      06006 1   C: 00155 0
34,3360     I: 53135 0   C: 01136 1   C: 71357 0   I: 52040 1   C: 71176 1   C: 71375 0      35030 1      04636 0
34,3370     C: 20753 1      04546 1      44770 1      55135 0      05205 0   I: 77624 1   C: 22327 1   I: 43014 0
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OCTAL LISTING FOR PARAGRAPH # 203,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

34,3400     C: 04670 1   C: 05263 0   I: 52014 0   C: 04707 0   C: 70636 0   C: 70667 1      31703 1      74750 0
34,3410        54154 0      06006 1   I: 41335 1   C: 00155 0   C: 16535 0   I: 52015 1   C: 16535 0   C: 70754 0
34,3420        31113 0      00006 1      13424 1      05644 1      06006 1   I: 77745 1   C: 01062 1   C: 01010 1
34,3430     I: 77650 1   C: 70636 0   I: 40220 0   C: 03704 1   C: 00001 0   I: 77634 0   C: 51751 0   C: 36307 0

34,3440     C: 73171 1   I: 71214 0   C: 05266 0   C: 02307 1   I: 51025 1   C: 33161 1   C: 71451 1   I: 77614 1
34,3450     C: 05066 1   I: 77776 1      05354 0   C: 00033 1      04415 0      11340 0      03560 1      03461 1
34,3460        03461 1      40107 0      74761 1      10000 0      03505 1      34767 0      55611 1      51611 0
34,3470        30032 0      00006 1      51611 0      21307 0      54154 0      06006 1   I: 45246 0   C: 16645 1

34,3500     I: 77444 0   C: 71566 1      11611 1      03466 0      03545 0      31572 0      55175 1      31573 1
34,3510        55171 0      31574 0      55173 1      06006 1   I: 45175 0   C: 03351 0   C: 47642 1   I: 50206 0
34,3520     C: 03357 0   I: 50025 0   C: 16641 0   C: 71566 1   I: 47375 0   C: 00001 0   C: 03357 0   I: 41561 0
34,3530     C: 16644 0   I: 45246 0   C: 16642 0   I: 77240 1   C: 71540 0   I: 74256 0   C: 16642 0   I: 41572 1

34,3540     I: 74375 0   C: 00007 0   C: 16637 1   C: 03212 0   I: 77776 1      37673 1      05654 0      13550 0
34,3550        67671 0      00006 1      13554 1      03560 1      40075 1      74753 0      10000 0      03600 1
34,3560        06006 1   I: 77614 1   C: 00273 1   I: 52135 1   C: 15336 0   C: 03704 1   I: 77614 1   C: 00153 0
34,3570     C: 44001 0   I: 77414 0   C: 01700 1   C: 73166 1      34766 1      00006 1      05011 1      03560 1

34,3600        06006 1   I: 43001 1   C: 00001 0   C: 04346 1   C: 71610 0   I: 53145 1   C: 02307 1   C: 73162 0
34,3610     I: 52375 1   C: 03204 1   C: 03715 1   I: 57456 1   I: 74235 0   C: 03707 1   C: 16646 1   I: 60325 0
34,3620     C: 02307 1   C: 00047 1   I: 60325 0   C: 00045 0   C: 00051 0   I: 70460 1   C: 00050 1   I: 74271 0
34,3630     I: 53721 0   C: 01734 0   C: 20163 1   I: 53214 0   C: 05707 1   C: 71637 0   C: 03212 0   C: 00025 0

34,3640     I: 77761 1   C: 16650 0   C: 37212 1   C: 47530 1   I: 45001 1   C: 00001 0   C: 47743 1   I: 70575 1
34,3650     C: 03204 1   C: 34017 0   C: 47530 1   I: 45175 0   C: 00025 0   C: 47633 1   I: 77721 0   C: 16652 1
34,3660     I: 76561 1   C: 15272 1   I: 77776 1      00004 0      40107 0      74761 1      10000 0      03710 1
34,3670        34767 0      55611 1      60000 1      60120 1      55612 1      51611 0      31307 1      00006 1

34,3700        51611 0      21572 1      00006 1      73755 1      51612 0      20017 0      11611 1      13671 0
34,3710        31572 0      55646 0      31573 1      55650 1      31574 0      55652 0      00006 1      30155 0
34,3720        53526 0      00006 1      30160 0      53530 1      00006 1      30162 1      53532 0      00006 1
34,3730        50120 1      30017 1      53576 0      00006 1      50120 1      30021 1      53600 1      00006 1

34,3740        50120 1      30023 0      53602 0      44770 1      55340 0      00003 1      03560 1   I: 43234 0
34,3750     C: 51751 0   C: 33574 1   I: 52015 1   C: 03317 1   C: 71437 1   C: 00122 0   C: 24775 1   C: 30424 0
34,3760     C: 06220 1   C: 37553 0   C: 37777 1   C: 37700 1   C: 00000 1   C: 00100 0   C: 04000 0   C: 00000 1
34,3770     C: 02000 0   C: 00000 1   C: 03772 0   C: 03773 1 CKSM 45775 0         @            @            @
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OCTAL LISTING FOR PARAGRAPH # 204,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,2000        04553 0       02003 0       04565 0       04572 0       06006 1    I: 71214 0    C: 05274 0    C: 32205 1
35,2010     C: 17754 1    C: 15336 0    C: 03744 0    C: 03766 0    I: 77776 1       34532 1       05535 1       34533 0
35,2020        05535 1       06006 1    I: 71214 0    C: 01270 0    C: 03663 1    C: 17413 1    C: 03744 0    I: 43054 1
35,2030     C: 72032 0    C: 01070 1    I: 77624 1    C: 11217 0    I: 43145 0    C: 15336 0    C: 03461 1    I: 43014 0

35,2040     C: 01310 1    C: 72043 0    C: 03661 0    C: 02355 0    I: 43345 1    C: 03663 1    C: 02355 0    C: 34041 0
35,2050     C: 45236 1    I: 77624 1    C: 72251 1    I: 77454 1    C: 72065 1       05671 1    C: 00611 1       35023 0
35,2060        04636 0    C: 20743 0       04103 1       02003 0       02055 0    I: 43014 0    C: 03601 0    C: 72044 1
35,2070     C: 01310 1    C: 72100 0    I: 77776 1       34533 0       05535 1       06006 1    I: 77650 1    C: 72120 1

35,2100     I: 77776 1       34532 1       05535 1       06006 1    I: 43014 0    C: 01351 1    C: 72120 1    C: 05350 1
35,2110     C: 72120 1    I: 43145 0    C: 15336 0    C: 01270 0    C: 17744 0    C: 03663 1    C: 37413 0    C: 72034 0
35,2120     I: 71201 1    C: 00001 0    C: 03746 1    C: 14047 1    C: 03754 1    I: 71406 0    C: 16734 0    I: 77756 0
35,2130     C: 26732 0    C: 03554 0    I: 77657 0    C: 57176 0    C: 26657 1    C: 03562 0    I: 43057 1    C: 57176 0

35,2140     C: 03466 0    C: 36746 1    C: 25002 1    I: 77745 1    C: 03663 1    C: 03503 1    I: 77615 0    C: 00037 0
35,2150     C: 37656 0    C: 72561 0    I: 51575 1    C: 03646 0    C: 26635 0    C: 03640 0    I: 51451 0    C: 03620 0
35,2160     C: 26637 1    C: 03540 0    I: 45115 0    C: 03612 1    C: 45174 1    I: 77624 1    C: 45330 0    C: 16641 0
35,2170     C: 03663 1    C: 03413 1    I: 77776 1       34534 1       05535 1       06006 1    I: 77624 1    C: 72774 0

35,2200     I: 77624 1    C: 73027 0    I: 77650 1    C: 72034 0    C: 13434 0    C: 16163 1       04553 0       00006 1
35,2210        31422 1       02215 0       04565 0       00006 1       31424 1       53755 0       04572 0       06006 1
35,2220     I: 77624 1    C: 11217 0    I: 77634 0    C: 51751 0    C: 03665 1    I: 77615 0    C: 02355 0    C: 03413 1
35,2230     C: 03503 1    C: 34041 0    C: 45236 1    I: 77624 1    C: 74000 1    I: 77624 1    C: 72561 0    I: 77624 1

35,2240     C: 72774 0    I: 43014 0    C: 01351 1    C: 72245 1    C: 05067 0    I: 77624 1    C: 73027 0    I: 77650 1
35,2250     C: 72222 0    I: 66220 1    C: 01023 1    C: 03665 1    C: 40000 0    I: 40345 1    C: 33145 1    C: 00001 0
35,2260     C: 27454 1    C: 03540 0    C: 27576 0    C: 03546 0    C: 27570 0    C: 03554 0    C: 27620 0    C: 03562 0
35,2270     C: 03612 1    I: 77624 1    C: 74000 1    I: 63235 0    C: 03540 0    I: 53515 0    C: 03540 0    I: 46315 1

35,2300     I: 51352 1    C: 02625 1    I: 63256 0    I: 63241 0    C: 00001 0    I: 75241 1    C: 02625 1    I: 65552 0
35,2310     I: 50315 0    C: 02625 1    C: 03540 0    I: 71244 0    C: 72317 1    C: 15344 0    I: 41425 1    I: 71214 0
35,2320     C: 03741 0    C: 72546 0    C: 03452 1    C: 14033 1    I: 77625 0    C: 03744 0    C: 03452 1    I: 45246 0
35,2330     C: 33151 1    I: 77640 0    C: 72556 1    I: 70535 0    C: 03665 1    I: 72030 1    C: 01023 1    C: 00154 1

35,2340     I: 77330 1    C: 03664 0    C: 03554 0    I: 65256 0    C: 00045 0    I: 53515 0    C: 03540 0    I: 77725 1
35,2350     I: 41525 0    C: 00045 0    I: 77621 1    C: 00015 0    C: 14037 0    C: 15334 1    I: 41425 1    C: 03744 0
35,2360     I: 50165 0    C: 00037 0    C: 01023 1    I: 71545 0    I: 56205 0    C: 00017 1    C: 00015 0    I: 77676 0
35,2370     C: 00035 1    I: 44246 1    C: 15334 1    I: 77240 1    C: 01023 1    C: 02617 0    I: 53435 0    C: 00007 0
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OCTAL LISTING FOR PARAGRAPH # 205,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,2400       I: 41241 0     C: 03546 0     C: 00015 0     I: 47315 0     C: 00001 0     C: 03562 0     I: 53435 0     C: 00001 0
35,2410       I: 41241 0     C: 03562 0     C: 00017 1     I: 77621 1     I: 63301 0     C: 00047 1     C: 00007 0     I: 5 235 0
35,2420       C: 00001 0     C: 02617 0     I: 50315 0     C: 00001 0     C: 00007 0     I: 65552 0     I: 77765 0     I: 43225 0
35,2430       C: 15334 1     C: 03744 0     I: 65525 0     C: 00035 1     I: 75221 1     C: 15334 1     C: 00037 0     I: 77615 0

35,2440       I: 56205 0     C: 33143 1     I: 77605 1     I: 41257 1     C: 20176 0     I: 51406 1     I: 50025 0     C: 03454 1
35,2450       C: 72454 1     I: 75345 1     C: 03454 1     I: 77606 1     I: 51135 1     C: 03665 1     C: 72464 1     I: 71331 0
35,2460       C: 03665 1     C: 37777 1     I: 77650 1     C: 72522 1     I: 41345 0     C: 03452 1     C: 00033 1     I: 71244 0
35,2470       C: 72500 1     C: 03454 1     I: 77605 1     C: 33147 0     C: 17454 1     I: 70446 0     I: 52076 1     C: 72510 0

35,2500       I: 51545 1     C: 03452 1     I: 51525 1     C: 00033 1     I: 77625 0     I: 71240 1     C: 72513 0     I: 77646 0
35,2510       I: 52165 1     C: 03450 0     C: 72522 1     I: 57545 1     C: 03450 0     I: 70406 1     C: 03450 0     I: 77615 0
35,2520       I: 77650 1     C: 72523 0     C: 03450 0     I: 77615 0     C: 02355 0     C: 02355 0     I: 63375 0     C: 03570 0
35,2530       C: 03576 0     I: 77624 1     C: 72734 1     I: 77624 1     C: 45304 1     I: 63375 0     C: 03612 1     C: 03620 0

35,2540       I: 77624 1     C: 72734 1     I: 77624 1     C: 45314 0     I: 77650 1     C: 72271 0     I: 43345 1     C: 03663 1
35,2550       C: 02355 0     C: 17663 1     I: 77614 1     C: 01310 1     C: 72556 1     C: 03744 0     I: 52145 0     C: 15336 0
35,2560       C: 01023 1     I: 77220 1     C: 02360 0     C: 03562 0     I: 65315 0     C: 03554 0     C: 03503 1     I: 65325 0
35,2570       C: 03656 1     C: 33143 1     I: 46125 0     C: 03766 0     C: 72577 1     I: 65345 0     C: 15336 0     I: 77624 1

35,2600       C: 72740 1     C: 27415 1     C: 00007 0     C: 27640 0     C: 03415 1     I: 63256 0     C: 03540 0     I: 41456 0
35,2610       I: 50235 0     C: 00001 0     C: 02617 0     I: 77715 1     I: 72441 0     C: 00001 0     I: 75326 1     I: 43244 1
35,2620       C: 72622 1     C: 15344 0     C: 16633 0     C: 03656 1     I: 77625 0     C: 03503 1     C: 03423 1     I: 40335 0
35,2630       C: 03766 0     C: 00001 0     I: 63325 0     C: 33156 0     C: 03540 0     C: 27570 0     C: 03546 0     C: 37576 1

35,2640       C: 22000 1     I: 77624 1     C: 72721 0     I: 64375 1     C: 03646 0     C: 00001 0     I: 77772 0     C: 37405 1
35,2650       C: 02360 0     I: 45020 1     C: 01023 1     C: 72721 0     I: 61375 1     C: 03405 0     C: 00001 0     I: 77772 0
35,2660       C: 03646 0     I: 63255 0     C: 03546 0     C: 03540 0     I: 65325 0     C: 03413 1     C: 03656 1     I: 41525 0
35,2670       C: 15344 0     I: 77624 1     C: 72740 1     I: 77775 1     C: 00001 0     C: 03415 1     I: 41575 0     C: 02625 1

35,2700       I: 57435 1     C: 02617 0     I: 41456 0     I: 76435 1     C: 02625 1     I: 77715 1     I: 64315 1     C: 03646 0
35,2710       C: 00001 0     I: 77772 0     C: 36611 1     C: 01023 1     I: 40220 0     C: 01023 1     C: 00001 0     I: 77650 1
35,2720       C: 72676 0     I: 57575 1     C: 02617 0     C: 24007 0     C: 03540 0     I: 57456 1     C: 00015 0     I: 76435 1
35,2730       C: 02617 0     C: 00001 0     I: 43401 0     C: 00023 0     I: 65325 0     C: 15336 0     C: 02355 0     I: 41406 0

35,2740       I: 45020 1     C: 02357 1     C: 27516 0     I: 71214 0     C: 01673 1     I: 43054 1     C: 72750 0     C: 01473 0
35,2750       I: 45545 1     C: 63736 0     I: 73014 0     C: 00063 1     C: 03746 1     I: 43014 0     C: 04303 0     C: 72761 1
35,2760       C: 00263 0     C: 25517 0     I: 77657 0     C: 57176 0     C: 25535 0     I: 77657 0     C: 57176 0     C: 35543 0
35,2770       C: 27211 0     I: 52175 0     C: 00001 0     C: 02357 1     I: 43020 1     C: 02360 0     C: 01311 0     C: 73003 0
```

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OCTAL LISTING FOR PARAGRAPH # 206,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,3000     I: 52014 0   C: 00470 1   C: 73005 0   I: 77614 1   C: 05074 1   I: 77775 1   C: 03405 0   C: 03620 0
35,3010     I: 77776 1      34535 0      05535 1      06006 1   I: 52375 1   C: 03405 0   C: 03620 0   I: 53046 0
35,3020     C: 73023 1   I: 77624 1   C: 72651 0   I: 77624 1   C: 72714 0   I: 77650 1   C: 02360 0   I: 71220 1
35,3030     C: 02360 0   C: 33154 1   C: 03626 0   I: 71214 0   C: 01351 1   C: 73055 0   C: 33154 1   I: 77615 0

35,3040     C: 33154 1   C: 03626 0   I: 77414 0   C: 01742 1   C: 73055 0      03137 1      03050 1      03056 1
35,3050        06006 1   I: 41575 0   C: 03646 0   I: 77624 1   C: 56444 0   I: 77776 1      03525 0      31760 1
35,3060        55756 0      04636 0   C: 01730 1      34536 0      04636 0   C: 20743 0      04103 1      03071 1
35,3070        03101 1      40076 1      74763 0      00006 1      13113 0      05402 1   C: 04024 0      05547 1

35,3100     C: 00047 1      05561 0   C: 00155 0      33136 0      54373 1      05402 1   C: 00014 1      06006 1
35,3110     I: 52014 0   C: 00670 0   C: 02356 0      05402 1   C: 04024 0      06006 1   I: 77745 1   C: 03413 1
35,3120     C: 03450 0   I: 43014 0   C: 05316 0   C: 73125 0   C: 05072 1   I: 71214 0   C: 05350 1   C: 73132 0
35,3130     C: 33135 0   C: 02001 1   I: 77776 1      14105 0   C: 00023 0   C: 00144 0   C: 73112 1      37677 0

35,3140        71214 0      15651 1   C: 14441 0   C: 37325 1   C: 00001 0   C: 20650 0   C: 12525 0   C: 12525 0
35,3150     C: 00004 0   C: 21505 1   C: 00002 0   C: 77777 0   C: 61337 1   C: 01252 0   C: 25253 1   C: 01473 0
35,3160     C: 00022 1   C: 20476 0   I: 77775 1   C: 15336 0   C: 34017 0   C: 71662 0   I: 52135 1   C: 16674 0
35,3170     C: 03704 1   I: 71220 1   C: 03705 0   C: 02307 1   C: 34041 0   C: 27170 1   I: 77775 1   C: 00001 0

35,3200     C: 27707 1   C: 00007 0   C: 03715 1   I: 77635 1   C: 03707 1   C: 03357 0   I: 71214 0   C: 04306 0
35,3210     C: 76425 0   C: 02307 1   C: 34041 0   C: 27202 1   I: 77775 1   C: 00007 0   C: 27204 1   C: 00001 0
35,3220     I: 53451 1   C: 03707 1   C: 17707 1   C: 00045 0   C: 26307 1   C: 03707 1   I: 77614 1   C: 05707 1
35,3230     C: 76462 0   I: 76521 0   C: 01734 0   C: 37357 1   C: 74437 1   C: 37351 1   C: 56225 1   C: 01310 1

35,3240     I: 77650 1   C: 03705 0   I: 70454 0   C: 73251 0   I: 77230 0   C: 73254 0   C: 03351 0   I: 77650 1
35,3250     C: 32042 0   I: 52175 0   C: 00003 1   C: 32042 0   I: 52175 0   C: 00011 1   C: 32042 0   I: 77775 1
35,3260     C: 15336 0   C: 17715 1   C: 15336 0   C: 26307 1   C: 03732 1   I: 53561 0   C: 33272 0   I: 77650 1
35,3270     C: 32042 0   C: 22363 1   C: 11623 0   I: 77775 1   C: 00031 0   I: 53361 0   C: 00007 0   C: 03351 0

35,3300     C: 27351 0   C: 00037 0   I: 53361 0   C: 00015 0   C: 03351 0   C: 27351 0   C: 00023 0   I: 77761 1
35,3310     C: 00003 1   C: 27357 0   C: 00031 0   I: 53361 0   C: 00011 1   C: 03357 0   C: 27357 0   C: 00037 0
35,3320     I: 53361 0   C: 00017 1   C: 03357 0   C: 27357 0   C: 00023 0   I: 77761 1   C: 00005 1   C: 24045 0
35,3330     C: 00031 0   I: 53361 0   C: 00013 0   C: 00045 0   C: 24045 0   C: 00037 0   I: 53361 0   C: 00021 1

35,3340     C: 00045 0   I: 77656 1   C: 24001 0   C: 03357 0   I: 77656 1   C: 27357 0   C: 03351 0   I: 77656 1
35,3350     C: 03351 0   I: 53435 0   C: 01742 1   C: 00007 0   I: 77641 1   C: 00001 0   C: 24021 1   C: 00007 0
35,3360     I: 77641 1   C: 03357 0   C: 34023 1   C: 47311 1   C: 24031 0   C: 00007 0   I: 50235 0   C: 03351 0
35,3370     C: 01742 1   I: 77752 1   C: 24021 1   C: 01742 1   I: 77641 1   C: 03351 0   C: 34023 1   C: 47311 1
```

```
OCTAL LISTING FOR PARAGRAPH # 207,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,3400     C: 00035 1   I: 45246 0   C: 07527 0   I: 77644 1   C: 73425 0   I: 50375 0   C: 01750 1   C: 00007 0
35,3410     C: 24021 1   C: 01734 0   I: 77641 1   C: 00007 0   C: 34023 1   C: 47311 1   C: 00033 1   I: 47175 1
35,3420     C: 00031 0   C: 45644 0   C: 01310 1   I: 77650 1   C: 03705 0   I: 77776 1      05671 1   C: 00401 1
35,3430        06006 1   I: 77650 1   C: 73405 1      05547 1   C: 00027 1      05547 1   C: 00031 0      35026 0

35,3440        05535 1      34535 0      05535 1      05547 1   C: 00045 0      06006 1   I: 71214 0   C: 00670 0
35,3450     C: 03413 1   C: 34041 0   C: 27145 1   I: 67175 0   C: 00007 0   C: 03746 1   C: 27640 0   C: 00001 0
35,3460     C: 03632 0   C: 03540 0   I: 53435 0   C: 03640 0   C: 36617 1   C: 72721 0   I: 61375 1   C: 03405 0
35,3470     C: 00001 0   I: 66172 0   C: 03745 1   C: 03646 0   I: 77646 0   C: 27763 0   C: 03632 0   I: 53315 0

35,3500     C: 03646 0   C: 03640 0   I: 77624 1   C: 54021 0   I: 77776 1      33553 1      05535 1      06006 1
35,3510     I: 77214 0   C: 01742 1   C: 73544 0   C: 03646 0   I: 45006 0   C: 56444 0   I: 77776 1      03525 0
35,3520        34536 0      05535 1      05561 0   C: 00155 0      14103 0      00006 1      23272 1      05547 1
35,3530     C: 00155 0      34772 1      54777 1      34770 0      05233 0   C: 03225 1   C: 50067 0      05362 0

35,3540     C: 40036 0   C: 05024 1   C: 13000 0      01272 1   I: 57545 1   C: 33552 0   C: 03626 0   I: 77634 0
35,3550     C: 73517 0   C: 00000 1   C: 35100 0   C: 01452 0   C: 00004 0   C: 31566 0   C: 00002 0   C: 27311 1
35,3560     C: 00003 1   C: 34661 1   C: 00000 1   C: 06433 0   C: 00000 1   C: 12326 0      03525 0      04655 0
35,3570     C: 50237 1   C: 00002 0   C: 00000 1   C: 00000 1   C: 04000 0   C: 00000 1   C: 00010 0   C: 00000 1

35,3600     C: 00001 0   C: 77777 0   C: 77557 0   C: 77777 0   C: 77760 0   C: 00000 1   C: 00012 1   C: 54631 1
35,3610     C: 63145 1   C: 21463 0   C: 06315 0   C: 77777 0   C: 77766 0   C: 77777 0   C: 77767 1   C: 00000 1
35,3620     C: 35610 0   C: 37405 1   C: 12250 0   C: 33041 1   C: 37714 1   C: 00003 1   C: 13241 1   C: 00605 1
35,3630     C: 00612 1   C: 40214 1   C: 45266 1   C: 73645 1   C: 56536 1   C: 70467 0   C: 71205 0   C: 16525 1

35,3640     C: 12525 0   C: 22525 0   C: 12525 0   C: 17775 1   C: 06676 0   C: 00000 1   C: 00062 0   C: 00020 0
35,3650     C: 14223 1   C: 00000 1   C: 05174 0   C: 00000 1   C: 01654 1   C: 00000 1   C: 00764 1   C: 00000 1
35,3660     C: 00322 1   C: 75725 0   C: 75417 1   C: 00325 0   C: 23740 0   C: 00306 1   C: 06614 1   C: 76027 0
35,3670     C: 70156 1   C: 74517 1   C: 54131 0   C: 30276 1   C: 05001 0   C: 00003 1   C: 27040 0   I: 43020 1

35,3700     C: 02310 1   C: 02716 0   C: 73753 1   I: 77614 1   C: 01711 1   C: 73753 1   I: 45174 1   C: 00002 0
35,3710     C: 27516 0   I: 77014 1   C: 00315 0   C: 73715 0   C: 00000 1   I: 53775 1   C: 01030 0   C: 57176 0
35,3720     C: 01503 0   C: 15535 0   C: 01044 0   C: 25517 0   C: 01036 0   I: 45057 1   C: 57176 0   C: 23434 0
35,3730     I: 77634 0   C: 26774 1   I: 43014 0   C: 04063 0   C: 00315 0   C: 73740 0   I: 77614 1   C: 04263 1

35,3740     I: 71214 0   C: 04307 1   C: 75735 1   C: 01044 0   C: 34041 0   C: 26744 1   I: 45014 0   C: 01674 0
35,3750     C: 27236 0   I: 77650 1   C: 02310 1   I: 45145 0   C: 01044 0   C: 27516 0   I: 43014 0   C: 01476 0
35,3760     C: 04476 0   I: 43014 0   C: 01675 1   C: 01474 1   C: 34041 0   C: 27236 0   I: 77650 1   C: 73706 1
35,3770     C: 03770 1   C: 03771 0   CKSM 51120 0      @            @            @            @            @
```

```
OCTAL LISTING FOR PARAGRAPH # 210,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,2000       I: 52375 1    C: 03554 0    C: 03540 0    I: 41456 0    C: 26625 1    C: 03540 0    I: 53435 0    C: 03546 0
36,2010       C: 02617 0    I: 77616 0       32015 1       05535 1       14103 0    C: 04137 0       04636 0    C: 03731 1
36,2020          31655 0       55773 1       06006 1    I: 43014 0    C: 00667 0    C: 01460 1    I: 66214 0    C: 00472 0
36,2030       C: 00777 0    C: 00000 1    I: 77414 0    C: 05310 0    C: 74050 1       34124 1       04636 0    C: 21074 1

36,2040          04103 1       12043 0       12035 1       30776 1       76214 1       10000 0       02061 1       06006 1
36,2050       I: 77745 1    C: 34467 0    C: 17740 1    C: 15336 0    C: 03742 0    C: 01353 0    I: 77414 0    C: 05310 0
36,2060       C: 74104 1       32470 0       05535 1       32472 1       05540 0       12075 0       30776 1       74767 1
36,2070          10000 0       05205 0       34773 0       05516 0       05205 0       30776 1       74766 0       00006 1

36,2100          12105 0       05547 1    C: 00254 1       12107 1    I: 77776 1       05561 0    C: 00254 1       30776 1
36,2110          76214 1       10000 0       12220 1       05561 0    C: 00176 1       05547 1    C: 00027 1       05362 0
36,2120       C: 00004 0    C: 05022 1    C: 26000 0       34760 1       70104 0       10006 0       12150 0       06006 1
36,2130       I: 77634 0    C: 51751 0    C: 35062 0    C: 60435 0    I: 77776 1       05547 1    C: 00010 0       37650 0

36,2140          05135 0    C: 02625 1    C: 70067 1       05362 0    C: 00072 1    C: 00111 0       04112 1       12157 1
36,2150          35047 1       05135 0    C: 02711 1    C: 26063 0       05362 0    C: 00052 0    C: 00111 0       35053 1
36,2160          05176 1       34764 0       70075 1       00006 1       12416 1       34754 0       70077 0       00006 1
36,2170          12416 1       34772 1       55774 0       30104 1       74760 0       10000 0       02263 1       05547 1

36,2200       C: 00037 0       04636 0    C: 76333 0       40106 1       74752 1       00006 1       14116 1       05547 1
36,2210       C: 00024 1       06006 1    I: 77624 1    C: 31005 0    I: 77776 1       04636 0    C: 16073 1       12416 1
36,2220          55351 0       05547 1    C: 00176 1       05561 0    C: 00010 0       11351 0       02255 1       32471 1
36,2230          05535 1       11140 1       62475 0       10000 0       12253 0       12237 1       12237 1       31140 0

36,2240          55355 1       10000 0       12117 0       35035 1       05535 1       06006 1    I: 77775 1    C: 03705 0
36,2250       C: 03732 1    I: 77776 1       02117 1       04362 1       02227 1       35027 1       05535 1       00006 1
36,2260          31251 0       53356 1       12117 0       05561 0    C: 00037 0       11351 0       12271 0       04655 0
36,2270       C: 74454 1       00006 1       40025 1       52155 1       00006 1       31356 0       20155 1       07224 1

36,2300          10154 0       12314 1       12305 1       34772 1       54155 1       10155 1       12307 0       64770 0
36,2310          05233 0    C: 02320 1    C: 74066 1       05205 0       34750 1       04636 0    C: 01731 0       12271 0
36,2320          37650 0       05135 0    C: 02327 0    C: 74066 1       05547 1    C: 00205 0       05314 1       06006 1
36,2330       I: 47014 1    C: 00701 1    C: 44717 0    C: 44370 0    C: 37262 0    C: 74437 1    C: 03343 0    I: 77776 1

36,2340          00004 0       35007 0       55655 1       11773 1       64770 0       02347 0       64770 0       00006 1
36,2350          12352 0       55655 1       06006 1    I: 41335 1    C: 03373 0    C: 34474 1    I: 45002 1    C: 44522 1
36,2360       I: 41335 1    C: 03373 0    C: 34474 1    I: 64361 1    C: 03343 0    C: 05014 1    C: 27311 1    C: 15336 0
36,2370       C: 03275 1    I: 77776 1       05402 1    C: 00131 1       30075 0       74764 1       00006 1       12416 1
```

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OCTAL LISTING FOR PARAGRAPH # 211,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,2400      34755 1      55774 0      37650 0      05176 1      06006 1   I: 72364 0   C: 03320 0   C: 03262 1
36,2410   I: 45014 0   C: 04075 1   C: 44377 1   I: 77614 1   C: 01035 0   C: 45053 0      30105 0      00004 0
36,2420      74755 0      10000 0      12426 1      04636 0   C: 51203 1      12430 0      04636 0   C: 51217 1
36,2430      05561 0   C: 00205 0      05402 1   C: 00111 0      00004 0      04463 1      15205 1   I: 73545 1

36,2440   C: 03740 1   I: 65276 1   C: 03740 1   I: 41546 0   I: 73525 1   C: 03742 0   I: 72405 0   I: 77725 1
36,2450   I: 71525 0   C: 03742 0   I: 72405 0   I: 43466 1      40075 1      74764 1      10000 0      12416 1
36,2460      04636 0   C: 76333 0      35011 1      04636 0   C: 01731 0      02454 0   C: 74707 1   C: 43433 1
36,2470   C: 01516 1   C: 00306 1   C: 01517 0   C: 14631 0   C: 23146 0   C: 77730 0      05402 1   C: 00004 0

36,2500      06006 1   I: 66170 1   C: 04000 0   C: 03424 0   I: 77745 1   C: 15336 0   C: 03757 1   C: 03761 1
36,2510   I: 77776 1      35026 0      03246 1      12511 1      35033 1      03222 0      12514 1      06006 1
36,2520   I: 71331 0   C: 00122 0   C: 00000 1   C: 03757 1   C: 17632 0   C: 03761 1   C: 17634 0   C: 33572 1
36,2530   C: 17551 0   C: 33662 0   C: 37652 1   C: 64455 1   I: 71214 0   C: 02662 1   C: 03632 0   I: 51444 1

36,2540   C: 74550 1   C: 03632 0   I: 45345 1   C: 03646 0   C: 33664 0   I: 43040 1   C: 74550 1   C: 02462 0
36,2550   I: 77545 0   C: 03646 0      07171 1   C: 00002 0   C: 02544 0   C: 35436 0   C: 14040 0   C: 05066 1
36,2560   C: 44052 0   C: 60030 1   C: 26415 0   C: 25057 1      06006 1   I: 77752 1   C: 17654 0   C: 33614 1
36,2570   C: 17730 0   C: 33666 1   C: 17636 1   C: 03634 0   I: 44254 1   C: 74604 0   C: 15326 1   I: 71406 0

36,2600   I: 73525 1   I: 45465 1   C: 40051 1   C: 74617 1   I: 45345 1   C: 03646 0   C: 33664 0   I: 71240 1
36,2610   C: 74614 1   C: 33672 1   C: 37726 0   C: 74617 1   I: 77745 1   C: 33670 0   C: 03726 1   I: 77624 1
36,2620   C: 65102 1   I: 52054 1   C: 74624 1   C: 64272 1   I: 77775 1   C: 03640 0   C: 16657 1   C: 03636 1
36,2630   C: 26760 1   C: 03700 0   C: 36746 1   C: 64304 1   I: 77615 0   C: 03716 1   C: 17552 0   C: 03634 0

36,2640   I: 52054 1   C: 74643 0   C: 74665 1   I: 51575 1   C: 03710 1   I: 77776 1      07171 1   C: 00002 0
36,2650   C: 00000 1   C: 00000 1   C: 47021 1   C: 65002 0   C: 35610 0   C: 07722 1   C: 63772 0   C: 63276 1
36,2660      06006 1   I: 77615 0   C: 01343 1   I: 52052 1   C: 74667 0   I: 77745 1   C: 03726 1   I: 41425 1
36,2670   C: 03726 1   I: 53575 0   C: 03656 1   C: 36152 1   C: 26570 1   I: 77615 0   C: 33676 0   I: 45206 1

36,2700   C: 03636 1   I: 45246 0   C: 33646 0   I: 52040 1   C: 74706 0   C: 74713 1   I: 51545 1   C: 00001 0
36,2710   I: 50025 0   C: 33650 1   C: 74763 0   I: 43345 1   C: 03730 0   C: 33600 1   I: 67240 0   C: 74723 1
36,2720   C: 33630 1   I: 77650 1   C: 64272 1   C: 03730 0   I: 53025 0   C: 33616 0   C: 74744 0   I: 45345 1
36,2730   C: 00001 0   C: 03666 1   I: 65301 0   C: 00047 1   C: 03670 0   I: 56225 1   C: 03726 1   I: 53605 1

36,2740   C: 00001 0   C: 20201 0   I: 77650 1   C: 74746 1   I: 77745 1   C: 00001 0   C: 14021 1   I: 77626 0
36,2750   C: 60141 0   I: 77600 1   C: 74617 1   C: 17666 1   C: 03726 1   C: 17670 0   C: 00021 1   I: 77615 0
36,2760   C: 03726 1   C: 37726 0   C: 74617 1   I: 77624 1   C: 75007 1   I: 41345 0   C: 03720 1   C: 03744 0
36,2770   I: 53021 1   C: 03636 1   C: 75000 0   I: 71240 1   C: 75000 0   C: 15326 1   I: 77650 1   C: 75002 1
```

```
OCTAL LISTING FOR PARAGRAPH # 212,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,3000    I: 57545 1   C: 15326 1   C: 37751 0   C: 64546 1   I: 52054 1   C: 75035 0   C: 64272 1   I: 45020 1
36,3010    C: 03753 0   C: 64323 1   I: 77776 1      35034 0      03232 1      34766 1      03226 1      13024 0
36,3020       12476 1      33257 1      03246 1      12476 1      35033 1      03222 0      12476 1      34535 0
36,3030       03246 1      12476 1      06006 1   I: 77650 1   C: 03753 0   I: 77624 1   C: 75007 1   I: 77776 1

36,3040       34774 1      54775 0      34770 0      54776 0      34537 1      03246 1      13044 0      06006 1
36,3050    I: 67201 0   C: 00001 0   C: 00777 0   I: 53025 0   C: 33572 1   C: 75064 1   I: 60335 1   C: 01351 1
36,3060    C: 00047 1   I: 52125 0   C: 33622 1   C: 75075 1   I: 43145 0   C: 33626 0   C: 00700 0   C: 75071 0
36,3070    I: 77752 1   I: 77752 1   I: 65301 0   C: 00047 1   C: 33624 1   I: 56325 0   C: 03706 0   I: 77776 1

36,3100       07171 1   C: 00001 0   C: 00001 0   C: 05070 0   C: 17527 1   C: 36700 0   C: 47114 0   C: 70670 1
36,3110       06006 1   I: 67206 1   C: 03076 0   I: 56205 0   I: 41257 1   C: 20165 1   C: 15334 1   I: 77621 1
36,3120    C: 03716 1   C: 03413 1   I: 77776 1      35026 0      03246 1      13123 0      34772 1      54771 1
36,3130       54772 1      06006 1   I: 77624 1   C: 63624 1   I: 53575 0   C: 03656 1   I: 74315 0   C: 03554 0

36,3140    C: 33632 0   I: 74315 0   C: 03562 0   C: 33634 0   I: 50255 0   I: 50015 0   C: 33636 1   C: 75174 1
36,3150    I: 50375 0   C: 03562 0   C: 03656 1   I: 71240 1   C: 75160 1   C: 33640 0   I: 52006 0   C: 75162 0
36,3160    I: 41545 0   C: 33642 1   I: 77756 0   C: 16732 0   I: 43146 0   C: 03666 1   C: 26734 0   C: 03640 0
36,3170    C: 26657 1   C: 03700 0   C: 36746 1   C: 25002 1   I: 43014 0   C: 01267 0   C: 03665 1   I: 77214 0

36,3200    C: 01071 0   I: 77626 0   C: 60362 0   C: 00037 0   I: 77615 0   C: 03716 1   C: 27656 1   C: 03700 0
36,3210    I: 77451 1   C: 03672 1      34756 1      54003 0      06006 1   C: 03646 0   I: 77624 1   C: 73027 0
36,3220    I: 77650 1   C: 75216 0      00006 1      23752 0      03232 1      34770 0      05516 0      15205 1
36,3230       01752 0      13255 1      00006 1      23547 0      04636 0   C: 21101 1      14103 0      13242 1

36,3240       13244 1      01547 0      51547 0      10004 1      51547 0      10003 0      00006 1      23752 0
36,3250       04636 0   C: 20743 0      14103 0      13255 1      01752 0      51752 0      10001 1   C: 01447 1
36,3260    I: 77620 0   C: 02310 1   I: 66370 0   C: 00066 1   C: 00051 0   C: 00022 1   I: 66374 1   C: 00022 1
36,3270    C: 00052 0   C: 00006 1   I: 63775 1   C: 03502 0   C: 02467 0   C: 12731 1   I: 77775 1   C: 03510 0

36,3300    I: 52717 1   C: 02555 0   C: 75046 1   C: 12731 1   I: 77775 1   C: 03516 0   I: 52717 1   C: 02643 1
36,3310    C: 75046 1   C: 12731 1   I: 77700 0   C: 75314 0   I: 43104 0   C: 75272 1   C: 02706 1   C: 75323 1
36,3320    I: 77775 1   C: 15336 0   C: 02723 0   I: 77201 1   C: 00001 0   C: 02707 0   I: 47036 1   C: 45657 1
36,3330    I: 47515 0   C: 02715 0   I: 76234 0   C: 45657 1   I: 47515 0   C: 02723 0   I: 76234 0   C: 45657 1

36,3340    I: 77171 0   C: 03526 0   C: 00000 1   C: 01114 1   I: 40151 0   C: 03526 0   C: 75347 0   C: 01117 1
36,3350    I: 77654 0   C: 75360 0   I: 40112 1   C: 75360 0   C: 01117 1   I: 52114 1   C: 00001 0   C: 75352 1
36,3360    I: 61551 1   C: 01114 1   I: 75405 1   C: 01117 1   I: 76257 0   C: 57576 1   C: 01114 1   I: 63101 1
36,3370    C: 00050 1   C: 77775 1   I: 77134 1   C: 02214 1   C: 00242 0   I: 40265 1   C: 15326 1   C: 00001 0
```

```
OCTAL LISTING FOR PARAGRAPH # 213,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,3400     C: 03456 0    I: 60351 0    C: 01114 1    C: 00047 1    I: 65345 0    C: 00155 0    C: 03524 1    I: 77701 1
36,3410     C: 00051 0    I: 70460 1    C: 00050 1    I: 41471 0    I: 77650 1    C: 63705 0    I: 77731 1    C: 00052 0
36,3420     C: 00066 1    I: 60775 1    C: 02707 0    C: 75134 0    I: 77206 0    C: 02715 0    I: 53303 1    C: 75112 1
36,3430     I: 77206 0    C: 02723 0    I: 53303 1    C: 75070 1    I: 61006 0    C: 75421 1    I: 45575 1    C: 74303 1

36,3440     I: 45575 1    C: 74311 1    I: 45575 1    C: 74317 1    I: 77214 0    C: 02706 1    C: 75451 0    C: 15336 0
36,3450     C: 03474 0    I: 66374 1    C: 00022 1    C: 00052 0    C: 00006 1    I: 77773 1    C: 74275 1    I: 53761 1
36,3460     C: 00001 0    C: 20201 0    C: 11136 0    I: 77304 0    C: 75455 1    C: 01122 1    I: 77732 1    C: 01122 1
36,3470     I: 77650 1    C: 02316 1    I: 45020 1    C: 02310 1    C: 27516 0    I: 74375 0    C: 03460 0    C: 03456 0

36,3500     C: 26643 1    C: 03466 0    I: 77761 1    C: 03456 0    C: 26651 1    C: 03474 0    I: 77761 1    C: 03456 0
36,3510     C: 02657 1    I: 77776 1       33763 0       55107 1       55110 1       34772 1       55111 0       55112 0
36,3520        05402 1    C: 04022 0       05547 1    C: 00230 0       31110 0       55107 1       31112 1       55111 0
36,3530        06006 1    I: 73150 1    C: 01107 0    C: 01111 1    I: 70731 0    C: 00051 0    C: 00006 1    C: 75070 1

36,3540     I: 60276 1    C: 00052 0    I: 45161 0    C: 02643 1    C: 75753 1    I: 77653 1    C: 02467 0    C: 02665 0
36,3550     I: 57543 1    C: 75070 1    I: 74301 0    C: 00052 0    C: 02651 1    I: 77624 1    C: 75753 1    I: 77653 1
36,3560     C: 02555 0    C: 02673 1    I: 77614 1    C: 02746 0    C: 75577 0    I: 57543 1    C: 75070 1    I: 74301 0
36,3570     C: 00052 0    C: 02657 1    I: 77624 1    C: 75753 1    I: 77653 1    C: 02643 1    C: 02701 0    I: 77624 1

36,3600     C: 22327 1    I: 77776 1       31107 0       63764 1       55110 1       31111 1       67701 0       55112 0
36,3610        06006 1    I: 66350 1    C: 01107 0    C: 00051 0    C: 00006 1    I: 77775 1    C: 02665 0    C: 06467 1
36,3620     I: 77775 1    C: 02673 1    C: 06555 1    I: 77214 0    C: 02746 0    C: 75635 0    C: 02701 0    C: 06643 0
36,3630     I: 52100 1    C: 75633 0    C: 75643 1    I: 77634 0    C: 75520 1    I: 43335 0    C: 01113 0    C: 35766 0

36,3640     I: 52030 0    C: 75643 1    C: 75630 0    I: 77624 1    C: 22327 1    I: 53375 0    C: 01701 0    C: 01130 1
36,3650     C: 03450 0    I: 47014 1    C: 00707 1    C: 75743 0    C: 27070 0    I: 77004 0    C: 57544 0    C: 00000 1
36,3660     I: 77014 1    C: 04343 1    C: 75664 1    C: 00002 0    I: 53775 1    C: 01114 1    C: 57205 1    I: 40055 0
36,3670     C: 01521 0    C: 75703 1    C: 25521 0    C: 01122 1    I: 53257 1    C: 57202 0    C: 01527 0    I: 77600 1

36,3700     C: 75707 0    C: 35527 1    C: 75716 0    I: 53375 0    C: 01535 0    C: 01114 1    C: 01535 0    I: 53375 0
36,3710     C: 01543 1    C: 01122 1    C: 01543 1    I: 45134 0    C: 02150 1    C: 23420 0    I: 77624 1    C: 22327 1
36,3720     I: 47014 1    C: 00707 1    C: 75746 0    C: 27047 1    I: 77624 1    C: 20264 0    I: 77624 1    C: 22327 1
36,3730     I: 77214 0    C: 02746 0    C: 75735 1    C: 03450 0    C: 01701 0    I: 66150 0    C: 02310 1    C: 00052 0

36,3740     I: 77776 1       04655 0    C: 27527 1    I: 52034 1    C: 27023 0    C: 75655 0    I: 45034 1    C: 26774 1
36,3750     C: 20240 0    I: 77650 1    C: 75726 0    I: 71124 0    C: 00051 0    C: 00047 1    I: 53674 1    C: 02214 1
36,3760     C: 57576 1    I: 43524 0    C: 00051 0    C: 00066 1    C: 77771 0    C: 00014 1    C: 03766 0    C: 03767 1
36,3770   CKSM 22503 1         @             @             @             @             @             @             @
```

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OCTAL LISTING FOR PARAGRAPH # 214,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,2000      34770 0      54776 0      05547 1   C: 00031 0      34767 0      04636 0   C: 21074 1      04103 1
37,2010      02012 0      02004 1      34772 1      55250 0      55251 1      35027 1      05535 1      06006 1
37,2020   I: 53145 1   C: 01251 0   C: 76155 1   C: 34041 0   C: 27516 0   I: 43014 0   C: 01303 0   C: 76045 1
37,2030   C: 01474 1   I: 70535 0   C: 00777 0   I: 43030 0   C: 76036 0   C: 01674 0   I: 43014 0   C: 01676 1

37,2040   C: 01673 1   I: 77624 1   C: 27236 0   I: 77650 1   C: 76066 0   I: 77775 1   C: 03605 1   C: 25535 0
37,2050   C: 03613 0   C: 15543 1   C: 03540 0   C: 01517 0   I: 43014 0   C: 01676 1   C: 00263 0   I: 53135 0
37,2060   C: 03604 0   C: 76064 1   I: 77614 1   C: 00063 1   I: 77624 1   C: 27211 0   I: 77745 1   C: 00015 0
37,2070   C: 27540 0   C: 00017 1   C: 27605 1   C: 00025 0   C: 03613 0   I: 77614 1   C: 02605 0   C: 60015 0

37,2100   I: 47014 1   C: 00356 1   C: 76104 0   C: 60004 0   I: 53646 0   C: 57576 1   C: 27623 0   C: 00001 0
37,2110   I: 50256 0   C: 00007 0   I: 67471 1   C: 03623 0   C: 03625 0   I: 43134 0   C: 03603 1   C: 01063 0
37,2120   I: 67214 1   C: 01663 0   C: 00050 1   I: 43054 1   C: 76126 0   C: 01463 1   I: 77775 1   C: 00001 0
37,2130   C: 16152 0   C: 00015 0   I: 45014 0   C: 00662 0   C: 26453 1   I: 77605 1   C: 36166 0   C: 03621 1

37,2140   I: 77776 1      32164 0      04636 0   C: 20743 0      04103 1      04103 1      06006 1   I: 43345 1
37,2150   C: 03540 0   C: 36161 1   C: 01251 0   I: 77634 0   C: 76015 1   I: 52034 1   C: 51751 0   C: 76023 1
37,2160   C: 00003 1   C: 25140 0   C: 00001 0   C: 00000 1   C: 01453 1   C: 00243 1   C: 32703 1   I: 77420 1
37,2170   C: 02310 1      40077 0      74754 1      10000 0      12213 1      34776 0      04636 0   C: 21067 0

37,2200      04103 1      02203 1      02213 0      06006 1   I: 77624 1   C: 30761 1   I: 77624 1   C: 62756 1
37,2210   I: 77776 1      05402 1   C: 04022 0      04636 0   C: 16062 1      05547 1   C: 00116 1      32260 1
37,2220      04636 0   C: 20607 1      04103 1      02247 1      02247 1      34774 1      05516 0      05205 0
37,2230      32257 0      04636 0   C: 20607 1      04103 1      02241 1      02255 1      34773 0      05516 0

37,2240      05205 0      32262 0      54001 1      31727 1      00006 1      20001 1      55024 1      05561 0
37,2250   C: 00116 1      05527 1      06006 1   I: 77650 1   C: 02310 1      05527 1      12171 0   C: 01527 0
37,2260   C: 16600 0   C: 14655 1   C: 61740 0      05561 0   C: 00037 0      37702 0      55722 0      37651 1
37,2270      05176 1      32332 1      04636 0   C: 20576 1      02320 1      02277 1      02271 1      32331 1

37,2300      04636 0   C: 20612 0      02320 1      12320 0      00004 0      00006 1      30025 0      53723 1
37,2310      30033 1      55724 0      30034 0      55726 1      30032 0      55730 0      00003 1      02277 1
37,2320      04636 0   C: 20575 1      37702 0      55722 0      35055 1      05176 1      05547 1   C: 00037 0
37,2330      05524 1   C: 15255 1   C: 01536 0      04611 0      55771 0      04665 0      55770 1      11774 0

37,2340      02416 0      02343 1      02417 1      00004 0      35007 0      55655 1      11773 1      64770 0
37,2350      12352 0      64770 0      00006 1      12355 1      55655 1      06006 1   I: 77624 1   C: 71432 1
37,2360   I: 77776 1      05561 0   C: 00055 1      50154 1      02365 0      02415 0      05561 0   C: 00124 0
37,2370      40107 0      74761 1      10000 0      02376 1      05547 1   C: 00124 0      44770 1      55774 0
```

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OCTAL LISTING FOR PARAGRAPH # 215,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,2400      05547 1   C: 00077 1      04636 0   C: 56074 1      05561 0   C: 00077 1      34772 1      04636 0
37,2410   C: 20753 1      05402 1   C: 00111 0      34772 1      02416 0      36214 0      55774 0      31770 0
37,2420      22000 1      31771 1      56003 1      22000 1      04660 0   I: 45145 0   C: 02307 1   C: 54136 1
37,2430   C: 00017 1   I: 52214 1   C: 04303 0   C: 76445 0   C: 03707 1   I: 77656 1   C: 27351 0   C: 03707 1

37,2440   I: 57456 1   C: 24011 1   C: 00003 1   I: 52056 0   C: 76460 1   I: 53455 0   C: 03707 1   I: 77676 0
37,2450   C: 24011 1   C: 03707 1   I: 57456 1   C: 27351 0   C: 00017 1   I: 74402 1   I: 53445 1   C: 00003 1
37,2460   C: 34003 0   C: 32000 0   C: 34031 1   C: 74437 1   C: 00007 0   I: 53435 0   C: 15332 1   C: 24001 0
37,2470   C: 00031 0   I: 53435 0   C: 03357 0   C: 17357 0   C: 01353 0   I: 74346 0   C: 03357 0   C: 27351 0

37,2500   C: 00031 0   I: 53435 0   C: 03357 0   C: 17357 0   C: 01353 0   I: 74356 1   C: 03357 0   I: 76455 1
37,2510   C: 03351 0   C: 24023 0   C: 00001 0   I: 53435 0   C: 00007 0   C: 24007 0   C: 00001 0   I: 76435 1
37,2520   C: 00007 0   C: 24015 0   C: 00023 0   I: 53435 0   C: 00031 0   C: 24031 0   C: 00023 0   I: 76435 1
37,2530   C: 00031 0   C: 24037 0   C: 00023 0   I: 77761 1   C: 00001 0   C: 37351 1   C: 73273 0   I: 45020 1

37,2540   C: 01023 1   C: 32050 0   I: 64375 1   C: 02445 0   C: 00001 0   I: 77772 0   C: 37405 1   C: 15756 1
37,2550   I: 77624 1   C: 32050 0   I: 61375 1   C: 03405 0   C: 00001 0   I: 77772 0   C: 37646 1   C: 01023 1
37,2560   I: 77620 0   C: 02360 0   C: 34041 0   C: 45236 1   I: 77214 0   C: 01067 1   C: 03562 0   C: 02617 0
37,2570   C: 27512 1   C: 03554 0   C: 02625 1   C: 27756 0   C: 03540 0   C: 37632 1   C: 16520 1   C: 02453 1

37,2600   C: 26541 0   C: 03546 0   C: 37640 1   C: 16520 1   C: 02533 0   C: 37504 1   C: 02360 0      35057 0
37,2610      05121 0   C: 03655 1   C: 14063 1      02630 0      37654 1      05135 0   C: 03154 1   C: 76067 1
37,2620      35017 1      05233 0   C: 02652 1   C: 76066 0      44767 1      04126 0   C: 00005 1      15314 0
37,2630      00006 1      22070 0      03171 0      34770 0      55067 0      40075 1      74770 1      26075 1

37,2640      44752 1      70076 1      54076 1      40103 1      74763 0      26103 1      34772 1      55425 1
37,2650      55426 1      00070 0      03171 0      34773 0      54001 1      40000 0      53166 0      34770 0
37,2660      55067 0      34767 0      55066 1      40102 0      74767 1      10000 0      02740 0      41105 0
37,2670      55271 0      00006 1      31662 1      53670 0      31663 0      57671 0      00006 1      31665 0

37,2700      53673 0      31666 0      57674 0      30102 1      74755 0      00006 1      12723 1      35011 1
37,2710      05223 1   C: 02773 0      31314 0      57533 0      55536 1      31316 1      57534 1      55537 0
37,2720      31320 1      57535 0      55540 0      34773 0      55725 1      33153 0      05233 0   C: 02636 0
37,2730   C: 32066 0      46214 1      04126 0   C: 00001 0      34125 0      54001 1      40000 0      53166 0

37,2740      40075 1      74770 1      10000 0      02762 0      35017 1      05223 1   C: 02652 1      34753 1
37,2750      05135 0   C: 03010 0   C: 76067 1      44766 0      04126 0   C: 00005 1      34760 1      00006 1
37,2760      05011 1      15314 0      00006 1      32767 0      53062 0      12747 0   C: 03100 0   C: 76067 1
37,2770      55066 1      05255 0   C: 00062 0      34767 0      54070 1      50000 1      30037 0      50070 0
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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971                 PAGE 1718

OCTAL LISTING FOR PARAGRAPH # 216,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,3000        57533 0      50070 0      55536 1      10070 1      12774 0      11066 1      12770 1      05314 1
37,3010        34767 0      00004 0      54070 1      60000 1      56000 1      11314 1      03020 0      03026 0
37,3020        63152 1      00006 1      63026 0      05671 1   C: 00205 0      03056 1      10070 1      13012 0
37,3030        05402 1   C: 16035 0   C: 20000 0   C: 03037 0   C: 76067 1      04636 0   C: 15276 0      06006 1

37,3040     I: 71214 0   C: 03314 1   C: 77047 1   C: 03735 0   I: 77615 0   C: 01105 1   C: 03727 0   I: 51575 1
37,3050     C: 01315 1   I: 77405 0   C: 37365 0      00006 1      30155 0      21426 1      05402 1   C: 10035 0
37,3060        06006 1   I: 77624 1   C: 77336 1   I: 77776 1      05402 1   C: 10035 0      34125 0      05607 0
37,3070     C: 01070 1   C: 01027 0      00003 1      05402 1   C: 10035 0      00006 1      31062 1      52006 0

37,3100        31044 0      55277 0      05547 1   C: 00036 1      05362 0   C: 00005 1   C: 05022 1   C: 20000 0
37,3110        06006 1   I: 77624 1   C: 73677 0   I: 77776 1      04636 0   C: 17231 1      44760 0      55722 0
37,3120        00006 1      03011 1      05561 0   C: 00147 0      05561 0   C: 00162 1      30104 1      74760 0
37,3130        10000 0      13146 0      34762 0      70074 0      00006 1      13141 1      05362 0   C: 00111 0

37,3140     C: 00132 1      04655 0   C: 10162 0      05402 1   C: 00035 1      15205 1      05362 0   C: 00111 0
37,3150     C: 00002 0      13141 1   C: 63401 1   C: 00170 1      34776 0      05607 0   C: 01070 1   C: 01027 0
37,3160        00003 1      06006 1   I: 45175 0   C: 01030 0   C: 77270 1   C: 25046 1   C: 01115 0   C: 35054 0
37,3170     C: 31263 1      00006 1      30025 0      53105 0      44772 0      55063 1      55064 0      55065 1

37,3200        34772 1      55320 0      55316 0      55315 0      55317 1      55321 1      55067 0      00006 1
37,3210        40040 1      53064 0      52040 1      55314 1      23316 1      40041 0      57065 0      56041 1
37,3220        55320 0      00002 0      11166 0      13225 0      15314 0      37652 1      55277 0      11067 0
37,3230        12652 0      33267 1      54002 1      11320 0      00002 0      13240 0      00002 0      00002 0

37,3240        22007 0      11316 0      13245 0      13254 0      13245 0      22041 1      11065 1      41065 1
37,3250        13220 0      13247 1      23320 1      00002 0      11063 1      41063 1      13261 0      13255 1
37,3260        13207 0      55314 1      41064 0      55316 0      44772 0      52040 1      13215 0   C: 02653 0
37,3270     I: 41456 0   C: 01756 1   I: 67340 1   C: 03746 1   C: 00047 1   I: 77240 1   C: 77324 1   I: 41441 0

37,3300     C: 01712 1   I: 44316 0   C: 37375 1   I: 56325 0   C: 37377 0   C: 00043 0   C: 00041 1   I: 41205 0
37,3310     C: 37401 0   I: 65361 0   C: 01756 1   I: 41205 0   C: 37403 1   C: 00041 1   I: 53361 0   C: 01712 1
37,3320     I: 77626 0   C: 76662 1   I: 41455 0   C: 01756 1   I: 63545 0   C: 00045 0   I: 77701 1   C: 00050 1
37,3330     I: 53663 1   C: 37367 1   C: 56623 0   I: 45561 1   C: 76670 1   I: 77616 0   I: 74375 0   C: 01315 1

37,3340     C: 37365 0   I: 76505 0   C: 01734 0   C: 03432 1   I: 41562 0   I: 41455 0   C: 01046 1   I: 74255 0
37,3350     C: 01036 0   C: 37373 1   I: 44055 1   C: 01030 0   C: 00037 0   C: 35071 1   C: 77270 1   I: 53255 0
37,3360     I: 77655 1   C: 01036 0   C: 35077 1   C: 00037 0   C: 02312 0   C: 32537 1   C: 61377 0   C: 55754 1
37,3370     C: 77644 1   C: 65556 1   C: 00000 1   C: 31000 0   C: 01463 1   C: 06315 0   C: 00001 0   C: 05000 1
```

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OCTAL LISTING FOR PARAGRAPH # 217,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,3400     C: 02047 0   C: 36332 0   C: 00152 1   C: 14511 1      06006 1   I: 77201 1   C: 00001 0   C: 01036 0
37,3410     I: 63361 0   C: 37700 1   C: 01712 1   I: 74235 0   C: 01756 1   C: 15246 0   I: 45455 1   C: 74251 1
37,3420     I: 72056 1   C: 00044 1   C: 03542 1   I: 57435 1   C: 01756 1   I: 66256 0   C: 00051 0   C: 00476 1
37,3430     I: 77300 1   C: 77433 0   C: 03534 0   C: 03550 1   C: 03534 0   I: 57435 1   C: 03542 1   I: 77772 0

37,3440     C: 03556 1   I: 77751 1   C: 03270 1   C: 14031 0   C: 00032 0   I: 41434 1   C: 51754 0   I: 77746 1
37,3450     C: 17564 0   I: 57556 0   C: 17570 0   C: 00033 1   I: 41434 1   C: 51754 0   I: 65356 1   I: 65346 0
37,3460     C: 00001 0   I: 74276 1   C: 03564 0   I: 77772 0   C: 17572 1   C: 00003 1   C: 17574 1   C: 00031 0
37,3470     I: 41434 1   C: 51754 0   I: 65356 1   I: 74346 0   C: 03572 1   C: 17572 1   C: 00005 1   I: 57405 1

37,3500     C: 03570 0   I: 77615 0   C: 03572 1   C: 17572 1   I: 43205 1   C: 03564 0   C: 03576 0   C: 27576 0
37,3510     C: 03572 1   I: 72505 1   C: 01734 0   C: 17572 1   I: 76561 1   C: 03564 0   C: 17564 0   I: 77626 0
37,3520     C: 50211 0   C: 03564 0   I: 76505 0   C: 01734 0   C: 03564 0   I: 76435 1   C: 03572 1   C: 27600 1
37,3530     C: 03542 1   I: 53435 0   C: 03572 1   I: 50206 0   C: 03556 1   C: 24021 1   C: 00001 0   I: 77641 1

37,3540     C: 03550 1   C: 34023 1   C: 47311 1   C: 24007 0   C: 03572 1   I: 72441 0   C: 03542 1   I: 77736 0
37,3550     C: 24010 0   C: 03564 0   I: 77641 1   C: 00001 0   C: 24023 0   I: 77641 1   C: 03600 1   C: 34021 0
37,3560     C: 47311 1   C: 24011 1   C: 01756 1   I: 72441 0   C: 03556 1   I: 77726 1   C: 00013 0   I: 77551 0
37,3570     C: 00007 0      04611 0      50120 1      40012 0      57722 1      54001 1      00004 0      40102 0

37,3600        74756 0      00006 1      13605 0      26102 0      03620 0      40001 1      61722 1      00006 1
37,3610        73701 0      55723 1      00006 1      63615 0      40000 0      64773 0      00006 1      63622 1
37,3620        34772 1      55723 1      40154 0      60000 1      03671 1      00006 1      61672 0      61664 1
37,3630        03671 1      55770 1      40156 1      60000 1      03671 1      00006 1      61673 1      61665 0

37,3640        03671 1      55771 0      40155 1      60000 1      00006 1      61674 0      61666 0      57772 1
37,3650        35024 1      54003 0      00006 1      33703 0      53447 0      04611 0      00006 1      31771 1
37,3660        53665 1      31772 1      55666 1      06006 1   I: 51575 1   C: 01036 0   C: 03723 1   I: 77650 1
37,3670     C: 03324 1      54001 1      00002 0      50000 1      34751 0      26001 1      00002 0   C: 45730 1

37,3700     C: 53410 1   C: 03146 1   C: 03656 1   C: 76066 0   C: 03704 1   C: 03705 0 CKSM 64724 1         @
37,3710          @            @            @            @            @            @            @            @
37,3720          @            @            @            @            @            @            @            @
37,3730          @            @            @            @            @            @            @            @

37,3740          @            @            @            @            @            @            @            @
37,3750          @            @            @            @            @            @            @            @
37,3760          @            @            @            @            @            @            @            @
37,3770          @            @            @            @            @            @            @            @
```

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OCTAL LISTING FOR PARAGRAPH # 220,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,2000        34770 0      57215 0      54115 0      11245 1      02006 0      02013 1      42212 0      60154 1
40,2010        00006 1      12013 0      04356 0      56154 1      54117 1      50000 1      02017 0      03275 1
40,2020        02074 0      02074 0      02074 0      02074 0      02074 0      02074 0      02074 0      02064 1
40,2030        02064 1      03275 1      03275 1      03275 1      03275 1      03275 1      03275 1      02072 0

40,2040        02251 0      03553 1      03275 1      03275 1      03275 1      03275 1      03275 1      03275 1
40,2050        03325 0      02304 1      02271 1      04200 1      03275 1      02364 1      02265 1      11202 1
40,2060        00002 0      00002 0      15205 1      15205 1      02057 1      36214 0      71203 0      10000 0
40,2070        02074 0      03275 1      34772 1      54117 1      02057 1      02221 1      11220 1      34772 1

40,2100        55220 1      02102 0      30117 0      04423 0      03161 1      36214 0      71203 0      10000 0
40,2110        02121 1      50137 1      57204 0      54022 0      40022 0      40022 0      56022 1      60117 0
40,2120        02136 1      50137 1      57204 0      54154 0      34772 1      54155 1      34355 0      07256 1
40,2130        56155 0      60117 0      54155 1      02136 1      26154 0      02156 1      50137 1      55204 1

40,2140        41202 1      50137 1      62212 1      00006 1      12150 0      11202 1      55202 1      05205 0
40,2150        36214 0      71203 0      10000 0      02156 1      41202 1      02146 0      04636 0   C: 60161 1
40,2160        02154 0      44770 1      60137 1      00006 1      62154 0      02221 1      50137 1      31204 0
40,2170        54155 1      07052 1   C: 02217 1      36214 0      71203 0      50000 1      02176 0      02203 1

40,2200        00006 1      40156 1      52156 1      56156 0      50137 1      55207 1      56155 0      50137 1
40,2210        55204 1      04651 1   C: 00022 1   C: 00020 0   C: 00012 1   C: 00005 1   C: 00000 1   C: 05174 0
40,2220     C: 13261 0      51202 0      32225 0      54137 0      00002 0   C: 00004 0   C: 00004 0   C: 00004 0
40,2230     C: 00004 0   C: 00004 0   C: 00003 1   C: 00003 1   C: 00003 1   C: 00003 1   C: 00003 1   C: 00002 0

40,2240     C: 00002 0   C: 00002 0   C: 00002 0   C: 00002 0   C: 00244 0   C: 00001 0   C: 00001 0   C: 00003 1
40,2250     C: 00000 1      34772 1      55204 1      34351 1      55202 1      02473 0      34770 0      55203 0
40,2260        34772 1      55216 1      34170 0      54136 1      05205 0      34772 1      55205 0      34352 1
40,2270        02254 0      02344 0      02330 0      34767 0      50137 1      64762 0      27203 0      11220 1

40,2300        34772 1      55220 1      02303 0      05205 0      02344 0      02310 1      34770 0      02274 1
40,2310        22002 0      02221 1      50137 1      32336 0      54123 0      64770 0      54122 1      34772 1
40,2320        54124 1      56123 1      03247 0      34756 1      54124 1      56122 0      03247 0      00001 0
40,2330        22002 0      02221 1      50137 1      32336 0      54122 1      64770 0      54123 0      02317 0

40,2340     C: 00005 1   C: 00003 1   C: 00000 1   C: 02476 0      22002 0      36214 0      71203 0      10000 0
40,2350        05205 0      44321 1      02360 0      44322 1      02360 0      44323 0      02360 0      05205 0
40,2360        61202 0      00006 1      12327 1      00002 0      11202 1      64770 0      02370 1      64770 0
40,2370        50000 1      32225 0      54137 0      11220 1      02402 0      02377 0      02377 0      30137 1
```

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OCTAL LISTING FOR PARAGRAPH # 221,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,2400        02424 1       02417 1       10137 0       54137 0       02424 1       32472 1       27216 1       30137 1
40,2410        54125 0       00006 1       27204 1       04636 0    C: 62337 1       30125 1       54137 0       02422 1
40,2420        25220 0       05205 0       22002 0       02433 1       67702 0       00006 1       65205 0       00002 0
40,2430        55202 1       22002 0       02221 1       34772 1       50137 1       55204 1       50137 1       55207 1

40,2440        54124 1       50137 1       44762 1       71203 0       77700 0       55203 0       50137 1       32463 1
40,2450        54143 0       03161 1       50137 1       32466 1       55202 1       02473 0       44767 1       27202 1
40,2460        02473 0       50137 1       34317 0       55202 1       00001 0    C: 00016 0    C: 00005 1    C: 00004 0
40,2470     C: 00015 0    C: 00011 1    C: 00003 1       31202 0       54021 0       44755 0       00004 0       50021 1

40,2500        57226 0       00006 1       62504 1       25221 1       15642 0       10154 0       56154 1       02512 0
40,2510        02521 0       67702 0       62562 1       54154 0       02517 0       34752 0       26154 0       34767 0
40,2520        02532 1       56154 1       62562 1       10000 0       02513 1    C: 71527 1       64770 0       40000 0
40,2530        02513 1       34772 1       54156 1       10154 0       12546 0       12546 0       12537 0       44752 1

40,2540        70154 0       54154 0       00006 1       50156 0       32557 1       52124 1       00006 1       50156 0
40,2550        32557 1       52155 1       07256 1       52124 1       20155 1       02566 0    C: 05605 1    C: 03656 1
40,2560     C: 16314 0    C: 31463 1    C: 16040 1       52124 1       52155 1       04403 1       04655 0    C: 62561 1
40,2570        52124 1       52155 1       04403 1       02575 1       02607 1       56156 0       56155 0       54154 0

40,2600        02566 0       02607 1       02566 0       02607 1       36211 0       03034 0       02566 0       56002 0
40,2610        54162 0       02635 0       07226 0       07052 1    C: 00123 1       00162 1       02431 0       02310 1
40,2620        30154 1       03146 1       46214 1       50117 0       64321 0       55202 1       02635 0       30155 0
40,2630        03146 1       04655 0    C: 62563 0       02635 0       02566 0       56002 0       54144 1       50140 1

40,2640        02640 1       02655 0       50117 0       30150 0       74347 1       04315 1       00006 1       50000 1
40,2650        30001 0       52155 1       34772 1       54156 1       00144 0       30145 1       02646 1       50140 1
40,2660        02660 0       02663 0       03261 1       00006 1       50145 1       30001 0       52155 1       34321 0
40,2670        55202 1       07224 1       03133 0       00136 0       07052 1    C: 02737 0       10155 1       34756 1

40,2700        02702 0       44756 0       60155 0       03046 0       04372 0       04372 0       03051 0       04372 0
40,2710        10154 0       02715 0       02715 0       40000 0       54154 0       10162 0       02733 1       02727 1
40,2720        10154 0    C: 04151 0       02731 0       02724 1       56154 1       74750 0       54154 0       04655 0
40,2730     C: 63151 1       44750 0       02726 0       40154 0       74750 0       40000 0       02726 0    C: 26161 0

40,2740     C: 30707 1    C: 21616 0    C: 07071 0       07052 1    C: 00123 1       56156 0       56155 0       56154 1
40,2750        00006 1       12753 0       04173 0       03044 1       03051 0       02727 1       07052 1    C: 00123 1
40,2760        02753 1       10154 0       02766 1       02766 1       04173 0       04173 0       32525 1       26154 0
40,2770        07052 1    C: 02741 1       34755 1       60155 0       03046 0       02705 1       07052 1    C: 00123 1
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OCTAL LISTING FOR PARAGRAPH # 222,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,3000         56156 0      60000 1      54156 1      34772 1      60155 0      03046 0      03051 0      50140 1
40,3010         03010 0      03021 1      30117 0      60145 1      54002 1      56155 0      50002 0      54001 1
40,3020         02727 1      34772 1      03013 0      07052 1   C: 00123 1      36211 0      13032 1      07052 1
40,3030      C: 00123 1      34767 0      03034 0      03000 1      56002 0      54124 1      56002 0      54123 0

40,3040         04372 0      10123 0      03037 0      00124 0      56155 0      60000 1      54155 1      00002 0
40,3050         14376 0      30162 1      00006 1      16711 1      04173 0      56002 0      54144 1      10154 0
40,3060         13070 1      13070 1      64770 0      54154 0      02330 0      40155 1      54155 1      00144 0
40,3070         02310 1      00144 0      56002 0      54115 0      03055 1      00006 1      32343 1      20155 1

40,3100         00006 1      13105 1      00006 1      34750 1      52155 1      34766 1      54137 0      34355 0
40,3110         07256 1      30154 1      04423 0      34772 1      56156 0      56155 0      54154 0      10143 0
40,3120         55202 1      03161 1      10137 0      03106 0      04261 0      00115 1      56002 0      54115 0
40,3130         03055 1      34770 0      03106 0      56002 0      54115 0      34772 1      54124 1      36214 0

40,3140         03247 0      34766 1      03247 0      03055 1      34322 0      03106 0      00006 1      72244 0
40,3150         22154 1      34772 1      54155 1      56002 0      54115 0      03131 1      03146 1      04655 0
40,3160      C: 62346 1      56002 0      54114 1      34342 0      70143 0      54021 0      56021 1      54141 1
40,3170         34770 0      70143 0      10000 0      03175 1      03211 0      56124 0      60000 1      60000 1

40,3200         60000 1      60000 1      60000 1      54124 1      34753 1      70143 0      10000 0      34767 0
40,3210         64770 0      54143 0      00004 0      50141 0      11226 1      03217 0   C: 00104 1      64770 0
40,3220         54142 1      50143 1      73243 0      00006 1      60124 0      00006 1      13241 1      50143 1
40,3230         43243 0      70142 1      60124 0      40000 0      50141 0      57226 0      00006 1      63241 0

40,3240         25221 1      00003 1      00114 0   C: 00037 0   C: 01740 0   C: 02000 0   C: 03740 1      54141 1
40,3250         34767 0      54143 0      56002 0      54114 1      03212 0      03161 1      04655 0   C: 63372 1
40,3260         04261 0      43431 0      60136 0      00006 1      13277 1      42721 0      60136 0      00006 1
40,3270         13272 1      03275 1      04235 1      04362 1      04151 0      04362 1      05205 0      05726 1

40,3300      C: 21501 0      44770 1      55217 0      04235 1      04432 0      04417 1      03412 0      44767 1
40,3310         03302 0      41204 1      64354 1      00006 1      26000 0      00006 1      13275 0      34772 1
40,3320         55216 1      04261 0      03301 0      44772 0      03302 0      44766 0      00006 1      03011 1
40,3330         10115 0      34753 1      71224 0      10000 0      03343 0      04432 0      11245 1      03341 1

40,3340         05205 0      04655 0   C: 21275 1      34772 1      55215 1      11245 1      05205 0      04455 1
40,3350         05205 0      31202 0      54132 0      34770 0      03373 0      34321 0      02430 1      34767 0
40,3360         03373 0      34322 0      02430 1      34766 1      03373 0      34323 1      02430 1      30132 1
40,3370         55202 1      52131 0      05215 1      70123 0      10000 0      00002 0      16710 0      34353 0
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OCTAL LISTING FOR PARAGRAPH # 223,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,3400      57202 0     54140 0     11214 0     64770 0     03146 1     03407 1     02473 0     5614  1
40,3410      55202 1     05205 0     11245 1     03415 1     05205 0     34772 1     57245 0     00004 0
40,3420      05167 1     31205 1     54001 1     31204 0     50064 0     52155 1     00003 1     04432 0
40,3430      05205 0     04224 1     04636 0  C: 66714 0     00004 0     41334 0     74770 1     27334 0

40,3440      33550 1     00006 1     05011 1     33551 0     55241 0     34757 0     00006 1     05013 0
40,3450      34355 0     54117 1     43546 1     50117 0     55226 1     10117 1     03451 1     43547 0
40,3460      55227 0     55232 1     55234 1     34775 0     55221 0     37704 0     04636 0  C: 01731 0
40,3470      43552 1     00004 0     00006 1     03011 1     44757 1     00006 1     03013 0     34765 1

40,3500      00006 1     02012 0     64752 0     55241 0     44770 1     71334 0     55334 0     40000 0
40,3510      74754 1     27334 0     40000 0     74755 0     27334 0     40000 0     74756 0     27334 0
40,3520      44752 1     71333 1     55333 1     40000 0     74754 1     27333 1     40000 0     74755 0
40,3530      27333 1     40000 0     74757 1     27333 1     41337 0     74762 1     27337 0     00003 1

40,3540      05120 1  C: 03377 1  C: 60102 1     04235 1     04417 1     13335 0  C: 05675 0  C: 07675 1
40,3550   C: 00175 1  C: 40650 0  C: 00115 1     56115 1     55215 1     00004 0     34757 0     00006 1
40,3560      05011 1     35004 0     71241 0     64752 0     55241 0     41334 0     75055 0     27334 0
40,3570      41333 1     74757 1     27333 1     41337 0     74762 1     27337 0     04542 0     44757 1

40,3600      00006 1     03013 0     43216 0     00006 1     03011 1     34355 0     54117 1     00004 0
40,3610      50117 0     11226 1     64770 0     03620 0     64770 0     40000 0     77674 1     03623 0
40,3620      40000 0     77674 1     40000 0     50117 0     55226 1     00003 1     10117 1     03606 1
40,3630      54375 1     54376 1     55357 0     05205 0  C: 55000 1  C: 16001 1     06006 1  I: 77624 1

40,3640   C: 61706 1  I: 77776 1     33770 1     04636 0  C: 20576 1     15524 0     03650 1     03642 1
40,3650      06006 1  I: 46135 1  C: 02316 1  C: 61704 0  I: 73150 1  C: 02311 0  C: 02313 1  I: 45335 0
40,3660   C: 02316 1  C: 21774 0  I: 51030 0  C: 61672 0  C: 61677 0  I: 67130 1  C: 02000 0  C: 02001 1
40,3670   I: 77650 1  C: 61702 0  I: 67130 1  C: 02004 1  C: 02005 0  I: 77650 1  C: 61702 0  I: 67130 1

40,3700   C: 03000 1  C: 03001 0  I: 77614 1  C: 01671 0  I: 77776 1     15524 0  I: 40020 1  C: 00051 0
40,3710   C: 61711 1  I: 77624 1  C: 27516 0  I: 71331 0  C: 00051 0  C: 00006 1  C: 15336 0  C: 02312 0
40,3720   C: 02314 0  C: 02316 1  I: 77770 1  C: 00044 1  I: 47573 0  C: 02445 0  I: 77615 0  C: 02312 0
40,3730   C: 02312 0  I: 47573 0  C: 02533 0  I: 77615 0  C: 02314 0  C: 02314 0  I: 75500 0  C: 61724 1

40,3740   C: 16314 0  C: 02312 0  I: 77766 0  C: 02312 0  I: 52000 0  C: 61747 1  C: 61753 1  I: 77745 1
40,3750   C: 15344 0  C: 02312 0  C: 02314 0  I: 45345 1  C: 02312 0  C: 21772 0  I: 71240 1  C: 61762 0
40,3760   C: 21772 0  C: 02312 0  I: 66150 0  C: 00051 0  C: 00052 0  I: 77776 1     04655 0  C: 27527 1
40,3770   C: 01543 1  C: 01670 1  C: 17000 1  C: 00002 0  C: 00000 1  C: 03775 1  C: 03776 1  CKSM 43000 0
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OCTAL LISTING FOR PARAGRAPH # 224,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,2000        34772 1      55220 1      34170 0      54136 1      11216 1      02040 1      02040 1      02010 1
41,2010        32036 0      61216 0      00006 1      12025 0      36214 0      71203 0      10000 0      02021 0
41,2020        02025 1      11202 1      02031 1      02031 1      02025 1      41216 1      55216 1      04417 1
41,2030        01216 0      34772 1      54154 0      04636 0   C: 60165 0      02025 1   C: 03377 1   C: 00034 0

41,2040        34772 1      55203 0      04261 0      41204 1      55244 0      62037 1      00006 1      62133 1
41,2050        00006 1      32115 0      52006 0      50140 1      02054 1      02057 1      02220 0      10146 0
41,2060        02131 0      02350 0      02066 0      25222 1      04313 1      02120 0      34752 0      55220 1
41,2070        44170 1      60136 0      00006 1      12075 0      02116 0      02304 1      11203 0      04173 0

41,2100        04261 0      11245 1      02105 1      02106 1      02105 1      04360 0      57210 0      04305 0
41,2110        00006 1      32115 0      52006 0      02133 1   C: 02056 0   C: 64102 0      30156 0      04305 0
41,2120        44773 1      61204 0      00006 1      12133 0      34323 1      55202 1      31222 1      03351 0
41,2130        02133 1      64770 0      04305 0      45004 1      61204 0      10000 0      64770 0      02141 1

41,2140        02145 0      54154 0      04432 0      04655 0   C: 66000 1      51204 0      32150 1      04660 0
41,2150     C: 62350 0   C: 62364 1   C: 62372 0   C: 62377 0   C: 62357 1   C: 62352 1   C: 62516 1   C: 60657 0
41,2160     C: 62350 0   C: 62350 0   C: 61261 0   C: 63224 0   C: 63224 0   C: 63224 0   C: 63224 0   C: 63224 0
41,2170     C: 63224 0   C: 63224 0   C: 62350 0   C: 62350 0   C: 62350 0   C: 62741 1   C: 62750 1   C: 62765 1

41,2200     C: 62716 0   C: 62611 0   C: 62350 0   C: 63341 1   C: 62350 0   C: 62350 0   C: 63433 0   C: 63462 1
41,2210     C: 61323 1   C: 61301 1   C: 61307 1   C: 61432 0   C: 12367 0   C: 63376 0   C: 62350 0   C: 62350 0
41,2220        10146 0      02225 0      02350 0      02225 0      02225 0      46211 1      61204 0      00006 1
41,2230        62232 0      02133 1      34767 0      54117 1      62257 0      54145 0      50117 0      30150 0

41,2240        54122 1      03033 1      02260 1      02245 0      24122 0      30122 0      74347 1      04315 1
41,2250        50000 1      30000 1      50145 1      56000 1      10117 1      02233 1      02133 1      00125 1
41,2260        50000 1      12262 1      00002 0      00002 0      00002 0      00002 0      16706 1      16706 1
41,2270        00002 0      16706 1      00002 0      00002 0      16706 1      00002 0      00002 0      16706 1

41,2300        34321 0      12305 1      34322 0      12305 1      34323 1      55202 1      40002 1      55216 1
41,2310        04636 0   C: 60431 1      04360 0      00136 0      30157 1      55205 0      56002 0      54117 1
41,2320        00006 1      32115 0      52006 0      10146 0      64770 0      12330 1      12331 0      12331 0
41,2330        04305 0      34352 1      55202 1      31205 1      12344 1      30160 0      55204 1      56002 0

41,2340        54117 1      34351 1      55202 1      31204 0      04655 0   C: 61156 1      00117 0      04173 0
41,2350        04655 0   C: 61261 0      44767 1      02423 0      50145 1      40002 1      56132 1      44770 1
41,2360        02423 0      50145 1      40001 1      56131 1      44772 0      02436 1      02461 0      50145 1
41,2370        40000 0      02403 1      44770 1      02436 1      50145 1      40001 1      02403 1      44767 1
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OCTAL LISTING FOR PARAGRAPH # 225,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,2400      02436 1      50145 1      40002 1      56130 0      44767 1      61204 0      10000 0      02412 1
41,2410      00136 0      02412 1      54122 1      50000 1      34321 0      55202 1      50122 0      40130 1
41,2420      03351 0      56122 0      02406 1      54123 0      22002 0      02510 1      04333 0      76214 1
41,2430      60123 1      10000 0      00001 0   C: 04151 0      02350 0      00001 0      54123 0      22002 0

41,2440      02510 1      74753 0      10000 0      02350 0      02425 0      22002 0      02510 1      74753 0
41,2450      10000 0      04173 0      00001 0      22002 0      02510 1      10000 0      00001 0      00001 0
41,2460      02350 0      22002 0      30146 1      64770 0      00006 1      12477 0      50140 1      02467 0
41,2470      02472 1      00001 0      03025 0      02260 1      00001 0      24145 1      00001 0      31222 1

41,2500      75021 0      00006 1      50000 1      00000 1      40000 0      12403 0   C: 00147 0   C: 00146 1
41,2510      50140 1      32505 0      50000 1      30000 1      74344 1      00002 0      02510 1      04333 0
41,2520      76214 1      54117 1      54122 1      60145 1      50000 1      40000 0      50122 0      57206 1
41,2530      10122 1      02522 0      34772 1      54155 1      54156 1      50117 0      34321 0      55202 1

41,2540      50117 0      41206 0      54154 0      03042 1      54123 0      00006 1      32560 0      52006 0
41,2550      50140 1      02551 1      02555 0      03033 1      02570 1      03025 0      02570 1   C: 02114 1
41,2560   C: 64102 0      04636 0   C: 61072 0      10117 1      02566 0      00136 0      54117 1      02532 1
41,2570      50000 1      32573 1      04660 0   C: 61260 1   C: 62561 1   C: 60531 0   C: 60563 1   C: 60574 1

41,2600   C: 60601 0   C: 60505 1   C: 60603 1   C: 65137 1   C: 65212 0   C: 60601 0   C: 60570 0   C: 60616 0
41,2610   C: 60633 1      44767 1      02423 0      02453 1      34353 0      02336 0      02300 0      34354 1
41,2620      02336 0      02302 1      34615 1      02336 0      02304 1      46211 1      03011 1      00006 1
41,2630      32115 0      52006 0      34772 1      03071 1      50145 1      54000 0      34770 0      03071 1

41,2640      50145 1      54001 1      34767 0      03071 1      50145 1      54002 1      44774 0      61205 1
41,2650      00006 1      12653 1      03001 0      00004 0      45001 1      61206 1      00006 1      62667 1
41,2660      31206 1      04306 0      50145 1      30000 1      54001 1      34770 0      55206 0      64352 1
41,2670      00006 1      12714 0      31210 0      00006 1      62702 0      31207 0      00006 1      51206 1

41,2700      05000 1      12706 0      41207 1      00006 1      51206 1      03000 1      11206 0      10000 0
41,2710      12714 0      22000 1      50145 1      54000 0      00003 1      03001 0      44770 1      02423 0
41,2720      02453 1      34353 0      02336 0      02300 0      34354 1      02336 0      02302 1      44773 1
41,2730      03011 1      00006 1      32115 0      52006 0      34772 1      03071 1      50145 1      54000 0

41,2740      12760 0      02300 0      00006 1      32115 0      52006 0      34772 1      03071 1      12712 0
41,2750      44770 1      02423 0      34752 0      55220 1      02302 1      00006 1      32115 0      52006 0
41,2760      34770 0      03071 1      50145 1      54001 1      03001 0      44767 1      02423 0      34752 0
41,2770      55220 1      02304 1      00006 1      32115 0      52006 0      34767 0      03071 1      50145 1
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OCTAL LISTING FOR PARAGRAPH # 226,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,3000        54002 1     34772 1     55203 0     44772 0     55217 0     04432 0     04261 0     04655 0
41,3010     C: 61412 1     54117 1     41203 0     54021 0     40021 0     40021 0     10000 0     13021 0
41,3020        00002 0     60117 0     00006 1     16711 1     04173 0     56002 0     54114 1     34343 1
41,3030        70147 1     04324 0     00114 0     56002 0     54114 1     03063 1     70153 1     50001 0

41,3040        00000 1     00114 0     56002 0     54114 1     50140 1     03045 0     03060 1     03063 1
41,3050        70147 1     50001 0     00000 1     60000 1     00114 0     03020 0     04324 0     04333 0
41,3060        34342 0     70147 1     13053 0     50117 0     33055 1     54001 1     50117 0     34342 0
41,3070        00002 0     54117 1     56002 0     54115 0     34772 1     54162 0     50117 0     57211 1

41,3100        54155 1     50117 0     57206 1     54154 0     50140 1     03105 0     03133 0     50117 0
41,3110        30150 0     74347 1     04305 0     00006 1     60117 0     54145 0     11203 0     03170 1
41,3120        02445 0     03033 1     02260 1     03151 1     24145 1     30145 1     26117 1     34772 1
41,3130        50117 0     53777 0     03151 1     04313 1     11203 0     03170 1     02445 0     03125 0

41,3140        02260 1     03145 1     34772 1     54117 1     03124 0     30146 1     64770 0     00006 1
41,3150        13155 1     56154 1     00115 1  C: 02122 1  C: 64102 0     44774 0     61222 1     00006 1
41,3160        13001 1     31222 1     75021 0     56154 1     00006 1     50154 1     01000 0     03001 0
41,3170        03042 1     54123 0     00006 1     33154 1     52006 0     50140 1     03176 1     03202 1

41,3200        03033 1     03203 0     03025 0     50000 1     33206 0     04660 0  C: 62347 0  C: 60753 0
41,3210     C: 60674 1  C: 60743 1  C: 60776 1  C: 61023 1  C: 60761 1  C: 60776 1  C: 65361 0  C: 61261 0
41,3220     C: 61027 0  C: 60756 0  C: 61261 0  C: 61007 1     44076 0     71222 0     54155 1     40136 1
41,3230        64170 0     10000 0     03241 0  C: 75377 0     03241 0     34753 1     26155 1     34772 1

41,3240        55225 1     36043 0     71204 1     04333 0     54022 0     40022 0     56022 1     61205 1
41,3250        54154 0     34772 1     55215 1     11245 1     03256 0     04455 1     00004 0     11223 1
41,3260        03263 0     05222 0  C: 03267 1     52155 1     53224 0     00003 1     00136 0     04366 0
41,3270        03307 0     03303 1     35016 0     05233 0  C: 03267 1  C: 62102 0     34346 1     05121 0

41,3300     C: 03314 1  C: 62102 0     05314 1     34772 1     55223 1     55224 0     05314 1     11224 0
41,3310        13311 0     24002 0     00002 0     00002 0     03307 0     05205 0     11215 1     03357 0
41,3320        36043 0     71223 1     02315 1     34171 1     71223 1     63233 0     54023 1     30023 0
41,3330        55204 1     32433 1     54136 1     44076 0     71224 0     54156 1     02050 0     04356 0

41,3340        05205 0     34321 0     55202 1     31252 0     54001 1     31222 1     04671 0     03351 0
41,3350        05205 0     54022 0     56002 0     54115 0     34753 1     27202 1     34766 1     54137 0
41,3360        40022 0     40022 0     40022 0     40000 0     74774 0     04423 0     10000 0     55202 1
41,3370        04655 0  C: 61255 1     10137 0     03357 0     04261 0     00115 1     03417 0     34764 0
```

```
OCTAL LISTING FOR PARAGRAPH # 227,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,3400        61202 0      00006 1      13404 0      04173 0      34772 1      57205 1      54154 0      34352 1
41,3410        55202 1      04636 0   C: 60473 1      04261 0      30154 1      04655 0   C: 10007 1      40002 1
41,3420        55216 1      34352 1      55202 1      34772 1      55205 0      04636 0   C: 60473 1      04360 0
41,3430        34770 0      55203 0      00136 0      34770 0      71016 0      10000 0      03460 0      33277 0

41,3440        54154 0      37660 0      71016 0      54160 1      04432 0      31016 1      00006 1      12350 1
41,3450        34170 0      54157 0      00006 1      31020 1      52156 1      30160 0      00004 0      00154 1
41,3460        34345 1      03440 1      33273 1      54154 0      31016 1      03443 1      64774 1      00004 0
41,3470        54124 1      44755 0      50124 0      57226 0      10000 0      25221 1      03477 0      10124 1

41,3500        03470 1      00003 1      50123 1      03510 0      03505 1      55204 1      55205 0      55220 1
41,3510        04261 0      04417 1      03534 0      33536 1      54136 1      10123 0      03522 1      02350 0
41,3520        03466 0      02350 0      36043 0      70123 0      54157 0      30123 1      54023 1      30023 0
41,3530        54160 1      10157 0      03537 0      02335 0      34772 1      55216 1      04224 1      10160 1

41,3540        13543 1      02314 0      04224 1      30156 0      54161 0      02335 0      02314 0      34772 1
41,3550        55217 0      55220 1      55216 1      30161 1      54156 1      02040 1   C: 03556 1   C: 03557 0
41,3560   CKSM 20775 0         @            @            @            @            @            @            @
41,3570           @            @            @            @            @            @            @            @

41,3600           @            @            @            @            @            @            @            @
41,3610           @            @            @            @            @            @            @            @
41,3620           @            @            @            @            @            @            @            @
41,3630           @            @            @            @            @            @            @            @

41,3640           @            @            @            @            @            @            @            @
41,3650           @            @            @            @            @            @            @            @
41,3660           @            @            @            @            @            @            @            @
41,3670           @            @            @            @            @            @            @            @

41,3700           @            @            @            @            @            @            @            @
41,3710           @            @            @            @            @            @            @            @
41,3720           @            @            @            @            @            @            @            @
41,3730           @            @            @            @            @            @            @            @

41,3740           @            @            @            @            @            @            @            @
41,3750           @            @            @            @            @            @            @            @
41,3760           @            @            @            @            @            @            @            @
41,3770           @            @            @            @            @            @            @            @
```

```
OCTAL LISTING FOR PARAGRAPH # 230,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,2000        32055 0     04636 0  C: 20576 1     05524 1     02006 0     02000 0     31465 1     74765 0
42,2010        10000 0     12050 1     05561 0  C: 00212 0     04636 0  C: 40463 1     32054 1     04636 0
42,2020     C: 20576 1     05524 1     02024 0     02016 1     31465 1     74346 0     00006 1     12042 1
42,2030        40000 0     74346 0     00006 1     12042 1     00004 0     04714 1  C: 13313 1     00003 1

42,2040        04636 0  C: 40614 0     32053 0     04636 0  C: 20576 1     05524 1     05524 1     02042 0
42,2050        05547 1  C: 00212 0     02014 0  C: 01460 1  C: 01457 0  C: 01056 0     52152 0     51205 1
42,2060        32127 1     54146 0     51205 1     32273 0     54147 1     41205 0     65004 0     00006 1
42,2070        62074 0     34770 0     54140 0     02112 1     34767 0     54140 0     51205 1     32773 0

42,2100        54153 1     35041 1     70146 0     54002 1     50000 1     32557 1     54150 1     00006 1
42,2110        50002 0     32561 1     52152 0     52006 0     52124 1     00006 1     50000 1     32510 1
42,2120        52124 1     52006 0     52124 1     00006 1     50000 1     32440 0     12120 1  C: 00000 1
42,2130     C: 40000 0  C: 40000 0  C: 40000 0  C: 00000 1  C: 01250 1  C: 00775 1  C: 01206 1  C: 01363 0

42,2140     C: 00375 0  C: 77776 1  C: 02462 0  C: 01255 1  C: 02460 1  C: 02355 0  C: 77777 0  C: 01254 0
42,2150     C: 01013 1  C: 01307 1  C: 00000 1  C: 00032 0  C: 00037 0  C: 01307 1  C: 00000 1  C: 01254 0
42,2160     C: 01250 1  C: 01016 1  C: 01362 1  C: 00000 1  C: 01250 1  C: 01250 1  C: 03735 0  C: 02336 0
42,2170     C: 03412 0  C: 01250 1  C: 03660 1  C: 00024 1  C: 03662 0  C: 01516 1  C: 02640 1  C: 64000 0

42,2200     C: 02003 0  C: 24006 1  C: 24011 1  C: 64014 0  C: 64017 0  C: 02022 0  C: 22025 0  C: 22030 1
42,2210     C: 24033 1  C: 64036 0  C: 22041 1  C: 00044 1  C: 24047 1  C: 24052 0  C: 24055 1  C: 22060 1
42,2220     C: 00000 1  C: 24066 1  C: 24071 1  C: 24074 1  C: 24077 1  C: 24102 1  C: 64105 1  C: 24110 1
42,2230     C: 24113 1  C: 24116 1  C: 24121 0  C: 24124 0  C: 24127 0  C: 04132 0  C: 04135 1  C: 00000 1

42,2240     C: 04143 0  C: 04146 0  C: 64151 0  C: 00000 1  C: 00000 1  C: 24162 1  C: 22165 0  C: 64170 0
42,2250     C: 24173 1  C: 24176 1  C: 24201 1  C: 24204 1  C: 24207 1  C: 24212 0  C: 02215 0  C: 24220 1
42,2260     C: 24223 1  C: 24226 1  C: 02231 0  C: 02234 0  C: 04237 0  C: 02242 1  C: 04245 0  C: 24250 0
42,2270     C: 04253 1  C: 04256 1  C: 24261 1  C: 00000 1  C: 04040 1  C: 04140 0  C: 04102 0  C: 00000 1

42,2300     C: 00504 0  C: 02000 0  C: 04000 0  C: 04000 0  C: 04000 0  C: 00000 1  C: 24400 0  C: 02000 0
42,2310     C: 24400 0  C: 00511 1  C: 00000 1  C: 24400 0  C: 04102 0  C: 04102 0  C: 00000 1  C: 04102 0
42,2320     C: 04140 0  C: 04102 0  C: 00000 1  C: 24400 0  C: 04140 0  C: 04000 0  C: 00140 1  C: 00000 1
42,2330     C: 20102 0  C: 04140 0  C: 24400 0  C: 24400 0  C: 24400 0  C: 24400 0  C: 24400 0  C: 24400 0

42,2340     C: 24400 0  C: 24400 0  C: 24400 0  C: 24500 1  C: 00542 1  C: 24410 1  C: 20204 0  C: 00410 1
42,2350     C: 10000 0  C: 00000 1  C: 00306 1  C: 00614 1  C: 00507 0  C: 00417 0  C: 00204 1  C: 00004 0
42,2360     C: 10507 1  C: 10507 1  C: 10200 1  C: 00444 0  C: 00000 1  C: 24510 0  C: 24512 1  C: 10440 0
42,2370     C: 00204 1  C: 20451 0  C: 00457 1  C: 36460 0  C: 00000 1  C: 37044 0  C: 10217 1  C: 34444 1
```

```
OCTAL LISTING FOR PARAGRAPH # 231,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,2400     C: 35004 0    C: 00000 1    C: 00000 1    C: 00000 1    C: 10450 1    C: 40444 1    C: 00010 0    C: 00000 1
42,2410     C: 00000 1    C: 10204 0    C: 00113 1    C: 22440 1    C: 24512 1    C: 24512 1    C: 24512 1    C: 24512 1
42,2420     C: 24512 1    C: 22451 1    C: 00102 1    C: 00000 1    C: 16143 0    C: 24507 1    C: 00102 1    C: 00102 1
42,2430     C: 06143 1    C: 00102 1    C: 22440 1    C: 24507 0    C: 00000 1    C: 00000 1    C: 01162 0    C: 00006 1

42,2440     C: 03240 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 10707 0    C: 03435 0    C: 13070 1
42,2450     C: 34345 1    C: 00005 1    C: 21616 0    C: 26113 0    C: 31713 0    C: 00070 0    C: 20460 1    C: 01065 0
42,2460     C: 05740 1    C: 11414 0    C: 31463 1    C: 07475 0    C: 16051 1    C: 00001 0    C: 03434 1    C: 00002 0
42,2470     C: 22245 1    C: 00014 1    C: 35607 0    C: 07606 0    C: 06300 1    C: 16631 1    C: 11307 0    C: 12000 1

42,2500     C: 00000 1    C: 27176 1    C: 14235 0    C: 01670 1    C: 20000 0    C: 07475 0    C: 16051 1    C: 05174 0
42,2510     C: 13261 0    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00714 0    C: 31463 1    C: 13412 1
42,2520     C: 07534 1    C: 05605 1    C: 03656 1    C: 00001 0    C: 16170 0    C: 00441 0    C: 34306 0    C: 07176 0
42,2530     C: 21603 1    C: 15340 1    C: 15340 1    C: 01031 1    C: 21032 0    C: 34631 1    C: 23146 0    C: 14340 0

42,2540     C: 24145 1    C: 02363 0    C: 03721 0    C: 20373 1    C: 02122 1    C: 00424 0    C: 30446 1    C: 00631 0
42,2550     C: 23146 0    C: 00260 0    C: 06213 1    C: 04231 0    C: 27400 0    C: 01031 1    C: 21032 0    C: 03660 1
42,2560     C: 03762 1    C: 03425 1    C: 01250 1    C: 01251 0    C: 00000 1    C: 02354 1    C: 02356 0    C: 03762 1
42,2570     C: 00746 1    C: 00750 0    C: 00752 1    C: 02342 0    C: 02344 0    C: 02334 1    C: 00771 0    C: 03660 1

42,2600     C: 03625 0    C: 03065 1    C: 03066 1    C: 00000 1    C: 03073 0    C: 03072 1    C: 00000 1    C: 03023 0
42,2610     C: 03024 1    C: 00000 1    C: 03501 0    C: 03503 1    C: 03505 1    C: 02346 1    C: 02344 0    C: 02334 1
42,2620     C: 02311 0    C: 02313 1    C: 00000 1    C: 02632 1    C: 00000 1    C: 00000 1    C: 02311 0    C: 02313 1
42,2630     C: 02315 1    C: 02311 0    C: 02313 1    C: 02315 1    C: 03765 0    C: 03743 1    C: 03753 0    C: 03633 1

42,2640     C: 03631 0    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 02640 1    C: 02634 1    C: 02636 0
42,2650     C: 02610 1    C: 02612 0    C: 02614 0    C: 03721 0    C: 03756 0    C: 03760 0    C: 03400 0    C: 03402 1
42,2660     C: 03326 0    C: 03722 0    C: 03740 1    C: 03736 0    C: 03713 1    C: 03724 0    C: 03726 1    C: 03637 0
42,2670     C: 03722 0    C: 03713 1    C: 00013 0    C: 00013 0    C: 00013 0    C: 03315 0    C: 03675 0    C: 03715 1

42,2700     C: 03713 1    C: 00746 1    C: 00750 0    C: 03315 0    C: 03722 0    C: 03677 1    C: 03315 0    C: 03174 0
42,2710     C: 03756 0    C: 01140 0    C: 03751 1    C: 03752 1    C: 01140 0    C: 03751 1    C: 03752 1    C: 00000 1
42,2720     C: 00000 1    C: 00000 1    C: 03620 0    C: 03622 1    C: 03624 1    C: 03315 0    C: 03722 0    C: 03637 0
42,2730     C: 02632 1    C: 02546 1    C: 03655 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1

42,2740     C: 00000 1    C: 03741 0    C: 03737 1    C: 01352 1    C: 03372 1    C: 03373 0    C: 00000 1    C: 03660 1
42,2750     C: 03762 1    C: 03425 1    C: 03404 1    C: 03406 0    C: 03410 1    C: 03537 0    C: 03541 1    C: 03543 0
42,2760     C: 03674 1    C: 03676 0    C: 03700 0    C: 03537 0    C: 03541 1    C: 03543 0    C: 03664 0    C: 03666 1
42,2770     C: 03670 0    C: 03404 1    C: 03406 0    C: 03410 1    C: 03725 1    C: 03727 0    C: 00000 1    C: 03704 1
```

```
OCTAL LISTING FOR PARAGRAPH # 232,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,3000     C: 03706 0    C: 03710 1    C: 00746 1    C: 02350 0    C: 02352 1    C: 01755 1    C: 01757 0    C: 01761 0
42,3010     C: 00036 1    C: 00035 1    C: 00000 1    C: 02773 0    C: 02775 0    C: 00000 1    C: 02757 0    C: 02761 0
42,3020     C: 02763 1    C: 03725 1    C: 03727 0    C: 00000 1    C: 03660 1    C: 03724 0    C: 03722 0    C: 02311 0
42,3030     C: 02313 1    C: 02315 1    C: 01250 1    C: 01251 0    C: 01252 0    C: 01253 1    C: 01254 0    C: 01255 1

42,3040     C: 02311 0    C: 02313 1    C: 02315 1    C: 16351 1    C: 00142 0    C: 16347 0    C: 16512 0    C: 22347 1
42,3050     C: 24454 1    C: 00000 1    C: 00553 1    C: 00143 1    C: 06344 1    C: 22347 1    C: 00512 1    C: 00012 1
42,3060     C: 24344 1    C: 24344 1    C: 24503 1    C: 00512 1    C: 00007 0    C: 16347 0    C: 16347 0    C: 24503 1
42,3070     C: 06512 1    C: 16512 0    C: 22507 0    C: 16505 0    C: 20410 0    C: 16352 1    C: 24507 0    C: 24512 1

42,3100     C: 24252 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 24507 0    C: 12512 1    C: 22447 0    C: 00000 1
42,3110     C: 00000 1    C: 24512 1    C: 00103 0    C: 24511 1    C: 16347 0    C: 16347 0    C: 16347 0    C: 16347 0
42,3120     C: 16347 0    C: 24512 1    C: 00302 0    C: 32655 0    C: 10347 0    C: 16344 0    C: 00302 0    C: 00302 0
42,3130     C: 16347 0    C: 00302 0    C: 24511 1    C: 16344 0    C: 06143 1    C: 06043 0    C: 06247 0       04636 0

42,3140     C: 60635 1       07226 0       03326 0       07052 1    C: 03200 0       34323 1       55202 1       04636 0
42,3150     C: 61072 0       03344 1       33202 1       56154 1       55212 0       33203 0       56155 0       04403 1
42,3160        34322 0       55202 1       04636 0    C: 61072 0       00006 1       33207 1       52155 1       31212 1
42,3170        04403 1       34321 0       55202 1       04636 0    C: 61072 0       00136 0    C: 25660 0    C: 31742 1

42,3200     C: 01727 1    C: 01217 1    C: 00011 1    C: 32445 0    C: 02104 0    C: 10422 1    C: 05174 0    C: 13261 0
42,3210     C: 00000 1    C: 00062 0       04636 0    C: 60635 1       07226 0       10154 0       03220 1       03251 1
42,3220        63306 1       10000 0       03235 0       03251 1       03251 1       10155 1       03230 0       03251 1
42,3230        63307 0       10000 0       03235 0       03251 1       03251 1       10154 0       33311 1       03246 1

42,3240        43311 0       54154 0       43312 0       54155 1       33310 0       03327 1       54154 0       33312 1
42,3250        03243 1       03313 0       33304 0       07256 1       46214 1       27202 1       04636 0    C: 61126 0
42,3260        34772 1       54124 1       44767 1       50117 0       64321 0       54143 0       04636 0    C: 61161 0
42,3270        03344 1       56155 0       00006 1       73305 0       52155 1       50117 0       34321 0       55202 1

42,3300        04636 0    C: 61126 0       04655 0    C: 62563 0    C: 23147 1    C: 23346 1    C: 77753 0    C: 41126 1
42,3310     C: 03252 1    C: 00025 0    C: 37016 1       10155 1       13323 1       13323 1       13317 0       00006 1
42,3320        43211 1       20155 1       13326 1       00006 1       33211 0       13321 0       56002 0       54144 1
42,3330        07052 1    C: 03176 1       00006 1       30155 0       53213 1       04372 0       04372 0       34772 1

42,3340        56156 0       56155 0       56154 1       00144 0       56002 0       54144 1       31213 0       00006 1
42,3350        74766 0       00006 1       74754 1       22155 0       31212 1       54154 0       07052 1    C: 03204 1
42,3360        00144 0       41203 0       74172 0       10000 0       03501 0       07052 1    C: 03444 0       03453 0
42,3370        34772 1       54156 1       33446 1       54154 0       33447 0       56155 0       07256 1       03464 1
```

```
OCTAL LISTING FOR PARAGRAPH # 233,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,3400       52156 1     52124 1     31207 0     23212 1     52155 1     07052 1  C: 03444 0     03453 0
42,3410       43451 0     03470 1     56155 0     00006 1     73450 1     20124 1     00006 1     13421 1
42,3420       04173 0     31210 0     23213 0     52155 1     07052 1  C: 03444 0     03453 0     43452 0
42,3430       03470 1     52124 1     20155 1     00006 1     13436 1     04173 0     07224 1     52155 1

42,3440       50145 1     52001 1     04655 0  C: 63001 0  C: 00006 1  C: 03240 1  C: 00025 0  C: 37100 1
42,3450    C: 13560 0  C: 00073 0  C: 13557 1     56156 0     60000 1     54156 1     34772 1     60155 0
42,3460       54155 1     34772 1     60154 1     56154 1     30154 1     00006 1     16711 1     04173 0
42,3470       54156 1     10155 1     64770 0     13475 0     64770 0     60156 0     00006 1     66711 0

42,3500       04173 0     44125 1     55244 0     04173 0     06006 1  I: 45034 1  C: 51751 0  C: 47530 1
42,3510    C: 34041 0  C: 27170 1  I: 46135 1  C: 00050 1  C: 65527 1  I: 77775 1  C: 00001 0  C: 00003 1
42,3520    I: 45145 0  C: 00015 0  C: 54141 1  I: 57455 1  C: 00003 1  I: 77650 1  C: 65531 0  I: 57575 1
42,3530    C: 00001 0  I: 64201 0  C: 00003 1  C: 01734 0  I: 65372 1  C: 15336 0  C: 24025 0  C: 00003 1

42,3540    I: 77624 1  C: 47633 1  C: 00003 1  I: 63256 0  C: 00003 1  I: 72431 1  C: 15330 0  I: 40045 1
42,3550    C: 00003 1  C: 65552 0  I: 40056 0  C: 65567 0  I: 50206 0  C: 15334 1  I: 65552 0  I: 50315 0
42,3560    C: 00017 1  C: 15332 1  I: 51152 0  C: 65567 0  I: 45345 1  C: 15344 0  I: 77606 1  I: 50375 0
42,3570    C: 00011 1  C: 15330 0  I: 65552 0  I: 77625 0  C: 15326 1  C: 16312 0  C: 00025 0  C: 02314 0

42,3600    I: 77776 1     35047 1     05176 1     31247 1     74764 1     00006 1     15524 0     33625 0
42,3610       04636 0  C: 20607 1     05626 0     05626 0     05205 0     34766 1     05516 0     34755 1
42,3620       05176 1     34770 0     04636 0  C: 01731 0     13504 1  C: 01463 1     05402 1  C: 07026 1
42,3630    C: 30000 1  C: 03706 0  C: 56100 0     34770 0     54332 1     05344 1  C: 00033 1     50302 0

42,3640       13641 0     13644 0     13647 0     13647 0     34767 0     54300 0     13672 0     33744 0
42,3650       54156 1     33746 1     04636 0  C: 20576 1     13733 1     13651 1     03735 0     44767 1
42,3660       60304 0     00006 1     63651 0     40304 1     64353 0     00006 1     63651 0     30304 0
42,3670       54300 0     24303 1     33745 1     60303 1     54156 1     33746 1     04636 0  C: 20576 1

42,3700       13733 1     13675 1     03735 0     40303 0     60300 1     00006 1     63710 1     13671 0
42,3710       33743 1     54156 1     33747 0     04636 0  C: 20576 1     13733 1     13750 1     03735 0
42,3720       30330 1     00006 1     63710 1     40330 0     60300 1     64770 0     00006 1     63710 1
42,3730       33745 1     60330 1     13674 0     04655 0  C: 57706 1     40154 0     74763 0     10000 0

42,3740       00002 0     50002 0     77771 0  C: 00330 1  C: 00304 0  C: 00303 1  C: 05201 1  C: 05202 1
42,3750       00004 0     30103 0     56001 0     34766 1     00006 1     06001 0     54103 1     05402 1
42,3760    C: 04026 1     00004 0     44767 1     60302 0     00006 1     63770 1     04655 0  C: 57757 0
42,3770       34346 1     05135 0  C: 03545 0  C: 56103 0     05205 0  C: 03775 1  C: 03776 1  CKSM 03706 0
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OCTAL LISTING FOR PARAGRAPH # 234,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,2000        50154 1     02002 1     02121 1     02133 1     02227 1     02364 1     03064 0     03062 0
43,2010        02451 0     03001 0     02544 0     12535 1     02265 1     02265 1     03037 0     02265 1
43,2020        02600 0     02312 0     02641 0     03102 1     02445 0     02265 1     02273 0     02301 1
43,2030        02304 1     02307 1     02437 0     02342 0     02774 1     03054 0     02116 0     02037 1

43,2040        03656 1     03660 1     03662 0     03664 0     02706 1     02713 0     02116 0     02116 0
43,2050        02352 1     02116 0     02703 1     02705 1     02557 1     02564 1     02116 0     02574 0
43,2060        02621 0     02773 0     02770 0     02722 1     03022 1     02735 1     02116 0     02731 0
43,2070        03006 1     02116 0     13030 0     02265 1     02116 0     02265 1     11247 0     02116 0

43,2100        30100 0     77646 0     10000 0     02116 0     34124 1     55247 0     30002 0     54155 1
43,2110        44767 1     04202 0     02113 0     10067 1     05152 1     00155 0     04362 1     04655 0
43,2120     C: 21275 1     31335 0     00006 1     12125 1     02116 0     04636 0  C: 16627 0     04636 0
43,2130     C: 17644 1     02132 0     02117 1     44124 0     61205 1     00006 1     12143 1     02165 1

43,2140        00006 1     12166 0     02116 0     02076 1     32163 1     04636 0  C: 20576 1     05524 1
43,2150        12151 1     32164 0     04636 0  C: 21064 0     02260 1     04636 0  C: 16724 1     04636 0
43,2160     C: 17644 1     05524 1     05524 1  C: 06226 1  C: 12200 0  C: 77670 0     02714 1     02076 1
43,2170        35043 0     54003 0     11354 0     02200 1     02175 0     04362 1     05671 1  C: 00115 1

43,2200        11323 0     02207 0     02207 0     02207 0     05671 1  C: 00117 0     05524 1     32226 0
43,2210        04636 0  C: 20576 1     05524 1     02214 1     31773 0     55313 0     31775 0     55312 1
43,2220        32164 0     04636 0  C: 21064 0     34770 0     55323 0     05524 1  C: 06134 1     02076 1
43,2230        32256 1     04636 0  C: 20576 1     05524 1     02235 1     32257 0     04636 0  C: 21064 0

43,2240        02260 1     04636 0  C: 17133 0     04636 0  C: 17644 1     05524 1     32255 1     04636 0
43,2250     C: 17244 0     04636 0  C: 17644 1     05524 1     05524 1  C: 02757 0  C: 06335 1  C: 12400 0
43,2260        31335 0     00006 1     16711 1     04362 1     05524 1     04417 1     34223 0     00006 1
43,2270        01007 1     04655 0  C: 63001 0     00006 1     30033 1     53014 1     30034 0     55015 0

43,2300        02117 1     03065 1  C: 00006 1     03071 1     05547 1  C: 00220 1     02303 0     05561 0
43,2310     C: 00220 1     02303 0     02076 1     32341 0     04636 0  C: 20576 1     05524 1     05524 1
43,2320        44615 0     60154 1     00006 1     12325 0     05524 1     00004 0     34772 1     54001 1
43,2330        52025 1     52155 1     53255 0     20155 1     07224 1     52155 1     20025 1     00003 1

43,2340        05524 1  C: 06230 0     05354 0  C: 00002 0     02116 0     35055 1     05135 0  C: 02000 0
43,2350     C: 66065 1     02117 1     05354 0  C: 00002 0     02116 0     35055 1     05135 0  C: 03132 1
43,2360     C: 66105 0     05402 1  C: 00174 0     02117 1     02714 1     35001 0     00006 1     02012 0
43,2370        10000 0     12116 1     02427 1     02076 1     45004 1     00006 1     03012 1     32163 1
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OCTAL LISTING FOR PARAGRAPH # 235,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,2400       04636 0   C: 20576 1      12414 0      02404 0      04611 0      04636 0   C: 42450 0      04636 0
43,2410    C: 42467 1      34767 0      05223 1   C: 02417 1      02427 1      15524 0      02117 1      00006 1
43,2420       31310 1      53477 0      31311 0      55500 1      04714 1   C: 42503 1      05314 1      34764 0
43,2430       70101 0      10000 0      00002 0      34764 0      00006 1      02030 0      15651 1      02076 1

43,2440       34755 1      05135 0   C: 03504 0   C: 64104 0      05205 0      05547 1   C: 00055 1      03065 1
43,2450    C: 00020 0      04611 0      40102 0      74076 0      00006 1      62465 1      31465 1      74753 0
43,2460       00006 1      62116 0      04636 0   C: 36344 1      02117 1      44760 0      00006 1      03012 1
43,2470       31465 1      00006 1      74766 0      76214 1      00004 0      50000 1      12477 0      12522 1

43,2500       12517 1      12517 1      00006 1      32516 1      52113 0      34750 1      54030 0      40102 0
43,2510       74076 0      26102 0      04714 1   C: 42642 1      02117 1   C: 02000 0   C: 54106 1      04714 1
43,2520    C: 42042 1      12117 0      04714 1   C: 42642 1      34770 0      55340 0      00006 1      32721 1
43,2530       52113 0      44076 0      70102 0      54102 0      02117 1      02714 1      02076 1      34754 0

43,2540       05135 0   C: 02427 1   C: 56106 0      05205 0      40102 0      74076 0      00006 1      62551 1
43,2550       02116 0      02076 1      34754 0      05121 0   C: 02000 0   C: 64106 1      05205 0      02076 1
43,2560       35051 0      05176 1      04655 0   C: 46330 0      02076 1      05547 1   C: 00222 0      35047 1
43,2570       05121 0   C: 02000 0   C: 62064 1      05205 0      02076 1      05561 0   C: 00222 0      02567 1

43,2600       02076 1      30074 1      74762 1      00006 1      12616 0      30075 0      74764 1      00006 1
43,2610       12616 0      35055 1      05121 0   C: 02263 1   C: 76067 1      05205 0      05671 1   C: 00406 0
43,2620       05524 1      04606 0      31722 1      00006 1      12627 1      00006 1      62632 1      37702 0
43,2630       55722 0      02117 1      34762 0      70105 1      00006 1      12117 0      05547 1   C: 00231 1

43,2640       12117 0      06006 1   I: 43014 0   C: 04275 0   C: 04306 0   C: 66655 1   I: 43014 0   C: 00350 1
43,2650    C: 66701 1   C: 05270 1   I: 43014 0   C: 01261 0   C: 00670 0   I: 43014 0   C: 00652 0   C: 66676 0
43,2660    C: 00267 1   I: 43014 0   C: 00270 1   C: 04266 1   I: 45034 1   C: 11030 1   C: 27516 0   I: 77776 1
43,2670       05362 0   C: 00002 0   C: 00001 0      00004 0      04655 0   C: 12712 0   I: 43014 0   C: 00270 1

43,2700    C: 04266 1   I: 77776 1      02117 1      03065 1   C: 00026 0      03071 1      32711 1      54334 1
43,2710       02117 1   C: 03643 0   C: 00125 1      03071 1      31214 1      00006 1      16711 1      12116 1
43,2720    C: 03226 1   C: 12106 0      02714 1      02076 1      34754 0      05135 0   C: 02377 0   C: 62066 0
43,2730       15205 1      05561 0   C: 00131 1      03065 1   C: 00066 1      02714 1      02076 1      34770 0

43,2740       55376 0      34772 1      55362 0      33177 0      55361 0      03454 1      23372 0      23373 1
43,2750       33176 1      54156 1      32763 1      04636 0   C: 20576 1      02760 1      03565 1      02750 1
43,2760       33177 0      55371 1      05524 1   C: 01201 0      31376 1      00006 1      13270 0      03454 1
43,2770       05632 0      03065 1   C: 00215 1      03071 1      34754 0      05135 0   C: 02000 0   C: 36103 0
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OCTAL LISTING FOR PARAGRAPH # 236,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,3000         05205 0       34754 0       05135 0    C: 02033 0    C: 36103 0       05205 0       34756 1       70105 1
43,3010         00006 1       12116 1       05561 0    C: 00213 1       05354 0    C: 00027 1       02116 0       05402 1
43,3020      C: 00112 0       02673 1       02076 1       35051 0       05135 0    C: 02000 0    C: 50107 1       15205 1
43,3030         05547 1    C: 00221 0       05547 1    C: 00204 1       34772 1       04655 0    C: 10007 1       05354 0

43,3040      C: 00026 0       02116 0       04606 0       45051 1       71751 1       55751 1       31747 1       00006 1
43,3050         74757 1       30001 0       27751 1       02117 1       02076 1       35047 1       05135 0    C: 03636 1
43,3060      C: 60105 0       05205 0       03065 1    C: 00177 0       03071 1       30002 0       05565 1       70001 1
43,3070         13077 0       30002 0       67701 0       05565 1       40000 0       00006 1       04001 1       50061 0

43,3100         54074 0       12117 0       02076 1       34766 1       55255 0       34767 0       70106 1       00006 1
43,3110         13112 1       34770 0       55256 0       33131 1       04636 0    C: 20576 1       05524 1       05524 1
43,3120         31256 1       00006 1       13126 0       05547 1    C: 00243 1       13105 1       05561 0    C: 00243 1
43,3130         13105 1    C: 01014 0       06006 1    I: 47145 1    C: 02636 0    C: 45640 1    I: 77776 1       56154 1

43,3140         55250 0       04636 0    C: 20715 0       33165 0       04636 0    C: 20743 0       13157 0       13151 0
43,3150         13143 0       06006 1    I: 47135 0    C: 01251 0    C: 51754 0    C: 02634 1    I: 77776 1       34772 1
43,3160         55632 0       05402 1    C: 00004 0       04655 0    C: 21275 1    C: 01435 1    C: 00061 0    C: 01373 1
43,3170      C: 01773 0    C: 60017 1    C: 17777 0    C: 25252 0    C: 52400 1    C: 76777 1    C: 01371 0    C: 03270 1

43,3200         31360 0       00006 1       13211 1       00006 1       31376 1       51377 0       52001 1       34772 1
43,3210         55360 1       00004 0       30002 0       55357 0       55363 1       25365 0       05673 0    C: 01102 0
43,3220         11362 0       34772 1       55362 0       03270 1       01357 1       10000 0       13200 1       13200 1
43,3230         10000 0       13200 1       00002 0       00006 1       23371 0       03264 1       11362 0       03244 0

43,3240         03235 0       03244 0       25366 0       01371 0       65736 0       00006 1       63250 0       03221 0
43,3250         25366 0       64774 1       50000 1       03254 1       01371 0       01371 0       01371 0       03271 0
43,3260         03452 1       01371 0       01371 0       01371 0       00006 1       23361 1       04655 0    C: 03177 0
43,3270         03233 0       34770 0       55372 1       34772 1       54003 0       35030 1       55377 1       35041 1

43,3300         55373 0       03321 1       35024 1       55377 1       35041 1       55373 0       03321 1       35024 1
43,3310         55377 1       33170 1       55373 0       03321 1       55372 1       33166 0       55377 1       33167 1
43,3320         55373 0       00004 0       30003 1       55374 1       00006 1       51377 0       30001 0       53376 0
43,3330         31377 0       55360 1       54001 1       24001 0       50000 1       52001 1       51377 0       40001 1

43,3340         51377 0       60000 1       03225 1       31360 0       00006 1       13371 0       00006 1       51377 0
43,3350         40001 1       51377 0       52001 1       51377 0       40000 0       51377 0       60001 0       03225 1
43,3360         31360 0       00006 1       13371 0       00006 1       31376 1       51377 0       52001 1       34772 1
43,3370         55360 1       00003 1       03264 1       31374 0       54003 0       25377 0       41377 1       61373 1
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OCTAL LISTING FOR PARAGRAPH # 237,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,3400       00006 1      13403 1      03321 1      11372 1      03314 1      25372 0      30003 1      64760 1
43,3410       54003 0      63175 1      00006 1      13307 1      10003 0      03302 0      35024 1      54003 0
43,3420       35004 0      55372 1      64765 1      50000 1      40000 0      11372 1      03421 0      33173 1
43,3430       54020 1      54022 0      54021 0      54023 1      60020 0      60022 1      60021 1      60023 0

43,3440       63174 0      03225 1      60020 0      60022 1      60021 1      60023 0      64770 0      03225 1
43,3450       25367 1      03233 0      34771 1      55376 0      34772 1      55374 1      34770 0      55377 1
43,3460       34772 1      55371 1      55373 0      34770 0      55375 0      31374 0      54001 1      74344 1
43,3470       61373 1      04671 0      03515 0      64756 1      03526 0      40000 0      55377 1      00006 1

43,3500       13503 0      34755 1      03504 0      35050 1      55373 0      34772 1      55371 1      34770 0
43,3510       55375 0      51373 1      30000 1      03515 0      03526 0      55372 1      61371 0      55371 1
43,3520       34772 1      61371 0      55371 1      41372 1      61373 1      00002 0      22000 1      31373 1
43,3530       75041 0      64344 0      00006 1      13622 0      11375 0      03540 0      03540 0      03622 1

43,3540       10001 1      03550 1      03550 1      03550 1      11375 0      03551 0      37702 0      03551 0
43,3550       34770 0      55375 0      11376 0      10067 1      05152 1      03557 0      03264 1      25373 1
43,3560       11377 1      03465 0      03465 0      03511 1      03511 1      41374 1      63655 1      00006 1
43,3570       12764 1      31374 0      64756 1      55374 1      03600 1      34752 0      27374 1      03614 1

43,3600       74344 1      00006 1      13612 0      63172 0      00006 1      13607 1      03614 1      35010 0
43,3610       27374 1      03614 1      63171 0      27374 1      11377 1      03457 1      34770 0      03475 1
43,3620       34762 0      03457 1      31374 0      74344 1      04333 0      54001 1      31374 0      74350 1
43,3630       00006 1      13637 1      54021 0      30001 0      74774 0      60021 1      54001 1      31376 1

43,3640       00006 1      13643 1      02746 0      11371 1      03646 0      03647 1      64770 0      55371 1
43,3650       40001 1      61371 0      67702 0      03225 1      03565 1   C: 66100 0      34772 1      13665 0
43,3660       34770 0      13665 0      34767 0      13665 0      36214 0      54331 1      02076 1      31214 1
43,3670       00006 1      13707 0      40104 0      74760 0      10000 0      13702 0      41214 0      64124 1

43,3700       00006 1      13707 0      44767 1      71214 0      00006 1      13707 0      13717 1      31214 1
43,3710       54301 1      30331 0      54302 1      34770 0      54303 0      04655 0   C: 65626 0      04362 1
43,3720       04415 0      15524 0   C: 03722 0   C: 03723 1 CKSM 54201 0         @            @            @
43,3730          @            @            @            @            @            @            @            @

43,3740          @            @            @            @            @            @            @            @
43,3750          @            @            @            @            @            @            @            @
43,3760          @            @            @            @            @            @            @            @
43,3770          @            @            @            @            @            @            @            @
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GAP:  ASSEMBLE REVISION 072 OF AGC PROGRAM ARTEMIS BY NASA 2021114-011        11:40 FEB. 26,1971                 PAGE 1736

OCCUPIED LOCATIONS  PAGE         OCCUPIED LOCATIONS  PAGE          OCCUPIED LOCATIONS  PAGE          OCCUPIED LOCATIONS  PAGE

   4000  TO    4045   139           5214  TO    5221 1220           6427  TO    6436 1124         00,2172  TO 00,2213 1157
   4046  TO    4062   140           5222  TO    5261 1223           6437  TO    6471 1125         00,2214  TO 00,2235 1158
   4063  TO    4076   141           5262  TO    5273 1224           6472  TO    6525 1126         00,2236  TO 00,2276 1159
   4077  TO    4102   178           5274  TO    5313 1225           6526  TO    6573 1127         00,2277  TO 00,2331 1160

   4103  TO    4123   206           5314  TO    5331 1232                       6574 1128         00,2332  TO 00,2352 1161
   4124  TO    4125   208           5332  TO    5343 1234           6575  TO    6635 1129         00,2353  TO 00,2421 1162
   4126  TO    4150   238           5344  TO    5361 1402           6636  TO    6671 1130         00,2422  TO 00,2435 1163
   4151  TO    4172   366           5362  TO    5410 1406           6672  TO    6715 1131         00,2436  TO 00,2476 1164

   4173  TO    4201   372           5411  TO    5455 1407           6716  TO    6751 1132         00,2477  TO 00,2536 1165
   4202  TO    4234   378           5456  TO    5463 1408           6752  TO    6753 1133         00,2537  TO 00,2566 1166
   4235  TO    4237   380           5464  TO    5467 1410           6754  TO    7030 1134         00,2567  TO 00,2606 1167
   4240  TO    4277   381           5470  TO    5476 1412           7031  TO    7037 1135         00,2607  TO 00,2623 1168

   4300  TO    4304   382           5477  TO    5510 1414           7040  TO    7051 1136         00,2624  TO 00,2640 1169
   4305  TO    4337   384           5511  TO    5515 1417           7052  TO    7104 1137         00,2641  TO 00,2652 1170
   4340  TO    4401   385           5516  TO    5546 1459           7105  TO    7122 1138         00,2653  TO 00,2717 1171
   4402  TO    4431   386           5547  TO    5576 1479           7123  TO    7163 1139         00,2720  TO 00,2746 1172

   4432  TO    4462   388           5577  TO    5606 1480           7164  TO    7205 1140         00,2747  TO 00,3005 1173
   4463  TO    4507   422           5607  TO    5625 1483           7206  TO    7223 1141         00,3006  TO 00,3021 1174
   4510  TO    4530   432           5626  TO    5631 1484           7224  TO    7264 1142         00,3022  TO 00,3071 1175
                 4531   433           5632  TO    5670 1485           7265  TO    7275 1143                     00,3072 1176

   4532  TO    4537   488           5671  TO    5722 1486           7276  TO    7334 1144         00,3073  TO 00,3131 1177
   4540  TO    4541   551           5723  TO    5725 1487           7335  TO    7360 1145         00,3132  TO 00,3147 1178
   4542  TO    4545   592           5726  TO    5765 1488           7361  TO    7413 1146         00,3150  TO 00,3172 1179
   4546  TO    4552   640           5766  TO    5776 1489           7414  TO    7461 1147         00,3173  TO 00,3205 1180

   4553  TO    4602   652           6000  TO    6005 1065           7462  TO    7525 1148         00,3206  TO 00,3230 1181
   4603  TO    4605   669           6006  TO    6025 1108           7526  TO    7557 1149         00,3231  TO 00,3276 1182
   4606  TO    4613   713           6026  TO    6051 1109           7560  TO    7610 1150         00,3277  TO 00,3341 1183
   4614  TO    4617  1025           6052  TO    6063 1110           7611  TO    7643 1151         00,3342  TO 00,3404 1184

                 4620  1037           6064  TO    6112 1111           7644  TO    7645 1202         00,3405  TO 00,3452 1185
   4621  TO    4635  1096           6113  TO    6162 1112           7646  TO    7702 1203         00,3453  TO 00,3513 1186
   4636  TO    4664  1104                         6163 1113           7703  TO    7705 1225         00,3514  TO 00,3547 1187
   4665  TO    4713  1105           6164  TO    6215 1114           7706  TO    7721 1487         00,3550  TO 00,3604 1188

   4714  TO    4746  1106           6216  TO    6231 1115           7722  TO    7725 1488         00,3605  TO 00,3646 1189
   4747  TO    4776  1200           6232  TO    6242 1116           7726  TO    7727   27         00,3647  TO 00,3710 1190
   4777  TO    5024  1201           6243  TO    6302 1117        00,2000  TO 00,2016 1119         00,3711  TO 00,3727 1191
   5025  TO    5057  1202           6303  TO    6322 1118        00,2017  TO 00,2040 1152         00,3730  TO 00,3763 1481

   5060  TO    5117  1207           6323  TO    6340 1120        00,2041  TO 00,2100 1153         00,3764  TO 00,3766 1482
   5120  TO    5155  1208           6341  TO    6362 1121        00,2101  TO 00,2120 1154         00,3767  TO 00,3770   27
   5156  TO    5162  1209           6363  TO    6402 1122        00,2121  TO 00,2143 1155         01,2000  TO 01,2032  230
   5163  TO    5213  1210           6403  TO    6426 1123        00,2144  TO 00,2171 1156         01,2033  TO 01,2070  231
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OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE

01,2071  TO 01,2132  232        04,2007  TO 04,2037  208        05,2260  TO 05,2266  188        06,2341  TO 06,2365  152
01,2133  TO 01,2176  233        04,2040  TO 04,2112  209        05,2267  TO 05,2334  189        06,2366  TO 06,2407  153
01,2177  TO 01,2242  234        04,2113  TO 04,2162  210        05,2335  TO 05,2366  190        06,2410  TO 06,2425  154
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21,2116  TO 21,2122  998          22,2304  TO 22,2360  408          23,2213  TO 23,2262  305          24,2114  TO 24,2122  588
21,2123  TO 21,2165 1000          22,2361  TO 22,2435  409          23,2263  TO 23,2320  306          24,2123  TO 24,2172  679

21,2166  TO 21,2200 1001          22,2436  TO 22,2517  410          23,2321  TO 23,2327  307          24,2173  TO 24,2213  680
21,2201  TO 21,2237 1002          22,2520  TO 22,2554  411          23,2330  TO 23,2357  517          24,2214  TO 24,2240  693
21,2240  TO 21,2314 1003          22,2555  TO 22,2633  412          23,2360  TO 23,2434  518          24,2241  TO 24,2256  694
21,2315  TO 21,2366 1004          22,2634  TO 22,2655  413          23,2435  TO 23,2513  519          24,2257  TO 24,2330  695
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30,2501  TO 30,2557  610          31,3552  TO 31,3605  682          33,2000  TO 33,2001  426          34,2342  TO 34,2405  543
30,2560  TO 30,2641  611          31,3606  TO 31,3623  686          33,2002  TO 33,2040  427          34,2406  TO 34,2412  544

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30,3070  TO 30,3151  615          31,3737  TO 31,3767 1261          33,2146  TO 33,2202  431          34,2557  TO 34,2624  548

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30,3363  TO 30,3403  619          32,2027  TO 32,2054  647          33,2276  TO 33,2343  437          34,2773  TO 34,3054  580

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30,3466  TO 30,3547  621          32,2132  TO 32,2210  649          33,2406  TO 33,2443  439          34,3137  TO 34,3220  582
30,3550  TO 30,3631  622          32,2211  TO 32,2267  650          33,2444  TO 33,2521  440          34,3221  TO 34,3250  583
30,3632  TO 30,3647  623          32,2270  TO 32,2271  651          33,2522  TO 33,2577  441          34,3251  TO 34,3323  584

30,3650  TO 30,3720  716          32,2272  TO 32,2303  907          33,2600  TO 33,2647  442          34,3324  TO 34,3374  585
30,3721  TO 30,3766  717          32,2304  TO 32,2322  908          33,2650  TO 33,2710  443          34,3375  TO 34,3405  586
30,3767  TO 30,3770   32          32,2323  TO 32,2337  909          33,2711  TO 33,2763  444          34,3406  TO 34,3431  589
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31,2133  TO 31,2145  509          32,2455  TO 32,2473  912          33,3120  TO 33,3172  447          34,3516  TO 34,3576  597
31,2146  TO 31,2206  510          32,2474  TO 32,2545  913          33,3173  TO 33,3211  448          34,3577  TO 34,3652  598
31,2207  TO 31,2270  511          32,2546  TO 32,2605  915          33,3212  TO 33,3263  449          34,3653  TO 34,3730  599

31,2271  TO 31,2337  512          32,2606  TO 32,2664  916          33,3264  TO 33,3340  450          34,3731  TO 34,3755  600
31,2340  TO 31,2350  618          32,2665  TO 32,2746  917          33,3341  TO 33,3415  451          34,3756  TO 34,3771 1386
31,2351  TO 31,2376  619          32,2747  TO 32,3025  918          33,3416  TO 33,3454  452          34,3772  TO 34,3773   33
31,2377  TO 31,2436  626          32,3026  TO 32,3075  919          33,3455  TO 33,3475  527          35,2000  TO 35,2033  466

31,2437  TO 31,2443  627          32,3076  TO 32,3101  920          33,3476  TO 33,3537  528          35,2034  TO 35,2114  467
31,2444  TO 31,2473  628          32,3102  TO 32,3144  925          33,3540  TO 33,3607  530          35,2115  TO 35,2176  468
31,2474  TO 31,2554  629          32,3145  TO 32,3223  926          33,3610  TO 33,3660  531          35,2177  TO 35,2205  469
31,2555  TO 31,2636  630          32,3224  TO 32,3300  927          33,3661  TO 33,3671  532          35,2206  TO 35,2250  472

31,2637  TO 31,2720  631          32,3301  TO 32,3354  928          33,3672  TO 33,3735  544          35,2251  TO 35,2330  473
31,2721  TO 31,3001  632          32,3355  TO 32,3432  929          33,3736  TO 33,3775  545          35,2331  TO 35,2412  474
31,3002  TO 31,3061  633          32,3433  TO 32,3463  930                      33,3776   33          35,2413  TO 35,2474  475
31,3062  TO 31,3143  634          32,3464  TO 32,3536  932          34,2000  TO 34,2030  536          35,2475  TO 35,2556  476

31,3144  TO 31,3225  635          32,3537  TO 32,3615  933          34,2031  TO 34,2074  537          35,2557  TO 35,2560  477
31,3226  TO 31,3307  636          32,3616  TO 32,3664  934          34,2075  TO 34,2152  538          35,2561  TO 35,2632  479
31,3310  TO 31,3371  637          32,3665  TO 32,3714  935          34,2153  TO 34,2225  539          35,2633  TO 35,2650  480
31,3372  TO 31,3453  638          32,3715  TO 32,3740  936          34,2226  TO 34,2271  540          35,2651  TO 35,2713  481
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35,2721  TO 35,2773   483         36,3174  TO 36,3245   905         37,3240  TO 37,3267   839         40,3553  TO 40,3620   392
35,2774  TO 35,3026   484         36,3246  TO 36,3257   906         37,3270  TO 37,3327   840         40,3621  TO 40,3635   393
35,3027  TO 35,3073   485         36,3260  TO 36,3300  1252         37,3330  TO 37,3403   841         40,3636  TO 40,3676   640

35,3074  TO 35,3136   486         36,3301  TO 36,3362  1253         37,3404  TO 37,3443   890         40,3677  TO 40,3760   641
35,3137  TO 35,3141   487         36,3363  TO 36,3444  1254         37,3444  TO 37,3515   891         40,3761  TO 40,3774   642
35,3142  TO 35,3157   488         36,3445  TO 36,3471  1255         37,3516  TO 37,3566   892         40,3775  TO 40,3776    34
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35,3331  TO 35,3412   606         36,3747  TO 36,3765  1260         37,3704  TO 37,3705    33         41,2220  TO 41,2263   338

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35,3433  TO 35,3510   644         37,2000  TO 37,2045   456         40,2053  TO 40,2120   327         41,2343  TO 41,2351   340
35,3511  TO 35,3553   645         37,2046  TO 37,2127   457         40,2121  TO 40,2201   328         41,2352  TO 41,2427   342
35,3554  TO 35,3561   671         37,2130  TO 37,2166   458         40,2202  TO 40,2251   329         41,2430  TO 41,2476   343

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THE SUBROUTINES IN THIS PROGRAM ARE AS FOLLOWS:

                    ERASTOTL.041
                    DIOGENES.064
                    MEDUSA  .035
                    MENELAUS.061
                    ULYSSES .029
                    ZEUS    .046


THE ASSEMBLY WAS GOOD AND MANUFACTURABLE. NO LINES WERE CUSSED.

BINARY RECORDS FOR "ARTEMIS.R072" SUCCESSFULLY STORED.
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